

**Academic Quality Assessment and
Development**
Self-Assessment Report
College of Engineering Graduate Programs
University of Massachusetts Dartmouth

Table of Contents

1. Civil and Environmental Engineering MS	2
2. Computer Science MS	190
3. Computer Engineering MS	249
Electrical Engineering MS	
Electrical Engineering PhD	
4. Mechanical Engineering MS	331
5. Physics MS	512



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Spring 2019

Academic Quality Assessment and Development
Self-Assessment Report

Civil and Environmental Engineering MS

Department of Civil and Environmental Engineering

College of Engineering

University of Massachusetts Dartmouth
North Dartmouth, MA



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Spring 2019

Table of Contents

I	Introduction.....	1
I.A.	Introduction to the Department of Civil and Environmental Engineering.....	2
II.	AQAD Core Criteria.....	3
II.A	Alignment of Departmental Activities with Campus Mission and Strategic Priorities.....	5
II.B	Evidence of Rigorous, Relevant, Current, and Coherent Curriculum.....	7
II.C	Faculty Quality and Productivity.....	11
II.D	Facilitation of Student Success.....	24
II.E	Resource Allocation.....	25

APPENDIX A – Curricula Vitae

APPENDIX B – Graduate Handbook

APPENDIX C – Graduate Courses

APPENDIX D – MS Program Graduates and Current Students

APPENDIX E – An example of Comprehensive exam for MSCE’s Course Work Track

Academic Quality Assessment and Development (AQAD) Self Study for the Master of Science (MS) Program at the University of Massachusetts Dartmouth (UMassD)

This self-study is in response to a call from the University of Massachusetts board of trustees to gather information about the Master of Science (MS) program offered through the Civil and Environmental Engineering (CEN) Department at UMass Dartmouth. The goal is to assess program quality in all relevant areas such as curriculum, faculty research activity and productivity and student success. The self-study report is part of a process that also involves a visit by external evaluators and the formation of an action plan.

The CEN Department is part of the College of Engineering, which is comprised of six departments: Bioengineering, Civil and Environmental Engineering, Computer and Information Science, Electrical and Computer Engineering, Mechanical Engineering, and Physics. The college offers eight undergraduate degree programs, five concentrations, eleven graduate programs, and six accelerated BS-MS programs that serve more than 1,400 students. The goals of the college are to prepare graduates to meet 21st-century technological challenges and improve the well-being of society; create new knowledge in engineering, technology, and computer science; and engage and develop students to become leaders in their fields through service and scholarship.

To prepare this portion of the self-study a committee of the CEN faculty was formed that included Dr. Daniel MacDonald (Chairperson), Dr. Mazdak Tootkaboni (Graduate Program Director) and Drs. Walaa Mogawer, Alireza Asadpoure, Amir Taghavy, and Arghavan Louhghalam (all members of the graduate committee). Members of this committee were charged with tasks pertaining to different components of the self-study report in line with AQAD core criteria and related questions as listed in the AQAD Handbook.

About the Civil and Environmental Engineering Master of Science Program and Curriculum

The Master of Science in Civil and Environmental Engineering (MSCE) has been in place for about fifteen years. It assists the region's and the nation's industries, small businesses, and governmental agencies by providing an accessible source of graduate education for its engineering employees. The need for advanced degrees in Civil and Environmental Engineering is both regional and global. The region is experiencing growth pressure and its attendant development, environmental and infrastructure problems. Our MSCE program helps provide Civil Engineers, with skills that are needed to handle such challenges, now and in the future. The educational goals of the program include (a) enhancing the knowledge of practicing civil and environmental engineers and providing them with the skills, experience, and confidence to solve the complex problems of today, as well as problems not yet encountered and (b) providing civil engineering graduates with the necessary basis to embark on a journey of lifelong learning either in professional development or in higher education.

The MSCE program at UMassD offers small classes, close contact with a diverse and international faculty, and easy access to well-supported computational and experimental

research facilities to provide state-of-the-art learning and research experiences. Courses are scheduled to permit either fulltime or part-time study.

Appendix D shows the graduates of the MS program since its inception. There is presently 10 masters students in the program. This data indicates that the CEN department has been able to sustain a relatively stable number of graduate students particularly in recent years. Our graduates often embark on a journey of lifelong learning through either pursuing a PhD degree—here at UMassD through the EAS program or in other institutions—or joining the civil engineering industry (including private sector careers in consulting or construction, as well as public sector careers).

Currently, there are 9 full-time faculty in the department (please see the curricula vitae of CEN faculty in Appendix A). Most of our faculty are active in funded research and thus are in a strong position to support graduate students in conducting world class research in such areas as transportation materials and systems, water and wastewater treatment, hazardous waste decontamination, fate and transport of contaminants, geotechnical engineering, applied and computational mechanics and materials engineering, structural engineering, quantitative engineering sustainability and resilience, hydrology, water resources engineering and ocean engineering (see AQAD criterion 3 for CEN research laboratories). Below is a list of CEN faculty and their fields of interest:

- **Asadpoure, Alireza:** Assistant Professor of Civil and Environmental Engineering (2015), BSc 2003 University of Tehran, MSc 2005 Sharif University of Technology, PhD 2011 Johns Hopkins University. Specializations: optimal design of materials and structures, computational fracture mechanics.
- **Louhghalam, Arghavan:** Assistant Professor of Civil and Environmental Engineering (2016), BSc 2000 Iran University of Science and Technology, MSc 2002 University of Tehran, PhD 2010 Johns Hopkins University. Specializations: Solid and fracture mechanics, structural dynamics and stochastic vibrations, quantitative engineering sustainability.
- **Fennessey, Neil M:** Associate Professor of Civil and Environmental Engineering (1995), BS 1975, BSCE 1983 University of Massachusetts Amherst, SMCE 1986 Massachusetts Institute of Technology, PhD 1994 Tufts University. Specializations: hydrology, water resources engineering.
- **MacDonald, Daniel** (CEN Department Chairperson): Professor of Civil and Environmental Engineering (2003) BSCE 1992 University of New Hampshire, MS 1996 Cornell University, PhD 2002 Massachusetts Institute of Technology/Woods Hole Oceanographic Institute Joint Program. Specializations: Coastal fluid dynamics, stratified turbulence, marine renewable energy, environmental engineering.
- **Miller, Heather J:** Professor of Civil and Environmental Engineering (1994), BS 1984 Northeastern University, ME 1986 University of Virginia, PhD 1994 University of New Hampshire. Specialization: Geotechnical engineering.
- **Mogawer, Walaa S:** Professor of Civil and Environmental Engineering (1989), BSc 1981 Kuwait University, MSc 1984, PhD 1989 University of Rhode Island, Specialization: Transportation engineering.

- **Sengupta, Sukalyan:** Professor of Civil and Environmental Engineering (1994), BS 1985 Calcutta University, MS 1991, PhD 1994 Lehigh University. Specialization: Environmental engineering.
- **Taghavy, Amir:** Assistant Professor of Civil and Environmental Engineering (2015), BS 2003 Amirkabir University, MS 2005 Sharif University of Technology, PhD 2013 Tufts University. Specialization: Geoenvironmental engineering, modeling the fate and transport of emerging contaminants, nanotechnologies for subsurface engineering applications.
- **Tootkaboni, Mazdak** (CEN Graduate Program Director): Associate Professor of Civil and Environmental Engineering (2010), BSc in Civil Engineering 2000 and MSc in Earthquake engineering 2002 University of Tehran, MSc 2007 and PhD 2009 in Structural Mechanics Johns Hopkins University. Specialization: Computational solid and structural mechanics, uncertainty quantification, data analytics, topology optimization, design under uncertainty.

Our MSCE program offers courses in a broad range of civil engineering subspecialties from Geotechnical Engineering to Environmental Engineering and from Water Resources and Ocean Engineering to Structural and Transportation Engineering; see Appendix B for degree requirements and Appendix C for a list of CEN graduate courses. However, to ensure our graduates are provided with a diverse set of skills and are ready to tackle the (often multidisciplinary) civil engineering problems of today and tomorrow, CEN faculty encourage our graduates to take courses across different departments in COE and across different colleges and schools (e.g. College of Arts and Sciences, School of Marine Science and Technology, etc). Courses from outside CEN are accepted for MS credit with approval from the student's advisor and the Graduate Program Director.

Administration and coordination of the diverse activities of the CEN Graduate Program are handled by the Graduate Program Director. The Director oversees the graduate committee and is responsible for, among others, coordination of its activities, keeping track of thesis and project committees and defenses, administration of comprehensive examinations for the course only option (see CEN grad catalog in Appendix B), judgements on academic probations and dismissals, and, in conjunction with the Chair, the allocation of teaching assistant positions.

AQAD Core Criteria

1) Programs shall ensure that their goals and objectives are linked to the campus mission and strategic priorities.

What is the Program's mission and is it clearly aligned with the campus mission and direction? How does the Program's mission relate to curriculum; enrollments; faculty teaching, research/professional/creative activity, and outreach? Is it aligned with the campus strategic priorities?

“UMass Dartmouth distinguishes itself as a vibrant, public research university dedicated to engaged learning and innovative research resulting in personal and lifelong student success. The university serves as an intellectual catalyst for economic, social, and cultural transformation on a global, national, and regional scale.”¹ The five goals of the UMass Dartmouth strategic plan are as follows²:

- *Goal 1: Innovative and High-Impact Research and Academic Programs*
UMass Dartmouth will vigorously contribute to the advancement of knowledge through the development of innovative and high-impact research and academic programs that are integrative, interdisciplinary, and promote critical thinking, problem-solving, and creativity.
- *Goal 2: Integrated Student-Centered Experiences*
The success of undergraduate and graduate students through a transformative educational experience will be UMass Dartmouth's highest priority. To enable students to progress toward achievement of their educational, personal, and career goals, investments will be made in key areas that support student success.
- *Goal 3: An Active and Engaged University Community Focused on Excellence in Research, Scholarship, and Innovation*
UMass Dartmouth will be recognized globally, nationally, and regionally for impactful research, scholarship, and innovation that reflect the expertise of its faculty and staff, the strengths of its programs, and the needs of the region and the Commonwealth. To accomplish this goal, the University will be actively engaged in a well-defined pathway to obtain Carnegie Doctoral Research University (DRU) status.
- *Goal 4: Highly Productive Collaborations, Partnerships, and Community Engagement*
From its inception, UMass Dartmouth has played a catalytic role in the region in economic, social, and cultural development. True to its history and rich legacy, the University will continue to support and expand collaborations that enable a mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity to address critical societal issues and contribute to the public good in areas such as sustainable economic development, education, environment, fishing industry, health care, manufacturing, and transportation.
- *Goal 5: Infrastructure and Processes in Support of Excellence*
A robust physical, technological, and administrative infrastructure that ensures a productive, safe, and positive environment for faculty, students, and staff is essential to the achievement of the strategic goals of UMassDTransform2020.

¹ <https://www.umassd.edu/about/missionandvision/>

² <https://www.umassd.edu/strategicplan/>

In addition, the mission statements of the College of Engineering and the Department are as follows:

College of Engineering Mission Statement: *The College of Engineering strives to serve the needs of the region and the nation by creating and disseminating knowledge through research and teaching and preparing students to excel in their chosen profession and to be contributing citizens in a diverse, changing world.*

Department Mission Statement: *The Civil and Environmental Engineering Department at UMass Dartmouth offers a Bachelor of Science and Master of Science in Civil Engineering. The program provides service to meet the needs of students, industry, government, and society. The program offers excellence, access, and value through a strong commitment to teaching, scholarship, outreach, and professionalism. The program contributes to the economic development of the region by providing a resource of practice-oriented education for local industry and business, by conducting research, and by active involvement in community affairs.*

CEN faculty engaged in the MSCE program strive to provide a graduate education that is well rounded and allows the students to embark on a journey of lifelong learning either in professional development or in higher education. We maintain the highest standard of academic excellence through high standards for admission to the program and graduation. All applicants are screened by CEN Graduate Committee, and the CEN Graduate Program Director (GPD). Further screening, in cases where allocation of COE resources is at stake such as awarding of Teaching Assistantships, is performed by the Department Chair, the Dean of Engineering, and the Associate Vice Chancellor for Graduate Studies, as necessary. A grade point average (GPA) of 2.5 or higher is required for admission although a GPA of 3.0 is preferred. To embrace the multi-disciplinary nature civil and environmental engineering, admission is open to those with BS degrees in other fields provided they demonstrate a firm grasp of most fundamental concepts³. Students that show signs of potential for cutting edge research, such as a unique set of skills (e.g. programming skills or hands on experience in the lab), dedication and derive for graduate study, or distinguished professional accomplishments are considered for admission even if there are some deficiencies in their background. Such cases, however, are individually assessed by the graduate committee and GPD.

All CEN faculty engaged in teaching graduate courses have PhD degrees from leading institutions. They are respected engineers as evidenced by their external grants, publications, and professional service record. They often serve as reviewers for federal and state funding organizations (NSF, DOE, DOT, etc) and prestigious journals and are actively engaged in organizing and chairing conferences. Many of our faculty have served industry and government as consultants and several are exceptional lecturers as evidenced by their annual student evaluations. They strive to create an intimate environment where one-on-one interactions with individual students or small groups are more the norm than an exception.

³ https://www.umassd.edu/media/umassdartmouth/collegeofengineering/cendept/Grad_Handbook_CEN_1-29-18_final.pdf

Teaching in our graduate classrooms is enriched by cutting edge research in the following 5 specialty areas (see AQAD criterion 3). Many of our introductory graduate courses are open to qualified senior undergraduate students as technical electives. This not only allows for enhancing the undergraduate experience in the college of engineering but also creates an environment where our motivated undergrads are inspired to pursue a graduate degree. To further increase the participation of UMassD CEN undergraduates, we offer a 5-Year BS/MS option to our qualified undergraduate students. Upon admission, these students are required to follow one of the three tracks offered by our graduate program (see Appendix B). However, they will be allowed to have 6 credits of upper level (400 or higher) tech-elective (not core-elective) courses count towards both their BS and MS degrees. Finally, many of our faculty engage talented undergraduate students (often in their senior year) in their research program in hopes such an engagement will create the spark to pursue a graduate degree.

Many CEN faculty are engaged in interdisciplinary research and collaborate closely with faculty in other departments across COE (mechanical engineering, bioengineering, electrical engineering, computer science, etc.), other UMassD colleges and schools (College of Arts and Sciences, School of Marine Science and Technology, etc.) as well as other research institutions (WHOI, MIT, Tufts, JHU, UCI, Imperial College, UConn, UMaine, etc.).

Our MSCE program offers small classes, often in the order of 10-15 students for less specialized courses and 8-10 students for the more specialized ones. However, our dual listed courses that often serve as technical electives for CEN senior undergrads, are larger (20+ students).

CEN department maintains an inclusive and diverse atmosphere among both its faculty and its graduate students. Each person, regardless of his/her ethnic, economic or social background or religious is treated with respect and fairness. CEN faculty is diverse in terms of gender, ethnicity and race and come from many different backgrounds. Our graduate student population is also very diverse with students from Middle East, India, Asia, and North America. Roughly 18% of graduates from the program over the last four years are women or students of color and 60% are international students.

Overall, the MSCE program contributes significantly to the campus mission and priorities by providing a high quality, international caliber, advanced training in Civil Engineering to our students, an opportunity for advanced workforce training to the local region, providing a resource for local economic development, and engaging students in cutting edge research.

2) Programs shall ensure that curriculum is relevant, rigorous, current, and coherent.

How does the program determine curricular content?

The CEN MS program determines curricular content primarily through the action of the CEN Curriculum Committee, the CEN Graduate Committee, and the CEN Advisory Board. The Graduate Committee is currently composed of five self-selected members of the faculty, including three Assistant Professors, one Associate Professor, and one Full Professor. Their areas of interest represent a wide spectrum of the department both in terms of seniority and in areas of expertise, including structural, transportation, and environmental subdisciplines. The primary focus of the Graduate Committee with regard to curricula is to ensure that the curricula have offerings in the areas of interest to our diverse student population and local industry; that they are structured in such a way that students are able to complete a degree in a reasonable amount of time while taking courses of most benefit to them; and that the program can offer a coherent program of study of academic excellence. Recent recommendations of the Graduate Committee have included a restructuring of the program to allow for a courses only option, which is capped by a Comprehensive Exam at the conclusion of the student's program.

The CEN Curriculum Committee is currently comprised of three self-selected faculty members (two Full Professors and one Assistant Professor) of the faculty and our Department Technical Associate, who also often teaches courses at the Undergraduate Level, and is a graduate of the CEN MS program. Their primary focus as regards the graduate curricula is to safeguard the academic rigor of the programs and to ensure that they comply with the college and university regulations. The Curriculum Committees make recommendations to the Graduate Committee to ensure that the course offerings meet the highest standards of graduate education in their disciplines. Due to enrollment, many graduate course offerings are cross-listed as Senior Technical Electives, so there is significant overlap between the undergraduate and graduate curricula. In reviewing new course proposals, and developing guidelines for new course, the Curriculum Committee carefully evaluates the distinction between graduate and undergraduate listings of the same course. Typically, graduate sections require additional effort from the student, with, for example, more comprehensive homework assignments, additional reviews of the literature, etc.

All CEN Department committees are strictly recommending bodies. All recommendations from committees must be approved by the CEN faculty at large before any action can be taken.

The department also has an Advisory Board composed of representatives from industry, government and academia, and this board makes recommendations on curriculum content and provides feedback on how well our students are prepared. Current CEN Advisory Board membership is shown in Table 1. With the recent addition of our courses only MS option, we are planning on using the advice of the Advisory Board in the upcoming year to help us identify what types of courses would be particularly valuable for local engineering firms, who may be the most significant driver of enrollment in this new option.

Recommendations made by any of these committees must be approved by a vote of the entire faculty in the department before effecting the curricula.

NAME	TITLE	AFFILIATION
Wayne Bates	Principal Engineer	Tighe and Bond
Rosa Castro-Krawiec, PE	Principal Engineer	JCK Underground
Christian Farland, PE	President	Thompson Farland, Inc.
Joseph Federico, PE	Senior Vice President	BETA Group, Inc
Matthew Gallant	Project Manager	Providence Water
Jack Hamm, PE	Sr. Env. Engineer	Mass DEP
David Hickox	Town Engineer	Town of Dartmouth
Alan Kirschner	Vice President	Brown and Caldwell
Glenn Mauk	Retired	
Jean McCluskey, PE	Principal	Mission-Focused Alliance, LLC
Susan Nilson	Engineer	CLE Engineering, Inc

Table 1: CEN Advisory Board Membership

How does the curriculum relate to the current standards of the discipline?

Curricula for an MS degree in Civil and Environmental Engineering vary widely from one University to another. At many Universities there are no required courses, allowing the student and their advisor to craft a curriculum that is specific to their educational and professional goals. This is fairly common for programs in Civil Engineering, given the wide breadth of subdisciplines. Some programs do require specific core courses, particularly for well-defined tracks of specialization. Given the current size of our program, we do not have defined tracks, and thus allow students flexibility in choosing their courses within the Department offerings. In general, courses must be designated as CEN courses, although courses taken from other departments may be accepted with the approval of the CEN graduate program director. The larger structure of the program requires that the students complete 30 credits, with six thesis credits (for students on the thesis track) or three project credits (for students on the project track) allowed to count towards the overall requirement.

Students in the courses-only track must pass a Qualification Exam at the conclusion of their studies. This test draws on the material from up to five of the classes they have taken in the program and provides a rigorous means of ensuring that the student has developed and retained a robust understanding of the topics covered. Students in the project track, must submit a written project report and publicly present the results of their project. Thesis track students are required to submit a written MS thesis and

satisfactorily complete an oral presentation and defense of the thesis. Please refer to the CEN Graduate Handbook, in Appendix B for more details on the degree requirements.

What internal or external measures of review are employed to ensure that the curriculum is up to date?

The CEN MS program graduated its first students in 2006, and has graduated a total of 40 students over the last 13 years. Over this period the curriculum has been modified as necessary, based on recommendations of the CEN Curriculum and Graduate Committees. Given the small size of our Department, the most significant changes occur in conjunction with the evolving needs of our faculty and their research programs. Particularly, as new faculty are hired, their presence brings an infusion of new and relevant ideas into the Department, which is formalized through the creation of new courses in their respective subdiscipline areas. As research activity is by its nature state of the art, course offerings developed in support of research will typically represent the most cutting edge topics in the field. Recent courses have been added in the areas of coastal processes and environmental fluid dynamics, spanning a wide spectrum flow in porous media to environmental turbulence, as well as structural optimization, finite element analysis, and reliability engineering, in order to support our diverse and growing areas of research activity. Many of these courses are in an early stage of development and have been offered under generic course numbers in recent years as formal course proposals are finalized and approved. This recent expansion of courses has helped to grow the program and also benefit students in other programs as well, given that students in Mechanical Engineering and Marine Science programs, among others, frequently enroll in our course offerings.

In addition to maintaining a curriculum consistent with our research enterprise, we also routinely request input from our Department Advisory Board, to make sure that our course offerings are relevant and effective for students entering private practice and/or governmental careers following graduation. As discussed above, with the addition of our new Courses Only track, we plan significant engagement with the Advisory Board, as well as other friends of the Department in the private and public sector, on this topic over the next several years.

Are the curricular offerings structured in a logical, sequential and coherent manner? Is there an appropriate balance between breadth and depth?

Requirements for the MSCE program are provided in detail in the CEN Graduate Handbook (Appendix B). The needs of students pursuing a MS degree in Civil Engineering are diverse, and highly tied to the subdiscipline in which they desire to achieve specialization. In many cases, Independent Studies are utilized to enable students to further develop a significant focus, in cases where existing offerings may not be sufficient to provide adequate depth for a specific student's professional interests. As such, we do not have a fixed set of required courses which are offered in a structured and sequential manner. Instead, students work closely with their faculty advisors to define a curriculum that suits their specific background and needs, while maintaining the rigor

required for an advanced degree in Engineering. As a small department, we are rarely able to offer sufficient coursework in a single subdiscipline to satisfy a student's complete credit requirements. Thus, a balance between breadth and depth naturally results, but one that is driven by student interest, rather than imposed by program structure. If and when the size of the Department grows in the future, it is possible that a significant number of courses in a single subdiscipline might be available, such that breadth might be sacrificed under the existing guidelines. In the event that this may occur in the future, there may be a need to impose more structure on the MS program in order to ensure both breadth and depth.

Does the curriculum adequately prepare students for further employment or study?

It is clear that the curriculum adequately prepare students for further employment or study. Many students who have graduated from our programs have gone on to successful careers in industry and/or have pursued Ph.D. study at other institutions such as Georgia Tech, Virginia Tech, Iowa State University, and Drexel University, and at least one has gone on to a faculty position at a leading university. Given the relative new development of the program, it is likely that many more will follow. Many of our CEN MS graduates are employed by Massachusetts and Rhode Island companies as well as from companies all over the country. For example, our graduates have been hired as Civil and Environmental Engineers, Energy Analysts, Structural Engineers, and Technical Consultants at organizations such as MassDOT, Simpson Gumpertz & Heger, EnTech Engineering, STV Inc., Fastech Consulting, Parsons Brinkerhoff, General Dynamics Electric Boat, Naval Undersea Warfare Center (NUWC), Cadmus Group, and Meridian Associates, among others.

In what way does the program contribute to the education of students in terms of general knowledge, critical thinking and other essential cognitive skills?

While virtually every course in the program contributes to these educational goals, the most critical contribution to these areas is in the student's capstone experience. The process of completing a dissertation, thesis or project relies almost entirely on the student's development of critical thinking; and the process of deeply researching such open ended activities and exploring numerous solutions leads inevitably to a great increase in the student's general knowledge. In addition, although many students are naturally talented in technical pursuits the importance of both written and oral communication in completing the thesis or project requirements is a critical aspect of student growth. The nature of the Comprehensive Exam, which is required for students in the Course Only option, remains under development, with the first student set to matriculate from that option at the end of 2018. However, the development of the guidelines for this exam are currently being undertaken within a framework of emphasizing critical thinking, and an ability to think broadly across existing course boundaries.

3) Programs shall ensure faculty quality and productivity

Do faculty possess the appropriate background, experience and credentials?

The CEN department has currently nine tenured/tenure track fulltime faculty with expertise that covers all major thrusts in civil engineering, i.e. Coastal Engineering, Environmental Engineering, Geotechnical Engineering, Structural Engineering, Transportation Engineering, and Water Resources. Detailed information about academic background, research profiles and experiences of individual CEN faculty members is provided in Appendix A (Curricula Vitae) and is summarized in Table 2. Recently, three research-oriented tenure track faculty, Dr. Alireza Asadpoure, Dr. Amir Taghavy and Dr. Arghavan Louhghalam, have joined the department to strengthen the Structural, Transportation and Environmental Engineering disciplines of the CEN program. Furthermore, a faculty search is now open for a fourth research-oriented faculty member in Geotechnical Engineering to replace Dr. Miller who recently announced her retirement by the end of academic year 2018-2019.

Many faculty in CEN department (Drs. Asadpoure, Louhghalam, MacDonald, Sengupta and Tootkaboni) have joint or affiliate appointments in other Departments and Schools. They leverage their affiliations to recruit graduate students and define multi-disciplinary research projects.

The following research labs within CEN department further support multi-disciplinary research and graduate program:

- (a) Coastal Engineering and Fluid Mechanics (CEFM) Laboratory: Daniel MacDonald runs the CEFM lab at UMass Dartmouth. Research conducted by the lab focuses on several key areas, including (i) turbulence and mixing in the coastal ocean, (ii) the use of autonomous, and remotely operated vehicles for environmental data collection, and (iii) marine renewable energy. Turbulence and mixing research is conducted primarily through measurements of turbulence and related parameters in the coastal ocean. In particular, the lab has had a specific emphasis on the dynamics of river plumes and their role in coastal transport and mixing. Other recent research involves direct numerical simulation (DNS) modeling of turbulent processes and attempts to develop new parameterizations for the prediction of turbulence in stratified shear environments. The laboratory supports a variety of traditional oceanographic equipment, including high frequency conductivity-temperature-depth (CTD) units, and acoustic doppler current profilers (ADCPs) for measuring the density and velocity structure of coastal water masses, respectively, as well as an Acrobat (SeaSciences) tow body, and a fleet of coastal, GPS enabled, surface drifters. The lab is also home to the UMassD T-REMUS, a specially equipped REMUS (Hydroid) autonomous underwater vehicle (AUV), outfitted with a MicroRider (Rockland Scientific) shear probe package for the direct measurement of ocean turbulence. In addition, the lab operates a DJI Phantom 4 Pro Drone, used to collect aerial images of surface fronts and other related ocean features. Finally, the lab has been active in the marine renewable energy field for over a decade, particularly in the development of small scale, low cost wave energy converters, and has been responsible for several patent applications related to this technology. Currently, the lab is developing a maximal asymmetric drag wave energy converter (MADWEC), designed to serve as a local energy source for a variety of

Name	Rank	Type of Academic Appointment TT, T, NTT	FT or PT	Highest Degree and Field	Institution from which Highest Degree Earned & Year	Years of Experience			Professional Registration/Certification	Level of Activity (high, med, low, none) in:		
						Govt./Industry Practice	Total Faculty	This Institution		Professional Society	Research	Consulting /Summer Work in Industry
Alireza Asadpoure	Ast Prof	TT	FT	Ph.D.			3	3		High ASCE, EMI	High	None
Neil Fennessey	Asc Prof	T	FT	Ph.D.	Tufts 1994	7	25	25		Low ASCE, AGU, AWRA	Low	Low
Arghavan Louhghalam	Ast Prof	TT	FT	Ph.D.	Johns Hopkins 2010	5	2	2		High ASCE, EMI	High	None
Dan MacDonald	Prof	T	FT	Ph.D.	MIT/WHOI Joint Program 2003	4	16	16	MA	High ASCE, AGU, MTS	High	Med
Heather Miller	Prof	T	FT	Ph.D.	U of New Hampshire 1994	4	24	24	MA, NH	High ASCE, TRB, BSCE	Med	Low
Walia Mogawer	Prof	T	FT	Ph.D.	U of Rhode Island 1989	12	30	30	RI	Med. ASCE, AAPT, ISAP, TRB, NEAPUG	High	None
Suku Sengupta	Prof	T	FT	Ph.D.	Lehigh University 1994	3	25	25	MA	Med. ASCE, AEESP, ACS	High	None
Amir Taghavy	Ast Prof	TT	FT	Ph.D.	Tufts University 2013		3	3		High ASCE, EMI	High	None
Mazdak Tootkaboni	Ast Prof	TT	FT	Ph.D.	Johns Hopkins 2009		9	9		High ASCE, EMI	High	None
Jeffrey Beaudry	Tech. Assoc.	NTT	FT	M.S.	University of Massachusetts Dartmouth 2014		5	5			N/A	None

Column 3 Code: TT = Tenure Track T = Tenured NTT = Non Tenure Track

Table 2: CEN faculty details summary.

applications in the open ocean, including sensor networks, AUV charging and communication systems, and aquaculture infrastructure, among others

- (b) The Computational Solid and Structural Mechanics (CS2M) laboratory: The core CEN faculty members in the CS2M are Drs. Asadpoure, Louhghalam and Tootkaboni. The general focus of the lab is on development of computational and predictive models to study the behavior of solids and structures. The main research topics are (i) developing schemes that combine recent advances in stochastic modeling (e.g. stochastic PDE solving techniques) and applied statistics with the existing methods in computational mechanics; (ii) optimization under uncertainty for complex systems and materials, more specifically development of novel topology optimization techniques to achieve robust/reliable device/component/system optimal design considering a wide range of constraints in their manufacturing, vibration, stability and/or multiphysical properties; (iii) developing mechanics-based predictive tools to assess sustainability and resilience of civil infrastructure, particularly using techniques of data analytics and applied statistics to quantify the environmental impact of civil infrastructures and identify the key contributing factors to this footprint. The research activities within CS2M usually demand significantly large computational resources, which are available to CS2M members through the following resources
- a. HPE system: This system, purchased through Dr. Louhghalam's and Dr. Asadpoure's startup, is mainly used for large-scale solid mechanics models. The cluster comprises of 304 processor-cores (Intel Xeon E5), 3.3 TB ECC memory, 6 Nvidia M6000 GPUs equipped with 3072 parallel-processing cores and 12 GB GDDR5 with 288 GB/s bandwidth) that can perform a single-precision computation at 7 Teraflops and 102 TBs of storage.
 - b. CSCVR system: This system is used for small/medium-scale solid mechanics models as well as training of large-scale predictive models. A portion of the system has been purchased via a funding, for which Dr. Tootkaboni is a co-PI. The Center for Scientific Computing and Visualization Research (CSCVR) provides multiple shared clusters to their members including CS2M members. The clusters consist of about 1300 CPU-cores, 20 Nvidia V100 GPUs (the latest GPU available at the time of this report with machine learning capabilities), 132TB storage, and 3TB of memory.
 - c. MGHPCC system: CS2M members typically use this system for a large number of small/medium computational tasks. The Massachusetts Green High-Performance Computing Cluster (MGHPCC) is located in Holyoke MA and provides computing to the five University of Massachusetts Campuses. MGHPCC consists of 14,376 cores (Intel and AMD), 660TBs of high-performance EMC Isilon X series storage and 513TBs of Farline storage.

The core faculty members actively train and supervise the graduate students in CS2M on using the above-mentioned high performance computing systems. These trainings include teaching basic knowledge of Linux and scripting as well

as system specific job schedulers required to automate computational task submission to each of these systems.

- (c) Highway Sustainability Research Center (HSRC): Dr. Mogawer directs the HSRC in CEN department. The HSRC serves as the center for evaluation, implementation, and development of new technologies in Hot Mix Asphalt materials that will assist in sustaining the road infrastructure of the Commonwealth of Massachusetts and the entire Northeast. The research activities of the HSRC are guided by the critical needs of the roadway industry, including preservation of the roadway system, critical decisions in pavement activities (pavement management), pavement health monitoring, environmental impacts of materials and construction, recycling, and sustainability and cost effectiveness. In addition, the center also performs research to develop novel methods/products to sustain the current network of roadways and to incorporate recycled materials and environmentally friendly technologies into the roadway to reduce construction costs and expand the roadway service life.
- (d) Geotechnical engineering lab: Dr. Heather Miller directs the geotechnical research at UMass Dartmouth. She has been involved in a wide range of research projects in the past, including measuring fundamental soil properties in the lab and in situ, evaluating site improvement and soil stabilization technologies, and use of recycled materials in construction projects. Since 2005, her research focus has been on freeze-thaw processes in soils, and seasonal load restriction (SLR) protocols. Dr. Miller and her student research assistants are helping DOTs throughout the country to address these challenges, by installing and monitoring instruments below the ground, and by developing models to predict freeze-thaw processes beneath roadways. They are also providing insight regarding how those freeze-thaw interactions are likely to shift as a result of global warming. Most recently, Dr. Miller is working on a project funded by NASA, in which remote sensing (satellite) observations are being used to inform researchers about the freeze-thaw state of the ground surface over wide geographic regions with diverse landscapes.
- (e) Environmental engineering lab: Dr. Taghavy and his computational research group focus on environmental hydrogeology, colloid science, and the overlap between these two fields at nano-scale encompassing the theoretical aspects of nanoparticle filtration in porous media and the applications and implications of engineered nanoparticles (ENPs) in subsurface engineering problems including environmental cleanup practices and enhanced oil recovery. Dr. Taghavy and his graduate students work on refining the existing colloid transport frameworks, and ultimately improving the mechanistic understanding of processes that control particle-collector surface interactions and deposition kinetics for different ENP classes (e.g., silica, graphene oxide, and metallic ENPs). On the other hand, Dr. Sengupta directs the experimental environmental research in areas of sustainable energy, macronutrients, and resource recovery & source reduction, focusing on problems including nitrogen and phosphorus recovery from greywater, silver recovery from laundry washwater, characterization of the intraparticle diffusivity and functional group penetration thickness of electrospun poly(acrylonitrile) and poly(caprolactone) ion exchange fibers, removal & recovery of phosphorus from wastewater, evaluation of bioretention systems for non-point nitrogen source control, and process stability in anaerobic digestion. Since year 2010, Dr.

Sengupta has served as the primary investigator on multiple externally funded projects sponsored by the Chemical, Biological, Environmental, and Transport Systems (CBET) program of National Science Foundation, and US-Israel Binational Agricultural Research & Development (BARD).

Are faculty current in relation to the knowledge base and content of the discipline and curricular offerings?

CEN Faculty hold a cutting-edge knowledge of contemporary issues and advances in their respective disciplines and lead nationally/internationally recognized research at the forefront of their area of specialization. This is most evident by the research outcomes and productivity of the faculty, i.e., by the amount of research grant expenditures by CEN faculty from 2014 to 2018, which exceeds \$4.1M (see Appendix A for CEN faculty CVs, and Table 3 for tabulated research expenditures), as well as by the number of peer-reviewed research publications as listed below for 2015-2018.

2018/19

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A. Louhghalam, **M. Tootkaboni****, T. Igusa, and F.J. Ulm, Closed-Form Solution of Road Roughness-Induced Vehicle Energy Dissipation. *Journal of Applied Mechanics*, Vol. 86, No. 1, 011003, (2019).

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F. Ponzoni, F. Giustozzi, **A. Louhghalam**, J. Gregory, and R. Karchin, Sensitivity Analysis of a Deflection-induced Pavement-Vehicle Interaction model, *Road Materials and Pavement Design*, 1-19, 2018.

Kraatz, Simon, Jacobs, Jennifer and **Miller, Heather**. (2018). *Spatial and temporal freeze-thaw variations in Alaskan roads*. *Cold Regions Science and Technology*. Volume 157, Pages 149-162 (in press). Doi.org/10.1016/j.coldregions.2018.10.006.

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M. Botshekan*, **M. Tootkaboni****, and **A. Louhghalam**, Global Sensitivity of Roughness-Induced Fuel Consumption to Road Surface Parameters and Car Dynamic Characteristics. Accepted for publication in *Journal of Transportation Research Record* (2019).

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Force Microscope ” Transportation Research Record (TRR): Journal of the Transportation Research Board, No. 2632, Transportation Research Board, Washington, D.C., 2017, pg. 99-109. <http://dx.doi.org/10.3141/2632-11>

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Fiscal Year	Research Expenditures
FY 2014	\$534,942
FY 2015	\$598,313
FY 2016	\$805,827
FY 2017	\$1,344,317
FY 2018	\$867,848

Table 3: Civil and Environmental Engineering Research Expenditures, FY 2014-2018

The CEN faculty members are active in attending, contributing to and organizing professional symposia and research conferences. These include regional and national conferences in various disciplines of Civil and Environmental Engineering such as the American Society of Civil Engineers (ASCE) Engineering Mechanics Institute (EMI), Ocean Sciences meeting, ASCE Environmental Water Resources Institute (EWRI), American Chemical Society (ACS), American Geophysical Union (AGU), and Transportation Research Board (TRB) conferences. The faculty are also involved in many major professional societies including, ACS (American Chemical Society), Marine Technology Society and American Water Resources Association. This sustained level of conference attendance, peer-reviewed publications and active affiliation with professional societies ensure that faculty are current in relation to their knowledge base. In addition, the tenured faculty partake of sabbatical leave opportunities to enhance their professional development.

Are the Program expectations for faculty involvement in teaching, research/professional/creative activity, and public service/academic outreach activities appropriate, and how are these expectations met? Are these expectations consistent with program policies regarding teaching assignments, merit allocations, and other aspects of faculty roles and rewards?

The program expectations for faculty involvement in teaching, research, professional activities, etc. are shown in Table 4, and are appropriate and consistent with program policies regarding teaching assignments. As previously mentioned, three research-oriented faculty members were hired in recent years, and an additional faculty member is expected to join CEN department in the Fall of 2019. These new hires were granted a teaching load reduction to facilitate the establishment of their research programs, as will be the case for future new hires. In addition, faculty with funded research might be granted release to provide the time needed to establish their research programs on a case by case basis. The hiring of new faculty also provides an opportunity for the faculty to lend their professional expertise to the regional industries, as evidenced by a long list of names of companies and governmental agencies that have received technical advice from the CEN faculty (see Appendix A for more detail). Furthermore, consulting provided by the faculty is beneficial to both the industry and the faculty since it boosts their professional development and growth.

Faculty responsibilities related to graduate program include advising graduate students for their thesis or project report, writing proposals to secure research funding from internal sources and external funding agencies, publishing in peer reviewed conference proceedings and journals or writing technical reports, etc. Faculty annual review is currently performed by six tenured faculty including the department chairperson through a process specified in contractual agreement, that is consistent with graduate program policies.

In what way does the Program foster professional development and growth of faculty?

The Program fosters professional development and growth of faculty by encouraging faculty to develop research ideas, write proposals to secure research funding and develop

advanced research programs. To this end, new faculty are given a reduced teaching load (on the average a reduced load is one course per semester) during their first two years so that they have time for grant writing, publications, and other research activities. In addition, they are also provided with graduate student support to facilitate the advancement of their research programs. These activities not only foster faculty growth but also are instrumental in further development of the graduate program.

All faculty in the program are given professional development funds mandated by contract and used at their discretion. The funds are mainly used to support travel to professional conferences and meetings or costs associated with publishing papers. Sabbatical leaves are available for faculty professional and research developments. Department and College research indirect funds have also been available to support faculty development and research initiatives.

Furthermore, many CEN faculty have been able to leverage other university assets to expand their research programs. For instance, Dr. Mogawer and Dr. MacDonald use Center for Innovation and Entrepreneurship (CIE) and School of Marine Science and Technology (SMAST) resources to advance their research, respectively. Faculty in the CS2M (Drs. Asadpoure, Louhghalam and Tootkaboni) also utilize the facilities and supports provided by CSCVR and MGHPCC as mentioned above.

In what way does the Program faculty lend its professional expertise – as expressed through teaching and research, scholarly and creative activity – to off-campus constituencies?

Regional industries, including Boston Engineering Corporation, Littoral Power Systems, Pike Industries, Palmer Paving Corporation, P.J. Keating, and J.H. Lynch,, have supported several civil and environmental engineering graduate students to solve industrial problems in the area of renewable energy (i.e., conventional hydropower and marine renewable energy) research and pavement and transportation engineering. These include students under the supervision of Dr. MacDonald and Dr. Mogawer. In addition, the Center for Innovation and Entrepreneurship (CIE), formerly Advanced Technology and Manufacturing Center, which serves as a University operated incubator, provides more opportunities for faculty interaction with industry and government.

4) Programs shall ensure teaching/learning environments that facilitate student success.

To what extent does the program have articulated learning outcomes (content and skills) for students? By what means are these outcomes measured? Are they achieved by most students?

The educational goals of our MSCE program include⁴:

⁴ <https://www.umassd.edu/engineering/cen/graduate/>

- enhancing the knowledge of practicing civil and environmental engineers and providing them with the skills, experience, and confidence to solve the complex problems of today, as well as problems not yet encountered
- providing civil engineering graduates with the necessary basis to embark on a journey of lifelong learning either in professional development or in higher education.

The course-specific learning outcomes are handed out to students taking the course at the beginning of the semester in form of the course syllabus document. Further information is contained on the Graduate Courses page of the CEN website⁵, UMass Dartmouth Graduate Catalog as well as the CEN Department Graduate Student Handbook (Appendix B).

The following are some of the methods used to measure learning outcomes:

- a) Short tests and hour-long exams are given several times during the course of the semester. These exams are meant to evaluate the achievement of the learning outcomes of individual courses.

⁵ Go to <https://www.umassd.edu/engineering/cen/graduate/courses/> and click on the link below Department of Civil and Environmental Engineering

Faculty Member (name)	FT or PT*	Classes Taught (Course No./Credit Hrs.) Term and Year	Total Activity Distribution		
			Teaching	Research/Scholarly Activity	Other
Alireza Asadpoure	FT	CEN 307 3 cr Fall 2018 CEN 430-02 3 cr Spring 2019 CEN 430-03/505 (Dual Listed) 3 cr Spring 2019	30%	60%	10%
Neil Fennessey	FT	CEN 303 3 cr Fall 2018 CEN 452 1 cr Fall 2018 CEN 325 3 cr Spring 2019 CEN 313-01 1 cr Spring 2019 CEN 313-02 1 cr Spring 2019	70 %	20%	10 %
Arghavan Loughghalam	FT	MNE 490/ MNE 591 3 cr Fall 2019 CEN 202 3 cr Spring 2019	20%	70%	10%
Dan MacDonald	FT	CEN 491 2cr Fall 2018 CEN 491 2cr Spring 2019	25%	45%	30%
Heather Miller	FT	CEN 305 3 cr Fall 2018 CEN 323 3 cr Spring 2019	60%	30%	10 %
Walaa Mogawer	FT	CEN 209 3 cr Fall 2018 CEN 484/584 (Dual Listed) 3 cr Spring 2019	40%	50%	10 %
Suku Sengupta	FT	CEN 411 + 573 (Dual Listed) 3 cr Fall 2018 CEN 430 + 514 (Dual Listed) 3 cr Fall 2018 CEN 412 3 cr Spring 2019 CEN 430 + 564 (Dual Listed) 3 cr Spring 2019	50 %	35 %	15 %
Amir Taghavy	FT	CEN 428/504 3cr Fall 2018 EGR 111 3 cr Fall 2018 CEN 304 3 cr Spring 2019 CEN 430 + 530 (Dual Listed) 3 cr Spring 2019	75%	15%	10%
Mazdak Tootkaboni	FT	CEN 306 3 cr Fall 2018 CEN 408 3 cr Spring 2019	40%	45%	15%
Jeffrey Beaudry	FT	EGR 241 3 cr Fall 2018 EGR 303 3 cr Fall 2018 EGR 241 3 cr Spring 2019 CEN 334 3 cr Spring 2019	100%		
Leo Sirois	PT	CEN 161-01 1 cr Fall 2018 CEN 161-0L 1 cr (1 sections) Fall 2018	100 %		

* FT = Full Time Faculty PT = Part Time Faculty

Table 4: CEN faculty workload summary.

- b) Students enrolled in the MS thesis or project option are required to take Graduate Thesis (CEN 590) or Graduate Project (CEN 592), respectively. Students are required to have an oral presentation (an hour-long seminar open to the entire university community) on the thesis or project topic. In addition to the written thesis or project report, the approval of the thesis/project committee (see Appendix B for more details) on a satisfactory oral presentation and defense of the thesis or project is required. The thesis or project committee consists of three faculty members and reviews the student's progress towards the degree and approves the thesis or project.
- c) Students enrolled in the MS course-only option must pass a comprehensive exam that assesses their knowledge on core graduate courses in several civil and environmental engineering disciplines. For more details on the comprehensive exam refer to the CEN department graduate handbook in Appendix B and for an example of comprehensive exam see Appendix E.
- d) All students in CEN MSCE program are encouraged to publish results of their research in peer-reviewed journals and conference proceedings. They can take advantage of resources such as services provided by the Writing and Reading Center. Through travel support, CEN graduate students are also encouraged to present their research outcomes in technical conferences and meetings.

How is assessment of student learning outcomes used in reviewing or evaluating program curriculum and faculty?

Faculty teaching a graduate course can recommend modifications to the current curriculum to graduate committee. This is typically done every few (2-3) years, if necessary, using data gathered from student evaluations (which often asks questions about the achievement of learning outcomes) and faculty experience. Based on gathered data, and faculty's input graduate committee then provides recommendations (through the chair) to the dean's office. These recommendations could include addition of new or removal of outdated courses from the curriculum. Furthermore, the alumni surveys will be used to assess to what extent students' expectations have been met by the curriculum from the perspective of achieving program's educational goals (see above). Course assignments and assessments are also used by faculty to assess student learning outcomes and their alignment with what is announced as the course learning outcomes and subsequently modify course syllabus and contents, if necessary.

In what ways does the program evaluate student success following graduation and the program's contribution to that success?

One of the ways through which we evaluate student success is by following their career path after graduation. Most of our recent graduates have successfully joined public and private sectors in civil and environmental engineering. For example, our graduates have been hired as Civil and Environmental Engineers, Energy Analysts, Structural Engineers, and Technical Consultants at organizations such as MassDOT, Parsons Brinkerhoff, General Dynamics Electric Boat, Naval Undersea Warfare Center (NUWC), Cadmus Group, and Meridian Associates, Simpson Gumpertz & Heger, EnTech Engineering, STV Inc., Fastech Consulting, among others. Some students have also continued their higher education as Ph.D. students in different institutions across the country, including Georgia Tech, Virginia Tech, Iowa State University, and Drexel University, and at least one has gone on to a faculty position at a leading university.

Many of our former graduate students will stay in touch with their advisors and mentors and share their feedback and experience with them. This feedback, especially the ones from graduates who now hold leadership positions in industry and government, help the MSCE program assess and improve its quality and also adapt itself to the current needs of the civil engineering industry.

What is the role of the core faculty in teaching lower division, upper division and graduate courses? What is the rationale for these assignments?

All faculty are usually expected to teach lower/upper division courses in their discipline (i.e. structural, geotechnical, transportation, water resources and environmental engineering) and graduate course in their interest areas. According to the faculty contract, the nominal maximum teaching load at the University is three courses per semester. However, typical loads within the College of Engineering are two courses per semester, in recognition of the fact that most College of Engineering faculty are involved more substantially in research than may be typical in other Colleges. The teaching assignments are ultimately at the discretion of the department chair, and may be reduced further to a 2-1 or 1-1 load for faculty with significant research activity or other obligations. However, the chair decision is usually based on students' needs, available resources and faculty preferences and interests. The teaching assignments are prepared by the department chairperson almost one year in advance.

5) Programs shall ensure that resources are used wisely.

What process does the Program use to allocate resources?

Departmental financial resources are derived primarily from student fees, research indirect cost return, and income from donor gifts to the Department. Use of these fees is determined by the Chair in close consultation with both the faculty and the Dean. In general, the majority of funds derived from student fees are used to support the undergraduate teaching laboratories, maintain departmental operations, hire part time lecturers (as needed to fill gaps in the curriculum due to faculty sabbaticals or gaps in the

faculty knowledge base), and purchase equipment (e.g. computers for the CEN computer lab). Additional funds are provided by the Dean's office on an as needed basis for TAs and course graders. The Department Chair, upon the recommendation of the Graduate Program Director and the graduate committee, assigns TA's where help is needed to support courses. TA's, with faculty supervision, are typically assigned to laboratories.

Research indirect cost (IC) return funds (10% of IC is returned to the Department) are generally used to support the Department research enterprise through a variety of mechanisms, including support of graduate students, limited renovations or equipment purchases, and travel. The Department benefits from one substantial gift fund which is designated for equipment purchases. Funds generated in this account have been used recently for major renovations to undergraduate laboratories, in collaboration with the Dean's office. A larger portion (15%) of the IC comes back to principal investigators, who may use the funds to further their research programs by hiring additional RA's, purchasing needed research equipment not part of direct grant funding, or providing summer support for preparation of proposals and other non-grant related tasks.

In what ways does the Program maximize the use of its human resources?

Human resources within the Department consist of nine full time faculty members, one administrative assistant, and one technical associate. The Chair balances faculty teaching loads to maximize both the educational experience and the growth of the Department research enterprise. See Table 4 for a breakdown of faculty workload. The CEN Technical Associate is used in a variety of capacities, including maintaining the teaching laboratories, teaching one to two classes per semester, and assisting faculty with research and proposals. Faculty are assigned courses according to their areas of expertise. TA's are assigned mainly to assist faculty in undergraduate labs.

In what ways does the Program maximize the use of material resources such as space, equipment, operating funds, etc.?

As with most universities, research and laboratory space are scarce and valuable resources that must be managed in the presence of many competing needs. The department, through an adhoc space committee, periodically assesses space utilization and makes recommendations to the department. Presently, the most dramatic space needs in the Department include the designation of graduate student office space, and a realignment of the main CEN office to include a much needed common space for meetings, including graduate student committee meetings and faculty meetings, as well as a focused location for undergraduate project teams to meet with faculty advisors and outside sponsors. Due to severe space limitations on campus, current CEN research facilities span the SouthCoast region of Massachusetts, with Dr. MacDonald's Coastal Engineering and Fluid Mechanics Laboratory located at the University's School for Marine Science and Technology (SMAST) campus in New Bedford, while Dr. Mogawer's Highway Sustainability Research Center is located at the University's Center for Entrepreneurship and Innovation (CIE) in Fall River. Despite the geographic distribution, the research facilities available to graduate students in the MSCE program are high level, and state of the art. A wide variety of environmental and oceanographic

instrumentation is available for student research in the Coastal Engineering and Fluid Mechanics Laboratory and other laboratories at SMAST. The Highway Sustainability Research Center houses state of the art asphalt testing equipment and is recognized as one of the leading facilities of its kind in the Northeast, if not the nation as a whole. Students focused on numerical and computational research have access to the state of the art facilities including (i) an in-house HPC system comprising of 304 processor-cores (Intel Xeon E5), 3.3 TB ECC memory, 6 Nvidia M6000 GPUs equipped with 3072 parallel-processing cores and 12 GB GDDR5 with 288 GB/s bandwidth, (ii) the CSCVR system (see CSCVR webpage⁶ for details), and (iii) the MGHPCC system (see MGHPCC webpage⁷ for details).

Several CEN faculty offices are housed in an area of the Textiles building on main campus that was recently renovated for the BioEngineering Department. As the BioEngineering Department grows, the ability to maintain those offices for CEN faculty may be in question. An additional CEN faculty member is housed in a temporary trailer on the Northwest corner of the campus. Over the long term, space is a crucial issue for the growth of the Department, in order to allow consolidation of Department faculty and resources, as well as quality research space.

⁶ <http://cscvr1.umassd.edu/>

⁷ <https://www.mghpcc.org/>

Appendix A

Curricula Vitae

Amir Taghavy

35 Carol Dr. Dedham, MA 02026 • Cell: 617-913-6746 • Email: ataghavy@umassd.edu • [Google Scholar](#)

Education

2007-2013	Environmental Engineering	Ph.D.	Tufts University, MA
2003-2005	Environmental Engineering	M.Sc.	Sharif University, Iran
1999-2003	Civil Engineering	B.Sc.	Amirkabir University, Iran

Professional Experience

2015-present	Assistant Professor	CEE Dept.	U. Mass. Dartmouth
2014-2015	Postdoctoral Research Fellow	CPE Dept.	U. Texas Austin
2007-2013	Graduate Research Assistant	IMPES Lab	Tufts University
2009-2010	Lab Supervisor	CAD Lab	Tufts University

Areas of Research Specialization

- Computational Hydrogeology
- Colloid Filtration, Nanocolloids
- Contaminants of Emerging Concern (CECs) in the Subsurface
- Nanotechnology Applications in Subsurface Engineering
- Numerical Methods
- Environmental Statistics

Professional Affiliations

- Associate Member, American Society of Civil Engineers (ASCE)
- Member, ASCE Environmental Water Resources Institute (EWRI)
 - o Elected Secretary of EWRI Groundwater Quality Committee
- Member, American Geophysical Union (AGU)
- Member, Association of Environmental Engineering and Science Professors (AEESP)

Teaching Experience *Rated Excellent in Teaching Effectiveness and Advisement by Faculty Evaluation Committee and Department Chair (academic years 2015-2018)*

Course ID	Subject	Term	Evals: Instructor; overall
CEN-428/504	<i>Probability & Statistics</i>	F 2018	<i>in progress</i>
EGR-111	<i>Intro to Engg & Computing</i>	F 2018	<i>in progress</i>
CEN-430/530	<i>Subsurface Remediation</i>	S 2018	4.73/5; 4.60/5
CEN-304	<i>Intro to Environmental Engineering</i>	S 2018	4.74/5; 4.73/5
CEN-428/504	<i>Probability & Statistics</i>	F 2017	4.82/5; 4.72/5
CEN-304	<i>Intro to Environmental Engineering</i>	S 2017	4.51/5; 4.46/5
CEN-428/504	<i>Probability & Statistics</i>	F 2016	4.56/5; 4.45/5
CEN-304	<i>Intro to Environmental Engineering</i>	S 2016	4.52/5; 4.26/5
CEN-428/504	<i>Probability & Statistics</i>	F 2015	4.67/5; 4.21/5

Journal Publications

1. **Taghavy, A.**; Abriola, L.M., 2018. Modeling Reactive Transport of Polydisperse Nanoparticles: Assessment of the Representative Particle Approach, *Environmental Science: Nano*, 5, 2293-2303.
2. **Taghavy, A.**; Kim, I.; Huh, C.; DiCarlo, D.A., 2018. A Two-Site Filtration Model for Silica Nano-Aggregate Mobility in Porous Media under High Salinity Conditions, *J. Nanoparticle Research*, 20 (6), 150.
3. **Taghavy, A.**; Pennell, K.D.; Abriola, L.M., 2015. Modeling coupled nanoparticle aggregation and transport in porous media: A Lagrangian approach, *Journal of Contaminant Hydrology*, 172, 48-60.
4. **Taghavy, A.**; Mittelman, A.; Wang, Y.G.; Pennell, K.D.; Abriola, L.M., 2013. Mathematical modeling of the transport and dissolution of citrate-stabilized silver nanoparticles in porous media. *Environmental Science & Technology*, 47, 8499-8507.

5. Mittelman, A.; **Taghavy, A.**; Wang, Y.G.; Abriola, L.M.; Pennell, K.D., 2013. Effects of Dissolved Oxygen on Silver Nanoparticle Mobility and Dissolution Kinetics in Water-Saturated Quartz Sand. *Journal of Nanoparticle Research*, 15, 1765.
6. **Taghavy, A.**; Costanza, J.; Pennell, K.D.; Abriola, L.M., 2010. Effectiveness of nano-scale zero-valent iron treatment of PCE-DNAPL source zone. *Journal of Contaminant Hydrology*, 118, 128-142.
7. Kim, I.; **Taghavy, A.**; DiCarlo, D.A.; Huh, C., Aggregation of silica nanoparticle mobility under high-salinity conditions, 2015. *J. of Petrol. Sci. Engin.* 133, 376-383.
8. **Taghavy, A.**; Kim, I.; Huh, C.; DiCarlo, D.A., Nanoparticle-stabilized CO₂-in-brine foams for improved volumetric sweep in CO₂-flooding applications, 2018 – *submitted to Transport In Porous Media*.

Selected Conference Proceedings and Presentations

1. Rahman, S.A.B., **Taghavy A.**, Modeling the transport and retention of elemental copper nanoparticles (nCu0) in saturated porous media in presence of humic acid, ASCE EWRI World Environmental & Water Resources Congress, Minneapolis, MN, June 3-7, 2018.
2. Rahman, S.A.B., **Taghavy A.**, A Multi-Site Filtration Model for the Transport of Elemental Copper Nanoparticle (nCu0) in the Presence of Humic Acid (HA) in Water-Saturated Porous Media, The American Geophysical Union Fall Meeting, December 11-15, 2017, New Orleans, LA. H11F-1265.
3. **Taghavy A.**, Kim I., Huh C., and DiCarlo D.A., Nanoparticle-stabilized CO₂-in-water foam: improved CO₂ flood conformance, ASCE EWRI World Environmental & Water Resources Congress, Sacramento, CA, May 21-25, 2017.
4. **Taghavy A.**, Kim I., Huh C., and DiCarlo D.A., Modeling the retention and transport of Silica nano-aggregates in porous media under high salinity conditions, ASCE EWRI World Environmental & Water Resources Congress, West Palm Beach, FL, May 22-26, 2016.
5. Worthen, A.J.; **Taghavy, A.**; Aroonsri, A.; Kim, I.; Johnston, K.P.; Huh, C.; Bryant, S.L.; DiCarlo, D.A., Multi-Scale Evaluation of Nanoparticle-Stabilized CO₂-in-Water Foams: From the Benchtop to the Field, SPE Annual Technical Conference and Exhibition, SPE-175065-MS.
6. **Taghavy, A.**; Prigiobbe, V.; Aroonsri, A.; Huh, C.; Bryant S.L. Mathematical modeling of field-scale oil displacement by nanoparticle-Stabilized CO₂-in-brine foams. Nanoparticles for Subsurface Engineering. May 6th 2014. University of Texas, Austin TX.
7. **Taghavy, A.**; Abriola, L.M. Size distribution effects on the fate and transport of nanoparticles in porous media. The American Geophysical Union Fall Meeting, December 9-13, 2013, San Francisco, CA. H31J-4.
8. **Taghavy, A.**; Pennell, K.D.; Abriola, L.M. Modeling the influence of aggregation on nanoparticle transport and retention in porous media. The American Geophysical Union Fall Meeting, December 3-7, 2012, San Francisco, CA. H13E-1387.
9. **Taghavy, A.**; Wang, Y.; Mittelman, A.; Becker, M.D.; Pennell, K.D.; Abriola, L.M. Modeling the simultaneous transport of silver nanoparticles and dissolved silver ions in water-saturated sand columns. The American Geophysical Union Fall Meeting, December 5-9, 2011, San Francisco, CA. H53B-1398.
10. Wang, Y.; **Taghavy, A.**; Mittelman, A.; Abriola, L.M.; Pennell, K.D. Dissolution of retained silver nanoparticles in water-saturated porous media. Society for Environmental Chemistry and Toxicology North America 32nd Annual Meeting. November 14-17, 2011. Boston, MA.
11. **Taghavy, A.**; Costanza, J.; Pennell, K.D.; Abriola, L.M. Simulating the reactive transport of organic solutes and zero valent iron nano particles in 1-D column experiments. The American Geophysical Union Fall Meeting, December 14-18, 2009. San Francisco, CA. H43B-1018.
12. **Taghavy A.**; Ataie-Ashtiani B. Influence of hysteresis in modeling LNAPL migration through non-homogeneous binary porous media. International Conference on Ground water for Sustainable Development, Jawaharlal Nehru University, February 1-4, 2006. New Delhi, India.

Grant Applications

Submitted/Pending

- UNS: Collaborative Research: Evaluation of the Influence of Particle Size Distribution on Nanoparticle Transport in Natural Systems, **Amir Taghavy** (PI), Pennell K.D. (Brown U.), National Science Foundation, \$414,000 (\$236,000, UMD), *pending*.
- A Multi-Scale Framework for Stochastic Characterization of the Mobility of Nanocolloids in Saturated Porous Media, **Taghavy, A.** (PI); and Tootkaboni, M. (UMD), National Science Foundation, \$330,000, Status: *Declined, Jul. 2018*.
- Collaborative Research: Characterization of the Interaction Dynamics of Emulsified Zero-Valent-Iron Nanoparticles with Entrapped DNAPL in Water-Wet Porous Media, **Taghavy, A.** (PI); and Kim, I. (WNEU),

National Science Foundation, \$180,000 (UMD), Status: *Declined Jul. 2018*.

- Collaborative Research: Evaluation of the Influence of Particle Size Distribution on Nanoparticle Transport in Natural Systems, Abriola L.M. (Tufts U.), **Amir Taghavy** (PI), Pennell K.D. (Tufts U.), National Science Foundation, \$350,000, Status: *declined*, rating: competitive.
- Developing an Optimization Scheme for Maximizing Foam-Induced Improvement of Volumetric Sweep of CO₂ for Enhanced Oil Recovery, **Taghavy, A.**; Asadpoure, A. (UMD), UMass Multi-disciplinary Seed Funding Program, \$33,500, Status: *declined*.

In preparation

- Collaborative Research: Effect of Pore-Scale Distribution of Flow Velocity on Filter-Scale Colloid Mobility in Porous Media, **Taghavy, A.** (PI); Parsa, S. (Harvard U); Weitz, D. (Harvard U), National Science Foundation (PD 18 – 1443), submission window: (Dec. 2018).
- A Multi-Scale Framework for Stochastic Characterization of the Mobility of Nanocolloids in Saturated Porous Media, **Taghavy, A.** (PI); and Tootkaboni, M. (UMD), National Science Foundation, \$330,000, (Resubmittal – Dec. 2018).
- Collaborative Research: H₂-gas production by anaerobic corrosion of nano-ZVI: incipit kinetics and effects on hydraulic properties of porous media, **Taghavy, A.**; Co-PI: TBD, National Science Foundation (PD 18-1179), (no deadline).

Peer-Review Service

- Environmental Science and Technology (ACS)
- Desalination (Elsevier)
- SPE Journal (OnePetro)
- Transport in Porous Media (Springer)
- International J. Heat & Mass Transfer (Elsevier)
- Water, Air & Soil Pollution (Springer)

Research Experience *Rated Very Good / Excellent in Scholar Activities & Publications by Faculty Evaluation Committee and Department Chair (academic years 2015-2018)*

2015-present	<i>Department of Civil & Environmental Engineering</i> U. Mass. Dartmouth
	- Supervised the research work of three graduate students and an undergraduate honors thesis student, and served on the dissertation committee of several MS and PhD students - Submitted several proposals to the CBET Division of the National Science Foundation - Serving as the secretary to the Groundwater Quality Committee of the ASCE Environmental and Water Resources Institute
2014-2015	<i>Center for Petroleum & Geosystems Engineering</i> U. Texas Austin
	- Prepared periodic project reports submitted to the U.S. Department of Energy and industry sponsors - Organized the 2015 annual projects review meeting for the Nanotechnologies for Subsurface Engineering (NSE) Consortium. - Developed a radial multiphase fractional flow and multi-species transport nanoparticle-stabilized foam transport simulator - Worked as a modeler on an integrated experimental-modeling investigation of nanoparticle-stabilized CO₂ foams for improving field-scale CO₂ flood conformance (<i>teamwork</i>) - Worked as a modeler on an integrated experimental-modeling study of the mobility of silica nano-aggregates under high salinity conditions (<i>teamwork</i>)
2007-2013	<i>Integrated Multi-Phase Environ. Systems (IMPES) Lab</i> Tufts University
	- Developed a Hybrid Eulerian-Lagrangian Particulate and solute reactive transport simulator (HELP-1D) - Worked as a modeler on an integrated experimental-modeling study of the effects of particle aging on the transport and dissolution of silver nanoparticles in porous media (<i>teamwork</i>) - Evaluated particle-size-distribution effects on the mobility and reactivity of NPs - Conducted an experimental study of the reactive transport of zero-valent-iron nanoparticles (nZVI) in water-saturated sandy media

Technical Skills

<i>Programming</i>	Developed several research codes in MATLAB and FORTRAN (published in peer-reviewed journals), designed data processing modules and GUI interfaces in VBA (MS Office environment)
<i>Modeling</i>	Hands-on experience with Visual MODFLOW and MT3D
<i>Software</i>	Instructed AutoCAD and MathCAD as a Lab TA to engineering students at Tufts University, an advanced user of MS Office, instructor-level knowledge of statistical analysis packages such as Minitab and SPSS
<i>Analytical</i>	Worked on the experimental characterization of the mobility of reactive zero-valent-iron nanoparticles in porous media, used Ion/Gas Chromatography and UV-Vis to analyze aqueous and soil samples, used Drop Shape Analyzer to determine the rheological properties of DNAPL samples.

Education

- **Ph.D. in Structural Mechanics (2011)**
Department of Civil Engineering, Johns Hopkins University, Baltimore, MD, USA
- **M.Sc. in Structural Mechanics (2009)**
Department of Civil Engineering, Johns Hopkins University, Baltimore, MD, USA
- **M.Sc. in Structural Mechanics (2005)**
Department of Civil Engineering, Sharif University of Technology, Tehran, Iran
- **B.S. in Civil Engineering (2003)**
School of Civil Engineering, University of Tehran, Tehran, Iran

Research interests

- Computational Design of Architected and Multifunctional Materials, Metamaterials
- Structural and Multidisciplinary Optimization
- Uncertainty Quantification and Stochastic Mechanics
- Computational Fracture Mechanics

Honors and Awards

- Featured in **National Academy of Sciences** report on Application of Light-weighting Technology to Military Vehicles, Vessels, and Aircraft, 2012
- Civil Engineering Service Award, Department of Civil Engineering, Johns Hopkins University, 2011
- Meyerhoff Fellowship, Department of Civil Engineering, Johns Hopkins University, 2006-2007

Experience

- **Assistant Professor, Department of Civil and Environmental Engineering (2015-)**
University of Massachusetts Dartmouth, Dartmouth, MA, USA
- **Research Scientist, Department of Mechanical and Aerospace Engineering (2011-2015)**
Department of Civil Engineering, University of California Irvine, Irvine, CA, USA
- **Research Assistant, Department of Civil Engineering (2006-2011)**
Johns Hopkins University, Baltimore, MD, USA
- **Teaching Assistant in the Department of Civil Engineering (2006-2011)**
Johns Hopkins University, Baltimore, MD, USA
- **Research Assistant, HPC Lab, School of Civil Engineering (2004-2005)**
University of Tehran, Tehran, Iran
- **Research Assistant, Structures Lab, School of Civil Engineering (Summer 2003)**
University of Tehran, Tehran, Iran

Peer Reviewed Journal Publications

Published/submitted:

- Guillemot J., **Asadpoure A.**, Tootkaboni M., Topology optimization with spatially dependent material uncertainties, *Structural and Multidisciplinary Optimization*, 2018. (to be submitted)
- Ruvalcaba N., Ortega A., **Asadpoure A.**, Valdevit L., Uniaxial strength of hollow microlattices with partially cracked nodes, *Journal of Applied Mechanics*, 2018. (Submitted)
- **Asadpoure A.**, Harati M., and Tootkaboni M., Incorporating manufacturability constraints into topology optimization of lattice structures, *Structural and Multidisciplinary Optimization*, 2018. (submitted)
- **Asadpoure A.**, Nejat S. A., and Tootkaboni M., Topology optimization for structural stability applications: Accounting for pseudo-modes, *Computer Methods in Applied Mechanics and Engineering*, 2018. (submitted)
- Ahmadi B., Jalalpour M., **Asadpoure A.**, and Tootkaboni M., Robust topology optimization of skeletal structures under uncertainty in elements' out-of-straightness, *Structural and Multidisciplinary Optimization*, 1-12, 2018. DOI: 10.1007/s00158-018-2035-y.
- **Asadpoure A.**, Tootkaboni M. and Valdevit L., Topology optimization of multiphase architected materials for energy dissipation, *Computer Methods in Applied Mechanics and Engineering*, 325, 314-329, 2017. DOI: 10.1016/j.cma.2017.07.007.
- **Asadpoure A.** and Valdevit L., Topology optimization of lightweight periodic lattices under simultaneous compressive and shear stiffness constraints. *International Journal of Solids and Structures*, 2015; 60-61: 1-16. DOI: 10.1016/j.ijsolstr.2015.01.016.
- **Asadpoure A.**, Guest J., and Valdevit L., Incorporating fabrication cost into topology optimization of discrete structures and lattices. *Structural and Multidisciplinary Optimization*, 2015;51(2): 385-396. DOI: 10.1007/s00158-014-1133-8
- Tootkaboni M., **Asadpoure A.**, and Guest J.K., Topology optimization of continuum structures under uncertainty - a Polynomial Chaos approach, *Computer Methods in Applied Mechanics and Engineering*, 2012; 201-204: 263-275. DOI: 10.1016/j.cma.2011.09.009
- Guest J.K., **Asadpoure A.**, and Ha S., Eliminating beta-continuation from Heaviside projection and density filter algorithms. *Structural and Multidisciplinary Optimization*, 2011; 44(4): 443-453. DOI: 10.1007/s00158-011-0676-1
- **Asadpoure A.**, Tootkaboni M., and Guest J.K., Robust topology optimization of structures with uncertainties in stiffness - Application to truss structures. *Computers & Structures*, 2011; 89: 1131-1141. DOI: 10.1016/j.compstruc.2010.11.004
- Ebrahimi S. H., Mohammadi S., and **Asadpoure A.**, An extended finite element (XFEM) approach for crack analysis in composite media. *International Journal of Civil Engineering*, 2008; 6(3): 198-207.
- **Asadpoure A.** and Mohammadi S., Developing new enrichment functions for crack simulation in orthotropic media by the extended finite element method, *International Journal for numerical methods in engineering*, 2007; 69(10): 2150-2172. DOI: 10.1002/nme.1839
- **Asadpoure A.**, Mohammadi S., and Vafai A., Modeling crack in orthotropic media using a coupled finite element and partition of unity methods, *Finite Elements in Analysis and Design*, 2006; 42(13): 1165-1175. DOI: 10.1016/j.finel.2006.05.001
- **Asadpoure A.**, Mohammadi S., and Vafai A., Crack analysis in orthotropic media using the extended finite element method, *Thin-Walled Structures*, 2006; 44(9): 1031-1038. DOI: 10.1016/j.tws.2006.07.007

In preparation:

- **Asadpoure A.**, Nejat S., Tootkaboni M., Light-weight lattice structures with improved stability performance, 2019.

- Asaadi E., **Asadpoure A.**, Tootkaboni M., Robust topology optimization of dissipative metamaterials under uncertainty, 2018.
- Valm N., Louhghalam A., Tootkaboni M., **Asadpoure A.**, Robust design of lattice structures subject to uncertainty in members' out-of-straightness and constructability constraints, 2018.
- Salari-Sharif L., **Asadpoure A.**, Valdevit, L. Tootkaboni M., Ultra-light Instability-tolerant Lattice Architectures: Topological Design and Experiments, 2019.

Grants

Awarded:

- Novel Base-isolators for Vibration Control, **Asadpoure A.** and Louhghalam A. (UMassD – PI), *The Center for Scientific Computing and Visualization Research (CSCVR) summer fellowship*, \$5,500. (Awarded)
- UMassD's Research Center for Biomedical Injury Protection and Mitigation Structures, Kim Y.K. (UMassD), Chalivendra V. (UMassD), Lewis A. (UMassD), Inalpolat M. (UML), Nagarajan R. (UML), Drane P. (UML), and Busconi B. (UMMS) and **Asadpoure A.**, *UMass President's Science and Technology Initiative*, \$120,000. (Awarded)

Submitted/Pending:

- Manufacturability-aware design of instability-tolerant multi-material lattice architectures, **Asadpoure A.**, Tootkaboni M. (UMassD), and Valdevit L. (UCI), *National Science Foundation*, \$462,210. (Declined)
- Collaborative Research: Stochastic Multiphysics Modeling and Topology Optimization of Constructible Natural Composite Structures for Sustainable Applications, Tootkaboni M., **Asadpoure A.**, and Guillemot J. (Duke), *National Science Foundation*, \$215,858 (UMassD), \$515,946 (Total). (Declined)
- Collaborative Research: La-Z-Walls: Topologically Optimized Meta-Structures for Wind-Induced Vibration Mitigation, Louhghalam A., **Asadpoure A.**, Tootkaboni M. (UMassD), and Valdevit L. (UCI), *National Science Foundation*, \$398,563 (UMassD), \$583,975 (Total). (Declined)
- Collaborative Research: Realizable Ultra-dissipative Multiphase Metamaterials with Robust Microstructure, **Asadpoure A.**, Tootkaboni M. (UMassD), and Valdevit L. (UCI), *National Science Foundation*, \$369,096 (UMassD), \$569,096 (Total). (Declined)
- Collaborative Research: Meta-Foundations: Topologically Optimized Periodic Foundations for Seismic Hazard; Louhghalam L., **Asadpoure A.**, M. Tootkaboni (UMassD) and L. Valdevit (UCI), *National Science Foundation*, \$397,148 (UMassD), \$580,020 (Total). (Declined)
- Collaborative Research: Ultra-dissipative metamaterials with robust microstructure, **Asadpoure A.** with M. Tootkaboni (UMassD) and L. Valdevit (UCI), *National Science Foundation*, \$343,522 (UMassD), \$543,522 (Total). (Declined)
- Developing an Optimization Scheme for Maximizing Foam-Induced Improvement of Volumetric Sweep of CO₂ for Enhanced Oil Recovery, Taghavy A. and **Asadpoure A.** (UMassD), *UMass Multidisciplinary Seed Funding Program*, \$33,500 (UMassD). (Declined)

In preparation:

- Robust Manufacturable Metamaterials for Exceptional Energy Dissipation, **Asadpoure A.**, Tootkaboni M. (UMassD), and Valdevit L. (UCI), *National Science Foundation*. (December 2018)
- Manufacturability-aware design of post-stable 3D lattice structures, **Asadpoure A.**, Tootkaboni M. (UMassD), *National Science Foundation*. (January 2019)

- Collaborative Research: Stochastic Multiphysics Modeling and Topologically Optimization of Constructible Natural Composite Structures for Sustainable Applications, Tootkaboni M., **Asadpoure A.** (UMassD), and Guillemot J. (Duke), *National Science Foundation*. (January 2019)
- Reconfiguring Structural Steel Connections via Plate-constrained Constructibility-aware Topology Optimization, Tootkaboni M., Louhghalam A., and **Asadpoure A.** (UMassD), *National Science Foundation*. (February 2019)

Conference Presentations

- **Asadpoure A.**, Harati M., and Tootkaboni M., Topology Optimization of Discrete Structures and Lattices with Improved Manufacturability Constraints, *Engineering Mechanics Institute (EMI)*, June 2018, Boston, MA.
- Tootkaboni M., Salari-Sharif L., **Asadpoure A.**, Valdevit, L., Topologically Optimized Instability-Tolerant Light Stiff Lattice Architectures, *Engineering Mechanics Institute (EMI)*, June 2018, Boston, MA.
- Nejat S., Tootkaboni M., **Asadpoure A.**, An innovative method for avoiding pseudo-modes in discrete topology optimization, *Engineering Mechanics Institute (EMI)*, June 2018, Boston, MA.
- Valm N., Louhghalam A., Tootkaboni M., **Asadpoure A.**, Robust topology optimization of geometrically imperfect frame structures, *Engineering Mechanics Institute (EMI)*, June 2018, Boston, MA.
- Valdevit L., **Asadpoure A.**, and Haghpanah B., Optimal design of architected materials with extreme energy dissipation, *TMS 2018*, March 2018, Phoenix, AZ.
- **Asadpoure A.**, Tootkaboni M., and Valdevit L., Ultra-dissipative multiphase material microstructures, *New.Mech 2017*, October 2017, Boston, MA.
- **Asadpoure A.**, Louhghalam A., Valdevit L., and Tootkaboni M., Ultra-dissipative multiphase metamaterials: Topological design under uncertainty, *SES 2017*, July 2017, Boston, MA.
- Tootkaboni M., **Asadpoure A.**, Salari-Sharif L., and Valdevit L., Topologically Optimized Light Stiff Lattice Structures with Improved Stability, *SES 2017*, July 2017, Boston, MA.
- **Asadpoure A.**, L. Louhghalam and M. Tootkaboni, Design of ultra-dissipative multiphase material microstructures under uncertainty, *2017 MACH Conference*, April 2017, Annapolis, MD.
- Salari-Sharif L., **Asadpoure A.**, Valdevit L., Tootkaboni M., FE Analysis and Experimental Investigation of Topologically Optimized Light Stiff Lattice Structures with and without Stability Constraints, *2017 MACH Conference*, April 2017, Annapolis, MD.
- **Asadpoure A.**, Tootkaboni M., and Valdevit L., Lattice topologies with optimized specific stiffness and improved stability performance, *Engineering Mechanics Institute (EMI)*, June 2017, San Diego, CA.
- Tootkaboni M., **Asadpoure A.**, and Valdevit L., Robust lattice architectures with improved stability performance, *Engineering Mechanics Institute (EMI)*, May 2016, Nashville, TN.
- **Asadpoure A.** and Tootkaboni M., Robust design of ultra-dissipative metamaterials via stochastic topology optimization, *Engineering Mechanics Institute (EMI)*, May 2016, Nashville, TN.
- **Asadpoure A.** and Valdevit L., Design of multiphase architected materials for exceptional energy dissipation, *2015 Material Research Society Fall Meeting and Exhibit*, December 2015, Boston, MA.
- **Asadpoure A.** and Valdevit L., Topology optimization of multiphase architected media for exceptional energy dissipation, *Engineering Mechanics Institute (EMI)*, June 2015, Palo Alto, CA.

- **Asadpoure A.** and Valdevit L., Optimal design of metal-elastomer architected cellular materials for exceptional combinations of stiffness, density and damping, *2014 MRS Fall Meeting & Exhibit*, December 2014; Boston, Massachusetts, USA.
- **Asadpoure A.** and Valdevit L., Topology optimization of dissipative multi-phase cellular materials, *2013 MRS Fall Meeting & Exhibit*, December 2013; Boston, Massachusetts, USA.
- **Asadpoure A.**, Guest J., and Valdevit L., Topology Optimization of Discrete Structures and Lattices Considering Manufacturing Cost, *10th World Congress on Structural and Multidisciplinary Optimization*, May 2013; Orlando, Florida, USA.
- **Asadpoure A.**, Tootkaboni M., and Guest J.K., Robust Topology Optimization – Design under Geometric and Material Property Uncertainties, *11th US National Congress on Computational Mechanics*, July 2011; Minneapolis, Minnesota, USA.
- Guest J.K. and **Asadpoure A.**, Advances in Projection-Based Algorithms for Continuum Topology Optimization, *Sixth M.I.T. Conference on Computational Fluid & Solid Mechanics*; June 2011; Cambridge, Massachusetts, USA.
- **Asadpoure A.**, Tootkaboni M., and Guest J.K., Robust Topology Optimization via Heaviside Projection Method and Polynomial Chaos, *Engineering Mechanics Institute 2011*, June 2011; Boston, Massachusetts, USA.
- Guest J.K., **Asadpoure A.**, and Igusa T., A Multi-Mesh Strategy for Continuum Topology Optimization under Correlated Uncertainties, *13th AIAA/ISSMO Multidisciplinary Analysis Optimization Conference*, September 2010; Fort Worth, Texas, USA.
- **Asadpoure A.**, Guest J.K., and Igusa T., Structural Topology Optimization Considering Correlated Uncertainties in Elastic Modulus, *51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, April 2010; Orlando, Florida, USA.
- **Asadpoure A.**, Guest J.K., and Igusa T., Topology optimization under correlated uncertainties, *10th U.S. National Congress on Computational Mechanics*, July 2009; Columbus, Ohio, USA.
- **Asadpoure A.**, Guest J.K., and Igusa T., Topology optimization of continuum structures considering fabrication flaws, *The 2009 Joint ASCE-ASME-SES Conference on Mechanics and Materials*, June 2009; Blacksburg, Virginia, USA.
- **Asadpoure A.** and Guest J.K., Structural Optimization Under Uncertainty, *T AIAA Region I Young Professional, Student and Education Conference*, November 2008; Laurel, Maryland, USA.
- **Asadpoure A.**, Mohammadi S., Vafai A., Crack propagation in composites with the use of Extended Finite Element Method (X-FEM), *Second National Congress on Civil Engineering*, 2005; Tehran, Iran.

Conference Proceedings

- **Asadpoure A.** and Valdevit L., Optimal design of multiphase cellular materials, *AMERIMECH Symposium on Dynamics of Periodic Materials and Structures*, April 2014; Atlanta, Georgia, USA.
- Guest J.K. **Asadpoure A.**, and Igusa T., A Multi-Mesh Strategy for Continuum Topology Optimization under Correlated Uncertainties, *13th AIAA/ISSMO Multidisciplinary Analysis Optimization Conference*, September 2010; Fort Worth, Texas, USA.
- **Asadpoure A.**, Guest J.K., and Igusa T., Structural Topology Optimization Considering Correlated Uncertainties in Elastic Modulus, *51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, April 2010; Orlando, Florida, USA.
- Guest J.K., **Asadpoure A.**, and Igusa T., Incorporating Geometric Uncertainties in Structural Optimization. *Inaugural International Conference of the Engineering Mechanics Institute*, May 2008; Minneapolis, Minnesota, USA.

- **Asadpoure A.**, Mohammadi S., and Vafai A., Extended finite element method in an orthotropic cracked medium, *VIII International Conference on Computational Plasticity Fundamentals and Applications (Complas 2005)*, 2005; Barcelona, Spain.
- **Asadpoure A.**, Mohammadi S., and Vafai A., Modeling crack in orthotropic medium using extended finite element method, *ECCOMAS Thematic Conference on Meshless Methods*, 2005; Lisbon, Portugal.
- **Asadpoure A.** Mohammadi S., and Vafai A., Crack propagation in composites with the use of Extended Finite Element Method (X-FEM), *Second National Congress on Civil Engineering*, 2005; Tehran, Iran.

Professional Activities

Referee of scholarly journals:

- Scientific Reports
- Computer Methods in Applied Mechanics and Engineering
- Structural and Multidisciplinary Optimization
- International Journal of Solids and Structures
- Journal of Mechanical Design
- Finite Element in Analysis and Design

Conference Mini-symposium Organizer and Session Chair:

- Organized and co-chair a mini-symposium on “Topology Optimization: from Algorithmic Developments to Applications”, *Engineering Mechanics Institute (EMI)*, June 2018, Boston, MA.
- Organized and co-chair a mini-symposium on “Architected Materials: Advances in Modeling, Design, Fabrication, Characterization, and Applications”, *Engineering Mechanics Institute (EMI)*, June 2018, Boston, MA.
- Organized and co-chaired a mini-symposium on “Topology Optimization; from Algorithmic Developments to Applications”, *Engineering Mechanics Institute (EMI)*, June 2017, San Diego, CA.
- Chaired a session on “Topology Optimization; Algorithms and Applications”, *Engineering Mechanics Institute (EMI)*, May 2016, Nashville, TN.

Workshops and Course works:

- Attended TEA time with SPA: Finding funding opportunities, University of Massachusetts Dartmouth, October 2017, Dartmouth, MA.
- Attended 2016 NSF Proposal Writing Workshop, Virginia Tech, June 27, 2016, Blacksburg, VA.
- Attended Workshop on Writing/Designing/Winning NSF Proposals, October 9, 2015, University of Massachusetts Boston, Boston, MA.
- Attended Mentoring Research Students in Science and Engineering held by the Office of Faculty Development (OFD), University of Massachusetts Dartmouth, Fall 2015, Dartmouth, MA.

University Service

- Department of Civil and Environmental Engineering, University of Massachusetts Dartmouth
 - Served on ABET committee (2015-2016)
 - Served on graduate Committee (2015-present)

- Served on managed CEN website (2015-present)
- Served on curriculum committee (2016-present)
- Served on space committee (2017-2018)
- College of Engineering, University of Massachusetts Dartmouth
 - Served on MATLAB committee (2017-present)
 - Invited talk, College of Engineering Dean's Advisory Council, Optimal design of multiphase architected materials for energy dissipation, April 2016
 - Invited talk, Mechanical Engineering (MNE) Graduate Seminar and Applied Sciences Seminar (EAS), Topology optimization for structural engineering and architected materials design, November 2015
- University of Massachusetts Dartmouth
 - Proposal assessment for Office of Undergraduate Research (OUR), Fall semester, 2016
 - Member of Scientific Computing Group at University of Massachusetts Dartmouth (2015-present)
 - Presented at College of Engineering Accepted Student Day, April 2, 2017
 - Presented at College of Engineering Open House, November 6, 2016
 - College of Engineering Open House, October 15, 2016
 - College of Engineering Open House, October 17, 2015
 - College of Engineering Open House, November 8, 2015
 - Experience University of Massachusetts Dartmouth 2016, March 5, 2016
 - Experience University of Massachusetts Dartmouth 2016, April 3, 2016

Membership in Professional Societies

- American Society of Civil Engineers (ASCE)
- International Society for Structural and Multidisciplinary Optimization (ISSMO)
- Engineering Mechanics Institute (EMI)

Mazdak Tootkaboni

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EDUCATION

- **Ph.D. in Structural Mechanics, 2009**
Johns Hopkins University, Baltimore, MD
- **M.Sc. in Structural Mechanics, 2007**
Johns Hopkins University, Baltimore, MD
- **M.Sc. in Earthquake Engineering, 2002**
University of Tehran, Tehran, Iran
- **B.Sc. in Civil Engineering, 2000**
University of Tehran, Tehran, Iran
- **Diploma in Physics and Mathematics**
NODET*, Iran

EMPLOYMENT

- **Associate Professor**, Univ. of Massachusetts Dartmouth (Sept. 2016 – Present)
- **Assistant Professor**, Univ. of Massachusetts Dartmouth (Sept. 2010 – Sept. 2016)
- **Postdoctoral Fellow**, Johns Hopkins University (Mar. 2010 – Aug. 2010)
- **Graduate Research Assistant**, Johns Hopkins University (2004 – 2009)
- **Techno-Ecnomic Analyst**, MAPNA (Iran Power Plants Management) Co. (2003 – 2004)
- **Structural Engineer**, Sadr-e Sanat Consulting Engineers Co. (2002 – 2003)

HONORS AND AWARDS

- Engineering Mechanics Institute (EMI) of ASCE Appreciation Award for outstaring service and dedication as co-chair of 2018 EMI conference (2018)
- University of Massachusetts Dartmouth Chancellor's Sponsored Research Recognition Award (2015)
- National Science Foundation Early **CAREER** Award (2014)

*NODET: National Organization for Developing Exceptional Talents

- Research on topology optimization recognized in National Academy of Sciences report on "Application of Lightweighting Technology to Military Vehicles, Vessels, and Aircraft" (2012)
- Paper on topology optimization under uncertainty featured in Science Direct Top 25 Hottest Articles, Journal of Computers and Structures (2011)
- Civil Engineering Graduate Teaching Award, Department of Civil Engineering, Johns Hopkins University (2007)
- **Meyerhoff Fellow**, Department of Civil Engineering, Johns Hopkins University (2005 – 2006)
- **Abel Wolman Fellow**, Whiting School of Engineering, Johns Hopkins University (2004 – 2005)
- **Outstanding NODET graduate** (1995)

RESEARCH INTERESTS

Topology Optimization, Design under Uncertainty, Multifunctional Architected Materials and Structures, Metamaterials for Resilient Infrastructure

Uncertainty Quantification, Data Analytics, Bayesian Inverse Modeling, Machine Learning, Stochastic Computational Mechanics

Stability-Critical Structures, Structure-Equipment Interactions

GRANTS RECEIVED

1. Collaborative Research: A Data-centric Uncertainty-informed Framework for Resilience Analytics of Critical Infrastructure Under Extreme Climate Events, \$446,443, Co-PI, with A. Louhghalam (PI) and R. Nateghi (Perdue), UMassD portion \$224,341, **National Science Foundation**, 1/2019-1/2022
2. Heterogeneous Terascale Computing Cluster for the Development and Efficient Implementation of High-Order Numerical Methods, \$643,899 Co-PI, with Sigal Gottlieb (UMassD) as PI and ten other members of CSCVR as Co-PIs, **Office of Naval Research**, 6/1/2018-5/31/2019
3. **CAREER**: Predictive analysis of stability-critical structures: an uncertainty-informed path from measurements to theory, \$400,000, **National Science Foundation**, 9/2014-8/2019.
4. Collaborative research: Geometric flaw-tolerant optimal structures and material microarchitectures via stochastic topology optimization, \$485,474, lead PI, with L. Valdevit (UCI) and J.K. Guest (JHU), UMassD/Tootkaboni portion \$187,855, **National Science Foundation**, 9/2014-8/2019[†].
5. Collaborative research: Uncertainty quantification and model validation in thin-walled structures: a probabilistic paradigm for advancing analysis-based design, \$362,392, lead PI, with B.W. Schafer (JHU), UMassD/Tootkaboni portion \$215,255, **National Science Foundation**, 9/2012-8/2017[‡].

[†]including no-cost extensions

[‡]including no-cost extensions

6. A comprehensive computational framework for analysis and optimization of wave energy converters, \$368,221, Co-PI, with M. Raessi (UMassD) and G.W. Cowels (UMassD), **National Science Foundation**, 9/2012-8/2017[§].
7. Erosion resistant coatings for composite wind turbine blades, \$136,000, lead PI, with M. Raessi (UMassD) and E. Reynaud and D. Schmidt (UML), UMassD/Tootkaboni portion \$68,000, **UMass President's Science and Technology Initiative**, 1/2015-11/2016.

JOURNAL PUBLICATIONS

- A. Louhghalam, **M. Tootkaboni**, T. Igusa and F.J. Ulm, Closed-Form Solution of Road Roughness-Induced Vehicle Energy Dissipation, *Journal of Applied Mechanics*, 86, No. 1, 011003, 2019
- M. Botshekan, **M. Tootkaboni**, and A. Louhghalam, Global Sensitivity of Roughness-Induced Fuel Consumption to Road Surface Parameters and Car Dynamic Characteristics, *Journal of Transportation Research Record*, accepted, 2019.
- M. Akbarian, A. Louhghalam, **M. Tootkaboni**, and F.J. Ulm, Hidden Excess Fuel Consumption in Pavement Systems, *Physical Review Letters*, submitted, 2018
- L. Salari-Sharif, A.G. Izard, B. Haghpanah, **M. Tootkaboni** and L. Valdevit, Negative stiffness inclusions: a novel approach towards real-time phononic bandgaps, *Physical Review Applied*, submitted, 2018
- E. Asaadi, P.S. Heyns, R.T. Haftka, and **M. Tootkaboni**, On the value of test data for reducing uncertainty in material models: Computational framework and application to spherical indentation, *Computer Methods in Applied Mechanics and Engineering*, submitted, 2018
- M. Farzanian, A. Louhghalam, B.W. Schafer and **M. Tootkaboni**, Geometric imperfection models for CFS structural members, part I: Comparative review of current models, *Thin-Walled Structures*, submitted, 2018
- B. Ahamdi, A. Asadpoure, M. Jalalpour and **M. Tootkaboni**, Robust topology optimization of skeletal structures with imperfect structural members, *Structural and Multidisciplinary Optimization*, 1-12, 2018
- L. Salari-Sharif, S.W. Godfrey, **M. Tootkaboni** and L. Valdevit, The effect of manufacturing defects on compressive strength of ultralight hollow microlattices: A data-driven study, *Additive Manufacturing*, 19, 51-61, 2018
- A. Asadpoure, **M. Tootkaboni** and L. Valdevit, Optimal design of multiphase architected materials for energy dissipation, *Computer Methods in Applied Mechanics and Engineering*, 325, 314-329, 2017
- X. Zhao, **M. Tootkaboni** and B.W. Schafer, Laser-based cross-section measurement of cold-formed steel members: model reconstruction and application, *Thin-Walled Structures*, 120, 70-80, 2017

[§]including no-cost extensions

- B. Amirzadeh, A. Louhghalam, M. Raessi and **M. Tootkaboni**, A computational framework for rain erosion prediction in wind turbine blades, part II: drop impact-induced stress analysis and blade coating fatigue life, *Journal of Wind Engineering & Industrial Aerodynamics*, 163, 44-54, 2017
- B. Amirzadeh, A. Louhghalam, M. Raessi and **M. Tootkaboni**, A computational framework for rain erosion prediction in wind turbine blades, part I: stochastic rain texture model and raindrop impact simulations, *Journal of Wind Engineering & Industrial Aerodynamics*, 163, 33-43, 2017
- H. Amouzegar, B.W. Schafer and **M. Tootkaboni**, An incremental numerical method for calculation of residual stresses and strains in cold-formed steel members, *Thin-Walled Structures*, 106, 61-74, 2016
- M. Jalalpour, **M. Tootkaboni**, An efficient approach to reliability-based topology optimization for continua under material uncertainty, *Structural and Multidisciplinary Optimization*, 53, 759-772, 2016
- X. Zhao, **M. Tootkaboni** and B.W. Schafer, Development of a laser-based geometric imperfection measurement platform with application to cold-formed steel construction, *Experimental Mechanics*, 55, 1779-1790, 2015
- A.S. Fallah, Y. Yang, R. Ward, **M. Tootkaboni**, R. Brambleby, A. Louhghalam and L.A. Louca, Wave propagation in two-dimensional anisotropic acoustic metamaterials of K4 topology, *Wave Motion*, 58, 101-116, 2015
- A. Louhghalam, **M. Tootkaboni** and F.J. Ulm, Roughness-induced energy dissipation: Statistical analysis and scaling, *Journal of Engineering Mechanics*, 10.1061/(ASCE)EM.1943-7889.0000944, 04015046, 2015
- A. Moradi, **M. Tootkaboni** and K. Pennell, A variance decomposition approach to uncertainty quantification and sensitivity analysis of the J&E model, *Journal of the Air & Waste Management Association*, 65, 154-164, 2015
- M. Moharrami, **M. Tootkaboni**, Reducing response of offshore platforms to wave loads using hydrodynamic buoyant mass dampers, *Engineering Structures*, 81, 162-174, 2014
- A. Louhghalam, T. Igusa and **M. Tootkaboni**, Dynamic characteristics of thin laminated composite cylindrical shells: Asymptotic analysis accounting for edge effect, *Journal of Composite Structures*, 112, 22-37, 2014
- H. Salahshoor, **M. Tootkaboni** and N. Rahbar, Nano-scale structure and mechanical properties of crosslinked hydrogels, *Journal of Nanomechanics and Micromechanics*, 10.1061/(ASCE)NM.2153-5477.0000091, A4014007, 2014
- M. Moharrami, A. Louhghalam and **M. Tootkaboni**, Optimal folding of cold formed steel cross sections under compression, *Journal of Thin-Walled Structures*, 76, 145-156, 2014
- M. Tootkaboni**, A. Asadpoure and J.K. Guest, Topology optimization of continuum structures under uncertainty - a Polynomial Chaos approach, *Computer Methods in Applied Mechanics and Engineering*, 201-204(1), 263-275, 2012

A. Asadpoure, **M. Tootkaboni** and J.K. Guest, Robust topology optimization of structures with uncertainties in stiffness - application to truss structures, *Computers and Structures*, 89, 1131-1141, 2011

M. Tootkaboni, L. Graham-Brady, A multi-scale spectral stochastic method for homogenization of multi-phase periodic composites with random material properties, *International Journal for Numerical Methods in Engineering*, 83, 59-90, 2010

M. Tootkaboni, L. Graham-Brady, Stochastic direct integration schemes for dynamic systems subjected to random excitations, *Probabilistic Engineering Mechanics*, 25, 163-171, 2010

M. Tootkaboni, L. Graham-Brady and B.W. Schafer, Geometrically non-linear behavior of structural systems with random material property: an asymptotic spectral stochastic approach, *Computer Methods in Applied Mechanics and Engineering*, 198, 3173-3185, 2009

WORKS IN PROGRESS

E. Assadi, A. Asadpoure, A. Louhghalam and **M. Tootkaboni**, Uncertainty-aware design of ultra-dissipative metamaterials via stochastic topology optimization, to be submitted to *Materials and Design*

A. Asadpoure, M. Harati and **M. Tootkaboni**, Towards mesh-independent and stable discrete topology optimization, to be submitted to *Structural and Multidisciplinary Optimization*

A. Asadpoure, S.A. Nejat and **M. Tootkaboni**, Topology optimization for structural stability applications: Accounting for pseudo-modes, to be submitted to *Structural and Multidisciplinary Optimization*

M. Tootkaboni, A consistent data-driven construction of random fields with applications in uncertainty quantification and model validation, to be submitted to *Journal of Computational Physics*

M. Tootkaboni, A. Louhghalam and T. Igusa, Quantifying variability in floor response spectra: A statistical analysis using random vibration theory, to be submitted to *Earthquake Engineering & Structural Dynamics*

TECHNICAL REPORTS

M. Tootkaboni, M. Raessi, E. Reynaud, and D. Schmidt, Rain-induced erosion in wind turbine blades: transient stress analysis, Technical report, University of Massachusetts, President's Office, June, 2015

M. Tootkaboni, M. Raessi, E. Reynaud, and D. Schmidt, Rain-induced erosion in wind turbine blades: rain texture model and raindrop impact pressure calculation, Technical report, University of Massachusetts, President's Office, February, 2015

PATENTS

A. Louhghalam, **M. Tootkaboni**, F.J. Ulm and A. Ammar, System and method to measure road roughness characteristics and pavement induced vehicle fuel consumption, U.S. Serial Number 62/594,132, provisional patent filed in Dec 2017.

CONFERENCE PROCEEDINGS

S. Farzanian, A. Louhghalam, B.W. Schafer and **M. Tootkaboni**, Geometric Imperfections in Shell Finite Element Models of CFS Members - A Review of Current State of Practice, *Proceedings of Structural Stability Research Council Annual Stability Conference*, Baltimore, MD, April 10-13, 2018.

X. Zhao, **M. Tootkaboni**, B.W. Schafer, High fidelity imperfection measurements and characterization for cold-formed steel members, *Proceedings of International Conference on Coupled Instabilities in Metal Structures*, Baltimore, MD, Nov. 7-8, 2016

S. Torabian, H. Amouzegar, **M. Tootkaboni**, B.W. Schafer, Finite Element Modeling Protocols and Parametric Analyses for Short Cold-formed Steel Zee-section Beam-columns, *Proceedings of Structural Stability Research Council Annual Stability Conference*, Orlando, FL, April 12-15, 2016

H. Amouzegar, B. Amirzadeh, X. Zhao, B.W. Schafer, **M. Tootkaboni**, Statistical Analysis of the Impact of Imperfection Modes on Collapse Behavior of Cold-Formed Steel Members, *Proceedings of Structural Stability Research Council Annual Stability Conference*, Nashville, TN, March 24-27, 2015

H. Foroughi, C.D. Moen, A.T. Myers, **M. Tootkaboni**, L. Vieira and B.W. Schafer, Analysis and Design of Thin Metallic Shell Structural Members - Current Practice and Future Research Needs, *Proceedings of Structural Stability Research Council Annual Stability Conference*, Toronto, Canada, March 25-28, 2014

M. Tootkaboni, A. Louhghalam, T. Igusa, Statistical analysis of variability in floor response spectra using random vibration theory, *Proceedings of the 11th International Conference on Structural Safety & Reliability, ICOSSAR*, New York, NY, June 16-20, 2013

M. Moharrami, A. Louhghalam, **M. Tootkaboni**, Optimal Cross Sections for Cold Formed Steel Members under Compression, *Proceedings of 10th World Congress on Structural and Multidisciplinary Optimization*, Orlando, FL, May 19-24, 2013

M. Tootkaboni, L. Graham-Brady, A family of stochastic direct integration schemes for dynamical systems subjected to non-white excitations, *Proceedings of the 18th ASCE Engineering Mechanics Division Conference*, Blacksburg, VA, June 3-6, 2007

M. Tootkaboni, L. Graham-Brady and B.W. Schafer, Evaluation of post-bifurcation behavior of structural systems with random material property using Koiter's method: a spectral stochastic approach, *Proceedings of the 18th ASCE Engineering Mechanics Division Conference*, Blacksburg, VA, June 3-6, 2007

CONFERENCE/POSTER PRESENTATIONS AND TALKS

M. Tootkaboni, L. Salari-Sharif, A. Asadpoure and L. Valdevit, Topologically Optimized Instability-Tolerant Light Stiff Lattice Architectures, *2018 EMI Conference*, MIT, Cambridge, MA, May 29-June 1, 2018

N. Valm, **M. Tootkaboni**, and A. Asadpoure, Robust topology optimization of geometrically imperfect frame structures, *2018 EMI Conference*, MIT, Cambridge, MA, May 29-June 1, 2018

- A. Asadpoure, M. Harati, and **M. Tootkaboni**, Topology Optimization of Discrete Structures and Lattices with Improved Manufacturability Constraints, *2018 EMI Conference*, MIT, Cambridge, MA, May 29-June 1, 2018
- S. Farzanian, A. Louhghalam, B.W. Schafer, and **M. Tootkaboni**, Geometric Imperfection Models in Shell FE Analysis of CFS Members: Validation through Data-Driven Stochastic Models, *2018 EMI Conference*, MIT, Cambridge, MA, May 29-June 1, 2018
- S.A. Nejat, **M. Tootkaboni** and A. Asadpoure, An innovative method for avoiding pseudo-modes in discrete topology optimization, *2018 EMI Conference*, MIT, Cambridge, MA, May 29-June 1, 2018
- M. Botshekan, **M. Tootkaboni** and A. Louhghalam, Global Sensitivity of Roughness-Induced Pavement-Vehicle Interaction to Road Surface Parameters and Car Dynamic Characteristics, *2018 EMI Conference*, MIT, Cambridge, MA, May 29-June 1, 2018
- E. Asaadi, P.S. Heyns and **M. Tootkaboni**, Uncertainty-informed design of material characterization tests, *2018 EMI Conference*, MIT, Cambridge, MA, May 29-June 1, 2018
- A. Louhghalam, **M. Tootkaboni**, and F.J. Ulm, Road roughness identification and pavement roughness-induced vehicle fuel consumption, *MIT-Lafarge Day*, MIT, Cambridge, Dec 4, 2017
- M. Tootkaboni**, A. Asadpoure, L. Salari-Sharif and L. Valdevit, Topologically Optimized Ultra-light Stiff Lattice Architectures with Improved Stability, *NEW.Mech 2017*, MIT, Cambridge, MA, Oct. 14, 2017
- A. Asadpoure, **M. Tootkaboni** and L. Valdevit, Ultra-dissipative multiphase material microstructures, *NEW.Mech 2017*, MIT, Cambridge, MA, Oct. 14, 2017
- M. Tootkaboni**, A. Asadpoure, L. Salari-Sharif and L. Valdevit, Topologically Optimized Light Stiff Lattice Structures with Improved Stability, *2017 SES Conference*, Boston, MA, July 25-28, 2017
- A. Asadpoure, A. Louhghalam, L. Valdevit, **M. Tootkaboni**, Ultra-dissipative Multiphase Metamaterials: Topological Design Under Uncertainty, *2017 SES Conference*, Boston, MA, July 25-28, 2017
- A. Asadpoure, **M. Tootkaboni**, and L. Valdevit, Lattice topologies with optimized specific stiffness and improved stability performance, *2017 EMI Conference*, UC San Diego, San Diego, CA, June 4-7, 2017
- M. Farzanian, **M. Tootkaboni**, Collapse analysis of thin cylindrical shell structures: extending single load perturbation approach via surrogate modeling, *2017 EMI Conference*, UC San Diego, San Diego, CA, June 4-7, 2017
- M. Farzanian, **M. Tootkaboni**, Geometric imperfection model validation through data-driven stochastic modeling for reliable analysis of thin-walled structures, *2017 EMI Conference*, UC San Diego, San Diego, CA, June 4-7, 2017
- A. Louhghalam, **M. Tootkaboni**, and F.J. Ulm, A closed form solution for road roughness-induced greenhouse gas emission, *2017 EMI Conference*, UC San Diego, San Diego, CA, June 4-7, 2017

A. Asadpoure, A. Louhghalam, and **M. Tootkaboni**, Design of ultra-dissipative multiphase material microstructures under uncertainty, *2017 Mach Conference*, Annapolis, MD, April 5-7, 2017.

B.L. Rossi Dias Endo, L. Salari-Sharif, **M. Tootkaboni** and L. Valdevit, The effect of manufacturing defects on mechanical properties of polymeric lattices fabricated via Fused Deposition Modeling, poster presentation at the *2017 Mach Conference*, Annapolis, MD, April 5-7, 2017.

L. Salari-Sharif, A. Guell, B. Haghpanah, **M. Tootkaboni** and L. Valdevit, Real-time Manipulation of Frequency Bandgaps Using Electromagnetic Forces in Phononic Crystals, poster presentation at the *2017 Mach Conference*, Annapolis, MD, April 5-7, 2017.

L. Salari-Sharif, A. Asadpoure, L. Valdevit, and **M. Tootkaboni**, FE analysis and experimental investigation of topologically optimized light stiff lattice structures with and without stability constraints, *2017 Mach Conference*, Annapolis, MD, April 5-7, 2017.

M. Tootkaboni, Uncertainty-Conscious Analysis and Design: from Model Validation to Robust Topology Optimization, *Invited Talk*, Imperial College, September 27, 2016

A. Asadpoure, **M. Tootkaboni**, Robust Design of Ultra-Dissipative Metamaterials, *2016 EMI Conference*, Vanderbilt University, Tennessee, TN, May 22-25, 2016

M. Tootkaboni, A. Asadpoure and L. Valdevit, Lattice Architectures with Improved Stability Performance, *2016 EMI Conference*, Vanderbilt University, Tennessee, TN, May 22-25, 2016

A. Louhghalam, **M. Tootkaboni**, M. Gonzalez and F.J. Ulm, Impact of Vehicle Speed and Traffic Flow on Pavement-Vehicle Interaction Emissions at the Network Level, *2016 EMI Conference*, Vanderbilt University, Tennessee, TN, May 22-25, 2016

M. Tootkaboni, Uncertainty-Conscious Analysis and Design, UConn, May 16, 2016

M. Tootkaboni, Uncertainty-Conscious Analysis and Design: from Stability-Critical Structures to Optimal Structural Topologies, Worcester Polytechnic Institute, April 27, 2016

S. Torabian, H. Amouzegar, **M. Tootkaboni**, B.W. Schafer, Finite Element Modeling Protocols and Parametric Analyses for Short Cold-formed Steel Zee-section Beam-columns, *Structural Stability Research Council Annual Stability Conference*, Orlando, FL, April 12-15, 2016

L. Salari-Sharif, **M. Tootkaboni**, L. Valdevit, Statistical Study of the Geometric Imperfections in Ultralight Hollow Microlattices, poster presentation at the *2016 Mach Conference*, Annapolis, MD, April 6-8, 2016.

M. Tootkaboni, Uncertainty-Conscious Analysis and Design: from instability-critical structures to optimal structural topologies, *Invited Talk*, University of Michigan, March 10, 2016

M. Tootkaboni, Uncertainty-Conscious Analysis and Design, *Invited Talk*, Stony Brook University, Feb 22, 2016

M. Tootkaboni, Uncertainty-Conscious Analysis and Design: from instability-critical structures to optimal structural topologies, *Invited Talk*, University of Pittsburgh, Feb 16, 2016

M. Jalalpour, **M. Tootkaboni**, Topology optimization under material uncertainty: An efficient reliability-based approach, *2015 EMI Conference*, Stanford University, Stanford, CA, June 16-19, 2015

B. Amirzadeh, M. Raessi, **M. Tootkaboni**, A computational framework for rain erosion prediction in composite wind turbine blades, *2015 EMI Conference*, Stanford University, Stanford, CA, June 16-19, 2015

B. Ahmadi, **M. Tootkaboni**, Optimization of cold-formed steel cross sectional shapes using charged system search, *2015 EMI Conference*, Stanford University, Stanford, CA, June 16-19, 2015

M. Tootkaboni, Uncertainty-Conscious Analysis and Design: from imperfect thin-walled structures to robust optimal structural topologies, *Invited Talk*, University of Nebraska Lincoln, June 11, 2015

H. Amouzegar, B. Amirzadeh, X. Zhao, B.W. Schafer, **M. Tootkaboni**, Statistical Analysis of the Impact of Imperfection Modes on Collapse Behavior of Cold-Formed Steel Members, *Structural Stability Research Council Annual Stability Conference*, Nashville, TN, March 24-27, 2015

M. Tootkaboni, Uncertainty-Conscious Analysis and Design: from imperfect thin-walled structures to robust optimal structural topologies, *Invited Talk*, Iowa State University, March 9, 2015

M. Tootkaboni, Uncertainty-Conscious Analysis and Design, *Invited Talk*, University of Massachusetts Amherst, March 2, 2015

M. Tootkaboni, Uncertainty-Conscious Analysis and Design: from imperfect thin-walled structures to robust optimal structural topologies, *Invited Talk*, Pennsylvania State University, Feb 23, 2015

H. Amouzegar, B. Ahmadi, **M. Tootkaboni**, Uncertainty-informed Nonlinear Analysis of Thin-walled Structures with Geometric Imperfections, *2014 EMI Conference*, McMaster University, Hamilton, Ontario, Canada, August 5-8, 2014

A. Louhghalam, T. Igusa, **M. Tootkaboni**, Perturbation Analysis of Modal Properties in Laminated Composite Cylinders: Accounting for Edge Effect, *First International Conference on Mechanics of Composites*, Stony Brook University, Long Island, NY, June 9-12, 2014

H. Foroughi, C.D. Moen, A.T. Myers, **M. Tootkaboni**, L. Vieira and B.W. Schafer, Analysis and Design of Thin Metallic Shell Structural Members - Current Practice and Future Research Needs, *Structural Stability Research Council Annual Stability Conference*, Toronto, Canada, March 25-28, 2014

M. Tootkaboni, A. Louhghalam, T. Igusa, Statistical analysis of variability in secondary system response spectra in primary-secondary systems, *2013 EMI Conference*, Northwestern University, Evanston, IL, August 4-7, 2013

M. Moharrami, **M. Tootkaboni**, Optimal Cross Sections for Cold Formed Steel Members under Compression, *10th World Congress on Structural and Multidisciplinary Optimization*, Orlando, FL, May 19-24, 2013

M. Tootkaboni, A. Asadpoure, J.K. Guest, Topology Optimization under Fabrication Uncertainties, *10th World Congress on Structural and Multidisciplinary Optimization*, Orlando, FL, May 19-24, 2013

M. Tootkaboni, A. Louhghalam, T. Igusa, Statistical analysis of variability in floor response spectra using random vibration theory, *11th International Conference on Structural Safety & Reliability, ICOSSAR*, Columbia University, New York, NY, June 16-20, 2013

A.M. Garehtapeh, **M. Tootkaboni** and K.G. Pennell, Predicting vapor intrusion exposures using field data and non-deterministic modeling approaches, poster presentation at the *2013 AEESP 50th Anniversary Conference*, Colorado School of Mines, Golden, CO, July 14-16, 2013.

D. Khatami, **M. Tootkaboni** and K.G. Pennell, Modeling of Nanosilver Reactions in Environmental Systems, poster presentation at the *2013 AEESP 50th Anniversary Conference*, Colorado School of Mines, Golden, CO, July 14-16, 2013.

A.M. Garehtapeh, **M. Tootkaboni** and K.G. Pennell, Development of a stochastic response surface method for evaluating vapor intrusion models, poster presentation at the *Northeast Superfund Research Program Grantees Meeting-Complex Mixtures and Exposures: Analyzing, Modeling and Predicting Fate and Effects at Multiple Levels of Environmental and Biological Systems*, Marine Biological Laboratories, Woods Hole, MA, April 23-24, 2012.

A.M. Gharehtapeh, **M. Tootkaboni**, K.G. Pennell, Uncertainty analysis of vapor intrusion models using stochastic response surface method, *ACS annual meeting*, Philadelphia, PA, August 9-23, 2012.

M. Tootkaboni, M. Moharrami and J.K. Guest, Asymptotic Stochastic Approach to Post-buckling Analysis under Material Uncertainties, *2012 Joint Conference of the Engineering Mechanics Institute and 11th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability (EMI/PMC 2012)*, University of Notre Dame, Notre Dame, IN, June 17-20, 2012.

M. Tootkaboni, A. Asadpoure, and J.K. Guest, Continuum Topology Optimization under Uncertainty: A Polynomial Chaos Approach, *EMI/PMC 2012*, University of Notre Dame, Notre Dame, IN, June 17-20, 2012.

A. Louhghalam, **M. Tootkaboni**, and T. Igusa, Perturbation Analysis of Modal Properties of Laminated Composite Cylinders: Accounting for Edge Effect, *EMI/PMC 2012*, University of Notre Dame, Notre Dame, IN, June 17-20, 2012.

M. Tootkaboni, Computational Modeling of Uncertainty in Structural Mechanics, *Scientific Computing Retreat*, UMass Dartmouth Center for Scientific Computing and Visualization Research, March, 2011

A. Asadpoure, **M. Tootkaboni**, and J.K. Guest, Robust Topology Optimization via Heaviside Projection Method and Polynomial Chaos Expansion, *Engineering Mechanics Institute Conference*, Northeastern University, Boston, MA, June 2-4, 2011

M. Tootkaboni, A. Asadpoure and J.K. Guest, Robust Topology Optimization of Structures with Uncertainties in Stiffness, *Six MIT conference on Computational Fluid and Solid Mechanics*, Cambridge, MA, June 15-17, 2011

A. Asadpoure, **M. Tootkaboni**, and J.K. Guest, Robust Topology Optimization - Design under Geometric and Material Property Uncertainties, *11th US National Congress on Computational Mechanics*, University of Minnesota, Minneapolis, MN, July 25-29, 2011

M. Tootkaboni, V. Zeinoddini, L. Graham-Brady, B.W. Schafer, and J.K. Guest, A Probabilistic Framework for the Analysis of Thin-Walled Structures, *Engineering Mechanics Institute Conference*, Los Angeles, CA, August 8-11, 2010

L. Graham-Brady, C. Zingale, and **M. Tootkaboni**, Variability of Strain Rate Dependent Brittle Materials with Randomly Occurring Flaws, *Engineering Mechanics Institute Conference*, Los Angeles, CA, August 8-11, 2010

M. Tootkaboni, Modeling Uncertainty in Structural Mechanics, *Invited Talk*, Department of Civil and Environmental Engineering, University of Massachusetts Dartmouth, North Dartmouth, MA, May, 2010

M. Tootkaboni, Computational Modeling of Uncertainty in Structural Mechanics, *Invited Talk*, Department of Civil Engineering, New Mexico State University, Las Cruces, NM, February, 2010

M. Tootkaboni, L. Graham-Brady, A family of stochastic direct integration schemes for the second order statistics of dynamical systems subjected to random excitations, *Inaugural International Conference of the Engineering Mechanics Institute*, Minneapolis, MN, May 19-21, 2008

M. Tootkaboni, L. Graham-Brady, A homogenization based spectral stochastic approach for linking global properties to local variations in random heterogeneous media, *Ninth National Congress on Computational Mechanics*, San Francisco, CA, July 2007

M. Tootkaboni, L. Graham-Brady, A family of stochastic direct integration schemes for dynamical systems subjected to non-white excitations, *18th ASCE Engineering Mechanics Division Conference*, Blacksburg, VA, June 3-6, 2007

M. Tootkaboni, L. Graham-Brady and B.W. Schafer, Evaluation of post-bifurcation behavior of structural systems with random material property using Koiter's method: a spectral stochastic approach, *18th ASCE Engineering Mechanics Division Conference*, Blacksburg, VA, June 3-6, 2007

M. Tootkaboni, L. Graham Brady, A multi-scale stochastic computational approach for linking local and global behavior of random media, *Seventh World Congress on Computational Mechanics*, Los Angeles, CA, July 2006

TEACHING EXPERIENCE

◦ **University of Massachusetts Dartmouth**

- Mechanics of Materials, undergraduate level (Spring 2015)
- Structural Analysis, undergraduate level (Fall 2010, 2011, 2012, 2013, 2014, 2015, 2016 and 2017)

- Design of Steel Structures, undergraduate level (Spring 2011, 2012, 2013, 2014, 2016 and 2017)
- Finite Element Analysis, graduate level (Fall 2011)
- Structural Mechanics, graduate level (Spring 2013 and 2014)
- **Johns Hopkins University**
 - Statics and Mechanics of Materials Lab, undergraduate level (Fall 2005, 2006 and 2007)

PROFESSIONAL SERVICE

- **Reviewer for NSF:** Served on several panels for the division of Civil, Mechanical and Manufacturing Innovation
- **Leadership Roles (Conf. Chair, Director of Tech. Program, etc.):**
 - Chaired the 2018 EMI Conference of ASCE (EMI 2018) with Arghavan Louhghalam (UMASSD), and Franz Ulm and Roland Pellenq (MIT), May 29-June 1, 2018. EMI 2018 which was co-hosted by MIT, and UMASSD broke the record in size and scope with about 100 minisymposia, 1200 submitted abstracts, and a 1000 attendees.
 - Directed the technical program for the 2018 EMI Conference of ASCE (EMI 2018) with Arghavan Louhghalam (UMASSD) and Franz Ulm (MIT), May 29-June 1, 2018. The program, which was the largest since the inception of EMI conferences in 2007, included 900 presentations in 150 technical sessions, 6 keynotes, 2 NSF sponsored events, and 7 student competitions.
 - For other leadership roles see UNIVERSITY SERVICE
- **Mini-symposium Organizer, Conference Session Chair, Conference Scientific Committee Member, Paper Competition Judge:**
 1. 2018 EMI Conference of ASCE, MIT-UMASSD, May 29-June 1, 2018, organized and co-chaired a mini-symposium on Architected Materials: Advances in Modeling, Design, Fabrication, Characterization, and Applications
 2. 2018 EMI Conference of ASCE, MIT-UMASSD, May 29-June 1, 2018, organize and co-chaired a mini-symposium on Topology Optimization: from Algorithmic Developments to Applications
 3. 2017 EMI Conference of ASCE, UC San Diego, June 4-7, 2017, organized and co-chaired a mini-symposium on Topology Optimization; from Algorithmic Developments to Applications
 4. 2016 Probabilistic Mechanics and Reliability Conference, Vanderbilt University, May 22-25, 2016, served as a member of the Scientific Committee
 5. 2016 EMI/PMC Conference of ASCE, Vanderbilt University, May 22-25, 2016, served on the judging panel for the Probabilistic Methods Committee's student paper competition
 6. 2016 EMI Conference of ASCE, Vanderbilt University, May 22-25, 2016, organized and co-chaired a mini-symposium on Topology Optimization: Algorithms and Applications

7. 2015 EMI Conference of ASCE, Stanford University, June 16-19, 2015, organized and co-chaired a mini-symposium on New Methods and Applications of Topology, Shape, Sizing, and Parametric Optimization
8. 2014 EMI Conference of ASCE, McMaster University, August 5-8, 2014, served on judging panel for the Probabilistic Mechanics Committee's student paper competition.
9. 2013 EMI Conference of ASCE, Northwestern University, August 4-7, 2013, organized and co-chaired a mini-symposium on Metallic Materials and Thin-Walled Structures
10. 2012 Joint Conference of the Engineering Mechanics Institute and 11th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability (EMI/PMC 2012), University of Notre Dame, June 17-20, 2012, organized and co-chaired a mini-symposium on Design and Optimization Under Uncertainty.
11. Sixth MIT conference on Computational Fluid and Solid Mechanics, Cambridge, MA, June 15-17, 2011, organized and co-chaired a mini-symposium on Advances in System, Sizing, Shape and Topology Optimization
12. 11th US National Congress on Computational Mechanics, University of Minnesota, July 25-29, 2011, organized and co-chaired a mini-symposium on Evaluation and Control of Computational Errors in Solid and Structural Mechanics

- **Reviewer for Scholarly Journals:** Computer Methods in Applied Mechanics and Engineering, Multiscale Modeling and Simulation, International Journal for Numerical Methods in Engineering, International Journal of Multiscale Computational Engineering, ASCE Journal of Engineering Mechanics, Structural and Multidisciplinary Optimization, Engineering Structures, Journal of Sound and Vibration, Finite Element in Analysis and Design, Acta Mechanica Sinica, Computer-Aided Design, Probabilistic Engineering Mechanics, Journal of Aerospace Engineering, Mechanics Research Communications, AIAA Journal, Applied Mathematical Modeling, Advances in Mechanical Engineering, Journal of Micromechanics, Engineering Optimization, Materials and Design, Swarm and Evolutionary Computation.

UNIVERSITY SERVICE

- **Service to the Department:**
 - Graduate Program Director (GPD) (2012 – Present)
 - Space Committee Chair (2017-2018)
 - Served on CEN search committee for the two tenure track positions in structural mechanics and environmental engineering (2014-15)
 - Organized CEN departmental seminars (2011-12 and 2012-13)
 - Committee assignments:
 1. Space Committee (2017-2018)
 2. Curriculum Committee (2010-11, 2011-12, 2014-15 and 2017-2018)
 3. Graduate Committee (2010 – Present)
 4. ABET Committee (2010 – Present)

· **Service to the College:**

- Served on MNE search committee for the tenure track position in computational solid mechanics (2013-14)
- Led CEN efforts in Open House, Experience UMass Dartmouth and Discovery Day events (2010 – Present)
- Served UMass Dartmouth Freshman Summer Institute (FSI) both as math instructor and as project supervisor

· **Service to the University:**

- Served as CEN representative in College Academic Council (2016 – Present)
- Served as CEN representative in Graduate Council (2012 – Present)
- Served on Faculty Senate’s Graduate Program Committee (2017 – 2018)
- Member of the Center for Scientific Computing and Visualization Research, a core faculty member of its Computational Solid and Structural Mechanics (CS2M[¶]) Group and a member of its library and grant-writing committees (2010 – Present)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- Member, American Society of Mechanical Engineers, ASME (2017 – Present)
- Member, International Society for Structural and Multidisciplinary Optimization, ISSMO (2013 – Present)
- Associate Member, American Society of Civil Engineers, ASCE (2010 – Present)
- Member, Engineering Mechanics Institute, EMI (2010 – Present)
- Member, Probabilistic Mechanics Committee (PMC^{||}) of EMI (2010 – Present)
- Affiliated PI, Cold Formed Steel Research Consortium (CFSRC^{**}) (2014 – Present)

[¶]CS2M is under auspices of UMass Dartmouth Center for Scientific Computing and Visualization Research and focuses on computational modeling of solids and structures

^{||}PMC is a technical committee of Engineering Mechanics Institute and promotes and fosters research in uncertainty analysis, model validation methods and risk-informed decision-making

^{**}CFSRC is a research consortium that aims to provide the world’s most comprehensive, innovative, and impactful research dedicated to cold-formed steel structures

Daniel G. MacDonald, Ph.D., P.E.

Department of Civil and Environmental Engineering
College of Engineering
Department of Estuarine and Ocean Sciences
School for Marine Science and Technology

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Education	Massachusetts Institute of Technology/ Woods Hole Oceanographic Institution Joint Program Cambridge/Woods Hole, MA Ph.D. , Oceanographic Engineering, 2003 (Departments of Civil and Environmental Engineering, MIT, and Applied Ocean Physics and Engineering, WHOI). Thesis: <i>Mixing Processes and Hydraulic Control in a Highly Stratified Estuary</i> .
	Cornell University Ithaca, NY M.S. , Civil and Environmental Engineering, 1996. Thesis: <i>Pollutant Mixing and Wake Characteristics Behind Headland Shaped Objects in Shallow Flow</i> .
	University of New Hampshire Durham, NH B.S.C.E. , <i>Summa Cum Laude</i> , 1992. Undergraduate Honors Thesis: <i>Laboratory Simulation of Protozoan Transport Through a Sandy Aquifer Using Carboxylated Microspheres</i> .
Registration	Registered Professional Engineer, Massachusetts
Academic/ Research Experience	University of Massachusetts Dartmouth North Dartmouth, MA Professor and Chairperson– Civil and Environmental Engineering (July 2018 – present) Professor – Civil and Environmental Engineering (September 2016 – June 2018) Associate Professor – Civil and Environmental Engineering (June 2014 – August 2016) Affiliate Faculty – Estuarine and Ocean Sciences (June 2014 – present) Associate Professor – School for Marine Science and Technology (September 2008 – June 2014) Assistant Professor – School for Marine Science and Technology (January 2003 – August 2008) Conduct basic and applied research including fate and transport associated with river plumes, stratified turbulence, engineering of outfalls and thermal discharges, and the sustainable development of marine renewable energy devices. Teach engineering/marine science courses to graduate and undergraduate students.
	WHOI Department of Applied Ocean Physics and Engineering Woods Hole, MA Ph.D. Candidate (July 1998 - September 2002) Post-Doctoral Investigator (September 2002 – January 2003) Advisor: Rocky Geyer Investigated the dynamics and kinematics of a highly stratified estuarine outflow, including turbulent kinetic energy (TKE) production and buoyancy flux rates, and two-layer hydraulic theory, using the Fraser River estuary and plume, (British Columbia, Canada) as a natural laboratory.
	Cornell Department of Civil & Environmental Engineering Ithaca, NY M.S. Candidate (September 1994 - August 1996) Advisor: Gerhard Jirka Analyzed the structure of wakes around headlands in shallow flow laboratory experiments.

**Teaching
Experience**

University of Massachusetts Dartmouth

Dartmouth, MA

- Courses Taught**

CEN 456/556, MAR 558: Waves and Tides	Spring 2006, 2009, 2018 Fall 2007, 2011, 2013, 2015
CEN 491: Civil Engineering Project	Fall 2017, 2018 Spring 2018, 2019
EGR 241: Statics	Spring 2015, Fall 2015
EGR 303: Engineering Economy	Fall 2016
MAR 110: Natural Hazards and the Ocean	Fall 2008-2012, 2014
MAR 520: Thesis Proposal Development	Spring 2004
MAR 565: Pollutant Transport in the Environ.	Spring 2007, 2008, 2010, 2016 Fall 2012, 2014
MAR 610: Introduction to Marine Turbulence	Spring 2004, 2005, 2007, 2017
MAR 615: Dynamics of Estuarine Circulation	Spring 2005, Fall 2010

- Student Advisement**

Current Graduate Students:

May May Khin	M.S.	Major Advisor
Nikiforos Delatolas	M.S.	Major Advisor
Jared Buckley	Ph.D.	Committee Member

Former Graduate Students:

Georgia Kakoulaki	Ph.D.	Major Advisor (May 2015)
Fei Chen	Ph.D.	Major Advisor (September 2009)
Michele Winchell	M.S.	Major Advisor (September 2018)
Vashkar Palma	M.S.	Major Advisor (May 2018)
Nathaniel Tarantino	M.S.	Major Advisor (May 2018)
Brandon Green	M.S.	Major Advisor (December 2012)
Adrienne Pappal	M.S.	Major Advisor (June 2006)
Jianfeng Wang	Ph.D.	Visiting Student (2010-2012) from Ocean University of China
Caue Lazanao	Ph.D.	Visiting Student (2018) from U. Sao Paulo (Brazil)
Rafael Avila	Ph.D.	Visiting Student (2017) from U. Federal do Rio Grande (Brazil)
Kareem Bonugli	M.S.	Committee Member (May 2015)
Ara Hakim	M.S.	Committee Member (May 2015)
Sudip Majumder	Ph.D.	Committee Member (August 2014)
Marcos Sastre	Ph.D.	Committee Member (May 2014)
Kelly Cole (Texas A&M)	Ph.D.	Committee Member (May 2014)
Valerie Hall	Ph.D.	Committee Member (May 2014)
Yeping Yuan (U. Wash.)	Ph.D.	Committee Member (August 2012)
Shawna King	M.S.	Committee Member (June 2012)
Joshua Carlson	M.S.	Committee Member (June 2012)
Zhankun Wang	Ph.D.	Committee Member (May 2009)
Grant Stuart	M.S.	Committee Member (June 2007)
Christopher Pease	M.S.	Committee Member (June 2005)

Undergraduate Students:

Wilton Gray	Undergraduate Research Assistant (2018-present)
James Leidhold	Undergraduate Research Assistant (2017-present)
Anneliese Schmidt	Undergraduate Research Assistant (2016-18)
Ryan Henderson	Undergraduate Research Assistant (2017)
Nathaniel Tarantino	Honor's Thesis Advisor (2015-16)

**Industry/
Consulting
Experience**

Independent consulting services provided to a number of industrial and municipal clients (2004-Present).

TRC Environmental Corporation Lowell, MA
Civil/Environmental Consultant. (Part time: February 2001 – December 2003, June 2013-Present).

GZA GeoEnvironmental, Inc. Newton Upper Falls, MA
Civil/Environmental Engineer. (October 1993-August 1994, October 1996-June 1998)
(Part time: July 1998 - May 2000).

Action Environmental, Inc. Newton, MA
Civil/Environmental Engineer. (November 1992 - October 1993).

**Research
Funding**

National Science Foundation. Collaborative Research: River plume fracture – Formation, erosion and decoupling of a frontal water mass. **D. MacDonald.** **\$567,587** (\$1,556,219 total with UConn and UMaine) April 2018 – April 2021.

Office of Naval Research. The Role of Scale in the Development and Evolution of Stratified Shear Turbulence, Entrainment and Mixing: Supplementary Funding **D. MacDonald** and M. Raessi. **\$45,453.** 2016-2019.

Massachusetts Seaport Economic Council. Reducing the cost of wave energy with an innovative tethered ballast system. **D. MacDonald.** \$239,898. 2016-2019.

Department of Energy (Energy Efficiency and Renewable Energy), as subcontractor to Littoral Power Systems, Inc. A cost-disruptive, low impact, modular form factor low-head hydropower system. **D. MacDonald.** **\$196,192 (\$1,421,666 total).** 2016-2019.

Massachusetts Department of Energy Resources. A cost-disruptive, low impact, modular form factor low-head hydropower system. **D. MacDonald.** **\$250,000.** 2016-2019.

Office of Naval Research. The Role of Scale in the Development and Evolution of Stratified Shear Turbulence, Entrainment and Mixing. **D. MacDonald** and M. Raessi. **\$114,003.** 2015-2018.

Massachusetts Clean Energy Center. Marine Renewable Energy Center Operational Funding. J. Miller. **\$535,000.** July 2012 – December 2013 (**D. MacDonald**, PI as of July 2013).

National Science Foundation. Collaborative Research: Sediment transport and storage in tidal floodplain water bodies. **D. MacDonald** (Collaborative Partners: J. Woodruff, UMass Amherst; Anna Martini, Amherst College). **\$69,782 (\$355,710 total).** 2012-2015.

UMass School for Marine Sciences. Hydrographic and numerical modeling assessments for sediment and contaminant trapping in floodplain tidal ponds. **D. MacDonald** (UMassD), J. Woodruff (UMass Amherst). **\$12,944.** Oct. 2010-Sep. 2011.

Department of Energy. New England Marine Renewable Energy Center Funding. J. Miller, B. Howes **D. MacDonald.** **\$50,000 (\$750,000 total).** Jul. 2010 – Jun 2011.

National Science Foundation. Collaborative research: Creation of a coastal current – the transition of an energetic river discharge from buoyant jet to geostrophic plume. **D. MacDonald** (PI, UMassD), R. Hetland (Co-PI, Texas A&M) and A. Horner-Devine (Co-PI, U. Washington). **\$499,416.00 (\$1,134,688.00 total).** Mar. 2009 – Feb. 2012.

UMass President's Science and Technology Initiative Fund. Marine renewable energy collaborative. **D. MacDonald**, P. Friedman, R. Laoulache, J. Manwell, J. Miller, J. Wiggin. **\$160,000**. July 2008 – June 2010.

National Science Foundation. Collaborative research: Mixing, spreading, and water mass modification in near field river plumes. **D. MacDonald** (PI, UMassD), and R. Hetland (Co-PI, Texas A&M). **\$345,186.00 (\$521,094.00 total)**. Mar. 2006 – Feb. 2010.

Executive Office of Environmental Affairs. Support for Regional Coastal Monitoring Series. **D. MacDonald and R. Rountree**. **\$5,000**. May 2003.

Brayton Point Power Station. Mt. Hope Bay Natural Laboratory - Observational Component (B. Rothschild, P.I.). **\$229,000 (\$1.2 million total)**, February 2003 – June 2006.

Brayton Point Power Station. High school outreach effort for Mt. Hope Bay (Funding provided to D. MacDonald as an addendum to the Mt. Hope Bay Natural Laboratory Project, B. Rothschild, P.I.). **\$8,000.00**. July-September 2004.

Patents

MacDonald, D.G. *Tethered ballast systems for point absorbing wave energy converters and method of use thereof*. U.S. National Stage patent application filed on June 8, 2018 (16/060,618). Canadian National Phase Patent Application filed on June 11, 2018 (PCT/US2016/065840).

MacDonald, D.G., J. Cantara, C. Nathan, A. Lopes, and B. Green. *Systems and Methods for Wave Energy Conversion*. US 9,581,128 B2, 28 February 2017.

MacDonald, D.G. *Enhanced Surface Cooling of Thermal Discharges*. University of Massachusetts, assignee. USPTO Patent 9003813. 14 April 2015.

Publications & Presentations

Refereed Journal Articles/Book Chapters

Note: Student authors are designated with a * preceding their names.

*Yellen, B., J. D. Woodruff, D.K. Ralston, **D.G. MacDonald** and D.S. Jones, 2017. Salt wedge dynamics lead to enhanced sediment trapping within side embayments in high-energy estuaries. *J. Geophys. Res. Oceans*, 122, 2226-2242, doi: 10.1002/2016JC012595

*Wang, J., **D.G. MacDonald**, P. Orton, *K. Cole, and J. Lan, 2015. The effect of discharge, tides, and wind on lift-off turbulence. *Estuaries and Coasts*, doi: 10.1007/s12237-015-9958-y.

Horner-Devine, A.R., R. D. Hetland, and **D. G. MacDonald**, 2015. Mixing and Transport in Coastal River Plumes. *Annual Review of Fluid Mechanics* **47**, 569-594.

*Kakoulaki, G., **D.G. MacDonald**, and A.R. Horner-Devine, 2014. The role of wind in the near field and midfield of a river plume. *Geophys. Res. Letters*. **41**, doi:10.1002/2014GL060606.

MacDonald, D.G., *J.O. Carlson, and L. Goodman, 2013. On the heterogeneity of shear-stratified turbulence: Observations from a near-field river plume. *J. Geophys. Res. Oceans*, **118**, 6223-6237. DOI: 10.1002/2013JC008891.

Horner-Devine, A.R., C.C. Chickadel, and **D.G. MacDonald**, 2013. Coherent structures and mixing at a river plume front. Chapter in *Coherent Flow Structures at the Earth's Surface*, J.G. Venditti, J. Best, M. Church and R.J. Hardy, eds. Wiley-Blackwell. ISBN: 978-1-119-96277-9.

*Green, B.E., and **D.G. MacDonald**, 2013. The use of numerical modeling to optimize a new wave energy converter technology. *Marine Technology Society Journal*, **47.4**, 151-163.

Woodruff, J.D., A. Martini, E. Elzidani, T. Naughton, D. Kekacs, and **D.G. MacDonald**, 2013. Off-river waterbodies on tidal rivers: Human impact on rates of infilling and the accumulation of pollutants. *Geomorphology*, **184**, 38-50.

D.G. MacDonald and *F. Chen, 2012. Enhancement of turbulence through lateral spreading in a stratified-shear flow: Development and assessment of a conceptual model. *J. Geophys. Res.-Oceans*, **117**, C05025, doi:10.1029/2011JC007484.

*Pappal, A.L., R.A. Rountree, and **D.G. MacDonald**, 2012. Relationship between body size and habitat complexity preference in age-0 and age-1 winter flounder *Pseudopleuronectes americanus*. *Journal of Fish Biology*, **81**(1), 220-229. doi: 10.1111/j.1095-8649.2012.03328.

MacDonald, D.G. 2009. Enhanced surface cooling as an alternative for thermal discharges. *J. of Env. Engineering*, ASCE. **135**(12), 1326-1337 doi:10.1061/_ASCE_EE.1943-7870.0000090.

*Chen, F., **D.G. MacDonald**, and R.D. Hetland, 2009. Lateral spreading of a near-field river plume: Observations and numerical simulations. *J. Geophys. Res.*, **114**, C07013 doi:10.1029/2008JC004893.

*Pappal, A.L., **D.G. MacDonald**, and R.A. Rountree, 2009. Evidence of Cobble Habitat Preference in Age-0 Winter Flounder, *Pseudopleuronectes americanus*. *Marine and Freshwater Behaviour and Physiology*. **42**(1), 43-53. doi:10.1080/10236240902765269.

MacDonald, D.G. and A.R. Horner-Devine, 2008. Temporal and spatial variability of vertical salt flux in a highly stratified estuary. *J. Geophys. Res.*, **113**, C09022, doi:10.1029/2007JC004620.

Hetland, R.D. and **D.G. MacDonald**, 2008. Spreading in the Merrimack River Plume. *Ocean Modeling*, **21**, pp 12-21.

MacDonald, D. G., L. Goodman, and R. D. Hetland, 2007. Turbulent dissipation in a near-field river plume: A comparison of control volume and microstructure observations with a numerical model, *J. Geophys. Res.*, **112**, C07026, doi:10.1029/2006JC004075, 13 pages.

*Chen, F., and **D.G. MacDonald**, 2006. Role of mixing in the structure and evolution of a buoyant discharge plume, *J. Geophys. Res.*, **111**, C11002, doi:10.1029/2006JC003563, 13 pages.

MacDonald, D.G., 2006. Estimating an estuarine mixing and exchange ratio from boundary data with application to Mt. Hope Bay (Massachusetts/Rhode Island), *Estuarine, Coastal and Shelf Science*, **70**, 326-332.

MacDonald, D.G., and W.R. Geyer, 2005. Hydraulic control of a highly stratified estuarine front. *Journal of Physical Oceanography*. **35**(3), 374-387.

MacDonald, D. G., and W. R. Geyer, 2004. Turbulent energy production and entrainment at a highly stratified estuarine front, *Journal of Geophysical Research – Oceans*, **109**, C05004, doi:10.1029/2003JC002094, 17 pages.

Harvey, R.W., N.E. Kinner, A. Bunn, **D. MacDonald** and D. Metge, 1995. Transport behavior of groundwater protozoa and protozoa-sized microspheres in sandy sediments. *Applied Environmental Microbiology*. **61**, 209-217.

Harvey, R., N. Kinner, **D. MacDonald**, D. Metge, and A. Bunn, 1993. Role of physical heterogeneity in the interpretation of small-scale laboratory and field observations of bacteria, microbial-sized microspheres, and bromide transport through aquifer sediments. *Water Resources Research*. **29**(8), 2713-2722.

Non Peer-Reviewed Articles

MacDonald, D.G. and K.R. Dyer, 2007. Estuarine Oceanography. *McGraw-Hill Encyclopedia of Science and Technology*, McGraw-Hill, New York.

R.A. Rountree and **D.G. MacDonald**, 2006. Introduction to the special issue: Natural and Anthropogenic Influences on the Mt. Hope Bay Ecosystem, *Northeast Naturalist*, **13**, Special Issue 4, pp 1-26.

MacDonald, D.G. and R.A. Rountree, 2006. Conclusion to the special issue: Natural and Anthropogenic Influences on the Mt. Hope Bay Ecosystem, *Northeast Naturalist*, **13**, Special Issue 4, pp 199-204.

Editorships

Baldwin, K., M. Merrill, S. Grilli, B. Howes, and **D. MacDonald** (Guest Editors), 2013. Marine Renewable Energy Technologies. Special issue of the *Marine Technology Society Journal*, **47** Number 4.

D.G. MacDonald and R.A. Rountree (Editors), 2006. Natural and Anthropogenic Influences on the Mt. Hope Bay Ecosystem. Special issue of the *Northeast Naturalist*, **13**, Special Issue 4.

Conference Papers, Posters, and Presentations

Tarantino, N., **D. MacDonald**, and R. Race. Numerical Modelling of a Tethered Ballast for Point Absorber Wave-Energy Converter Technology. Poster presented at Marine Renewable Energy Conference, Fall River, MA, May 15, 2018.

Tarantino, N., **D. MacDonald**, and R. Race. Numerical Modelling of a Tethered Ballast for Point Absorber Wave-Energy Converter Technology. Poster presented at Water Power Week Washington 2018, Washington, D.C., April 29 – May 2, 2018.

MacDonald, D., M. Raessi, and A. Schmidt. Does Scale Matter? Bridging the Gap Between Field and Laboratory Observations of Turbulence. Poster presented at the 2018 Ocean Sciences Meeting, Portland, OR, February 11-16, 2018.

Palma, V., **D. MacDonald** and M. Raessi. Initializing DNS Models to Represent Naturally Occurring Turbulence. Poster presented at the 2018 Ocean Sciences Meeting, Portland, OR, February 11-16, 2018.

Tarantino, N., **D. MacDonald**, and R. Race, Modeling of a Tethered Ballast Point Absorber Wave Energy Converter. Presentation at Marine Technology Society Marine Renewable Energy Techsurge, Portsmouth, NH, November 2016.

MacDonald, D.G., and M. Raessi, The Role of Physical Scale in Shear-Stratified Turbulence. Presentation at Ocean Sciences Meeting, New Orleans, LA, February 2016.

MacDonald, D.G., B.C. *Yellen, J.D. Woodruff, A. Martini, and D.S. Jones. Temporal Scales Of Sediment Deposition In Tidally Influenced Coves Along The Lower CT River. Poster at Gordon Research Conference on Coastal Ocean Modeling, June 2015.

*Yellen, Brian C., J.D. Woodruff, **D. MacDonald**, A. Martini, D.S. Jones. Infilling of tidal freshwater river coves – observations at multiple time scales. Geological Society of America (GSA) Northeastern Section – 50th Annual Meeting, Bretton Woods, New Hampshire. March 2015.

*Yellen, Brian C., J.D. Woodruff, **D. MacDonald**, A. Martini. Sedimentary response of tidal freshwater river coves to salt intrusion – implications for sea level rise. Geological Society of America (GSA) Annual Meeting, Vancouver, British Columbia. GSA Abstracts/ Programs Vol. 46(6), October 2014.

Thomson, J., S. Zippel, A. Horner-Devine, R. Hetland, and **D. MacDonald**. Do breaking waves mix river plumes? Presentation at Ocean Sciences, Honolulu, HI, February 2014.

MacDonald, D.G. Do we really need to consider lateral spreading to get turbulent entrainment rates correct? Presentation at the River Plume Mixing and Dynamics Workshop, Timberline Lodge, OR, October 2013.

MacDonald, D.G. UMass Dartmouth Marine Renewable Energy Research and Collaborations. Presentation at the Nova Scotia Tidal Energy Research Symposium, Wolfville, NS, May 2013.

*Green, B. and **D.G. MacDonald**. Use of Numerical Modeling to Optimize a New Wave Energy Converter Technology. Presentation at 4th annual Marine Renewable Energy Center (MREC) Technical Conference, Warwick, RI, January 2013.

MacDonald, D.G. Development of a low cost, low maintenance wave energy converter. Presentation at Global Cleantech Meetup, Boston, MA, October 2012.

*Kakoulaki, G., **D.G. MacDonald**, *K. Cole, and *J. Wang. The use of surface drifters for “tracking” mixing and spreading in the Merrimack River plume. Poster at Physics of Estuaries and Coastal Seas (PECS) meeting, New York City, August 2012.

*Wang, J., **D.G. MacDonald** and *G. Kakoulaki. The influence of discharge, wind and tides on near-field plume dynamics. Poster at Physics of Estuaries and Coastal Seas (PECS) meeting, New York City, August 2012.

MacDonald, D.G., *J.O. Carlson, and L. Goodman. Control volume, microstructure, and overturns: Unraveling the heterogeneity of turbulence in a near-field river plume. Presentation at Ocean Sciences, Salt Lake City, UT, February 2012.

*Kakoulaki, G., **D.G. MacDonald**, *K. Cole, and *J. Wang. The use of surface drifters for “tracking” mixing and spreading in the Merrimack River plume. Poster at Ocean Sciences, Salt Lake City, UT, February 2012.

*Wang, J., **D.G. MacDonald** and P. Orton. The influence of discharge, wind and tides on near-to mid-field plume dynamics. Poster at Ocean Sciences, Salt Lake City, UT, February 2012.

*Green, B. and **D.G. MacDonald**. Model-data comparisons of a new wave energy convertor technology. Presentation at 3rd annual Marine Renewable Energy Center (MREC) Technical Conference, Cambridge, MA, November 2011.

*Wang, J., **D.G. MacDonald**, P. Orton, and *G. Kakoulaki. The influence on wind and tides on near-to mid-field plume dynamics. Poster presented at Gordon Research Conference on Coastal Ocean Modeling, Holyoke, MA, June 2011.

*Kakoulaki, G., **D.G. MacDonald**, *J. Wang, and *K. Cole. Observations of midfield dynamics in a river plume with a fleet of surface drifters. Poster presented at Gordon Research Conference on Coastal Ocean Modeling, Holyoke, MA, June 2011.

MacDonald, D.G., L. Goodman, R. Hetland and *F. Chen. Turbulent field heterogeneity in a near field plume. Poster presented at Ocean Sciences, Portland, OR, February 2010.

*Chen, F. and **D.G. MacDonald**. On the relationship of turbulent mixing and lateral spreading for a near-field river plume. Presentation at Ocean Sciences, Portland, OR, February 2010.

*Kakoulaki, G., **D.G. MacDonald**, R.D. Hetland, and *F. Chen. Comparison between observational and numerical drifters in the Merrimack River mid-field plume. Poster presented at Ocean Sciences, Portland, OR, February 2010.

MacDonald, D.G. Structure of the Merrimack River near-field plume. Poster presented at Gordon Research Conference on Coastal Physical Oceanography, New London, NH, June 2009.

*Chen, F. and **D.G. MacDonald**. On the relationship of turbulent mixing and lateral spreading for a near-field river plume. Poster presented at Gordon Research Conference on Coastal Physical Oceanography, New London, NH, June 2009.

MacDonald, D.G., R. Hetland, L. Goodman, and *F. Chen. Structure and evolution of the Merrimack River Near-Field Plume. Presentation at MABPOM, Woods Hole, MA, September 2008.

*Chen, F., **D.G. MacDonald**, and R.D. Hetland. Observations and modeling of near-field plume spreading in the Merrimack River. Presentation at MABPOM, Woods Hole, MA, September 2008.

MacDonald, D.G., L. Goodman, and R. Hetland. A comparison of turbulence measurements in a near field river plume. Presentation at Ocean Sciences, Orlando, FL, March 2008. **INVITED SPEAKER.**

Chen, F., **D.G. MacDonald**, and R.D. Hetland. Estimates of spreading in a near-field river plume from observations and model simulations. Presentation at Ocean Sciences Meeting, Orlando, FL, March 2008.

Hetland, R.D., and **D.G. MacDonald**. Spreading in the near-field Merrimack River plume. Presentation at Ocean Sciences Meeting, Orlando, FL, March 2008.

MacDonald, D.G. Alternative options for heat discharge in Mt. Hope Bay. Published abstract for Estuarine Research Federation (ERF) biennial conference, Providence, RI, November 2007.

MacDonald, D.G. Estimating TKE production from linearized profiles in a shear stratified flow. Poster at Gordon Research Conference on Coastal Ocean Modeling, New London, NH, June 2007.

*Chen, F., **D.G. MacDonald**, and R. Hetland. Quantifying spreading in a near field river plume from observations and model simulations. Poster presented at Gordon Research Conference on Coastal Ocean Modeling, New London, NH, June 2007.

MacDonald, D.G., R. Hetland, and L. Goodman. Observations of spreading and entrainment in a near-field river plume. Poster presented at Physics of Estuaries and Coastal Seas (PECS) Meeting, Astoria, Oregon, September 2006.

*Pappal, A.L., R. Rountree, and **D. MacDonald**. Habitat Preferences of Juvenile Winter Flounder, *Pseudopleuronectes americanus*, in the Presence of Cobble. Presentation at the 2006 Winter Meeting, Southern New England Chapter of the American Fisheries Society, Narragansett, Rhode Island, January 18, 2006.

MacDonald, D. Estuarine exchange processes and turbulent mixing through a narrow estuarine channel. Abstract submitted to the 18th Biennial Conference of the Estuarine Research Federation (ERF), Norfolk, Virginia, October 2005.

*Chen, F. and **D. MacDonald**. Mixing processes and buoyancy flux rates in a thermal plume. Abstract submitted to the 18th Biennial Conference of the Estuarine Research Federation (ERF), Norfolk, Virginia, October 2005.

*Pappal, A.L., R. Rountree, and **D. MacDonald**. Habitat use by juvenile winter flounder, *Pseudopleuronectes americanus*, a laboratory study. Poster presented at the 9th annual meeting of the American Fisheries Society, Flatfish Biology Conference, Westbrook, Connecticut, December 1-2, 2004.

MacDonald, D., *L. Zhao, W. Brown, C. Chen and L. Goodman. The Mt. Hope Bay Natural Laboratory: Unraveling the physics of a heavily impacted ecosystem. Poster presented at the Mid-Atlantic Bight Physical Oceanography and Meteorology (MABPOM) Meeting, Fall River, Massachusetts, October 16-17, 2003.

MacDonald, D. and R. Geyer. Froude angle control at a highly stratified estuarine front. Paper and poster presented at the 2nd Meeting on the Physical Oceanography of Sea Straits, Villefranche Sur Mer, France, April 2002.

MacDonald, D. and R. Geyer. Turbulent energy production and mixing at a highly stratified estuarine front. Presented at Ocean Sciences Meeting, Honolulu, HI, February 2002.

MacDonald, D., and R. Geyer. Dissipation and 3-D plume structure at a highly stratified river mouth. Poster presented at Gordon Research Conference on Coastal Ocean Circulation, New London, NH, June 2001.

MacDonald, D., A. Horner, and R. Geyer. Vertical salt flux in a salt wedge estuary. Poster presented at American Geophysical Union Fall Meeting, San Francisco, CA, December 2000.

MacDonald, D.G. and W.R. Geyer, 2000. Observations of shear-induced mixing in a salt wedge estuary, in Lawrence, G., R. Pieters and N. Yonemitsu, eds., *Fifth International Symposium on Stratified Flows*, Vancouver, B.C., Canada, July 10-13, 2000: Vancouver, University of British Columbia, Dept. of Civil Engineering, v. 2, p. 895-900.

MacDonald, D., A. Horner, S. Inagaki, Y. Kasajima, C. Troy, R. Geyer, D. Jay, S. Monismith, and P. Rhines. Salt wedge dynamics in the Fraser River Estuary. Poster presented at Ocean Sciences Meeting, San Antonio, TX, January 2000.

MacDonald, D.G. and G.H. Jirka, 1997. Characteristics of headland wakes in shallow flow, in Wang, S., and Carstens, T., eds., *Environmental and Coastal Hydraulics: Protecting the Aquatic Habitat: Proceedings of Theme B: The 27th Congress of the International Association of Hydraulic Research*, San Francisco, CA, August 10-15, 1997: New York, American Society of Civil Engineers, p. 88-93.

Harvey, R.W., N.E. Kinner, **D. MacDonald**, A.L. Bunn, and D.W. Metge, 1996. Transport of indigenous protozoa in a sandy aquifer, Cape Cod, Massachusetts, in Morganwalp, D.W., and Aronson, D.A., eds., *U.S. Geological Survey Toxic Substances Hydrology Program--Proceedings of the Technical Meeting*, Colorado Springs, Colorado, September 20-24, 1993: U.S. Geological Survey Water-Resources Investigations Report 94-4015, v. 1, p. 253-257.

Harvey, R.W., N. Kinner, A. Bunn, and **D. MacDonald**, 1993. Transport of protozoa through an organically contaminated sandy aquifer, in Stanford, J., and Simons, J., eds., *Proceedings of the First International Conference on Ground Water Ecology*, Tampa, Florida, April 26-29, 1993: Huntsville, Alabama, American Water Resources Association, p. 111-118.

Invited Presentations

MacDonald, D.G. Turbulent Geography, Tethered Ballasts, and Fractured Plumes: An update from the Coastal Engineering and Fluid Mechanics (CEFM) Lab. Invited Seminar for the UMass Dartmouth Department of Estuarine and Ocean Science Seminar Series, February 28, 2018.

MacDonald, D.G. Drifting With the Wind: Using Simple Drifters to Evaluate the Influence of Wind on a Mid-Size River Plume and an Overview of Other Research. Invited Seminar at the Massachusetts Division of Marine Fisheries, New Bedford, MA, March 2, 2016.

MacDonald, D.G. Comparing AUV and Shipboard Measurements of River Plume Turbulence. Naval Undersea Warfare Center, Newport, RI, April 2015.

MacDonald, D.G. Drifting With the Wind – Using Simple Drifters to Evaluate the Influence of Wind on a Mid-Size River Plume. Dept. of Naval Architecture and Ocean Engineering, United States Naval Academy, February 2015.

MacDonald, D.G. The Heterogeneity of Stratified Shear Turbulence in the Merrimack River Near-Field Plume. Applied Ocean Physics and Engineering Seminar, Woods Hole Oceanographic Institution, May 2014.

MacDonald, D.G. Energy and Environmental Science in the Coastal Environment. College of Engineering and Computer Sciences, New York Institute of Technology, March 2014.

MacDonald, D.G. River Plume Turbulence in the Coastal Ocean. Dept. of Naval Architecture and Ocean Engineering, United States Naval Academy, February 2014.

MacDonald, D.G. Exploring the Merrimack River Plume: What happens when the river ends? Dept. of Civil and Environmental Engineering, University of Massachusetts Lowell, November 2013.

MacDonald, D.G. Stratified shear turbulence in the Merrimack River plume. University of Rhode Island Graduate School of Oceanography, Physical Oceanography Seminar, April 26, 2013.

MacDonald, D.G. Development of a new low cost, low maintenance wave energy converter at UMass Dartmouth. UMass Dartmouth Mechanical Engineering Department Seminar, March 7, 2013.

MacDonald, D.G. “Recycling” Energy From the Sea: Marine renewable energy at UMass Dartmouth, and a new wave energy converter for near-shore use. Key note presentation at UMass Dartmouth Sigma Xi Exhibition, April 30, 2012.

MacDonald, D.G. A tale of two plumes: physics, practical application and politics. University of Maine, Dept. of Civil and Environmental Engineering. 14 April 2011.

MacDonald, D.G. Turbulent heterogeneity in a near-field plume. Woods Hole Oceanographic Institution, Applied Ocean Physics and Engineering Department, Coastal Ocean and Fluid Dynamics Laboratory (COFDL) seminar. 10 July 2010.

MacDonald, D.G. Structure and evolution of the Merrimack River Near-Field Plume. University of Rhode Island, Graduate School of Oceanography (GSO) Physical Oceanography seminar. 3 April 2009.

MacDonald, D.G. Near field structure of the Merrimack River plume. Woods Hole Oceanographic Institution, Applied Ocean Physics and Engineering Department, Coastal Ocean and Fluid Dynamics Laboratory (COFDL) seminar. 13 March 2009.

MacDonald, D.G. To mix or not to mix: Managing discharged heat in Mt. Hope Bay. University of Massachusetts School for Marine Science Research Colloquium. 22 January 2009.

MacDonald, D.G. An alternative to cooling towers in Mt. Hope Bay. Presentation to local elected officials at the request of Senator Joan Menard. 30 June 2008.

MacDonald, D.G. UMass Dartmouth and the Marine Renewable Energy Consortium. Energy Innovation Roundtable, organized by the Canadian Department of Foreign Affairs and International Trade. Cambridge, MA. 11 April 2008.

MacDonald, D.G. Measuring turbulence in the near-field of the Merrimack River plume. University of Connecticut Department of Marine Sciences. 4 April 2008.

MacDonald, D.G. Measuring turbulence in the near-field of the Merrimack River plume. UMass Dartmouth, School for Marine Science and Technology. 14 November 2007.

MacDonald, D.G. Recent studies on heat transfer in Mt. Hope Bay. U.S. Environmental Protection Agency, Region 1 Headquarters, Boston, MA. 29 October 2007.

MacDonald, D.G. Plumes, mixing and coastal engineering. Alden Research Laboratories, Holden MA. 10 August 2005

MacDonald, D.G. Mixing in a Salt Wedge Estuary: A Physical Overview of the Fraser River (British Columbia) Estuarine System. Southampton College (NY), 14 April 2004.

MacDonald, D.G. Mt. Hope Bay Natural Laboratory: Public School Outreach Opportunities. Somerset High School Science Faculty, 26 March 2004.

MacDonald, D.G. Science, the media, and Mt. Hope Bay: A Scientists perspective. University of Rhode Island/Metcalf Institute for Marine and Environmental Reporting & The Providence Journal, Science Seminar for Editors, 25 April 2003.

MacDonald, D.G., and W.R. Geyer. Turbulent kinetic energy and buoyancy flux in a highly stratified estuary. University of Massachusetts Dartmouth, School for Marine Science and Technology. 14 November 2002.

MacDonald, D.G., and W.R. Geyer. Turbulent kinetic energy and buoyancy flux in a highly stratified estuary. Texas A&M University, Department of Oceanography. 6 November 2002.

MacDonald, D.G. Estuaries and stratified flows. Woods Hole Oceanographic Institution, Exhibit Center Public Seminar Series. July 2001.

MacDonald, D.G., and W.R. Geyer. Salt wedge dynamics and diapycnal mixing in the Fraser River Estuary. Woods Hole Oceanographic Institution, Coastal Ocean Fluid Dynamics Laboratory (COFDL) seminar. September 2000.

MacDonald, D.G. Estuarine dynamics and mixing: An introduction to river channel oceanography. Woods Hole Oceanographic Institution, Joint Program Student Seminar series. August 2000.

Conference Sessions Chaired

Convened and Chaired Session (The Dynamics of Buoyancy Driven Flows in Estuaries, River Plumes and on the Continental Shelf), Ocean Sciences Meeting, February 2016, New Orleans, LA.

Chaired Session (Wave Energy), Marine Renewable Energy Center Technical Conference, January 2013, Warwick, RI.

Chaired Session (Wave Energy), Marine Renewable Energy Center Technical Conference, November 2010, Cambridge, MA.

Convened and Chaired Session (Mixing Processes and Buoyant Flows: Plumes and the Coastal Ocean), Ocean Sciences Meeting, February 2010, Portland, OR.

Chaired Session, Physics of Estuaries and Coastal Seas (PECS) Meeting, Sept. 2006, Astoria, OR.

Co-Organized Mid-Atlantic Bight Physical Oceanography and Meteorology (MABPOM) Meeting, October 2003, Fall River, MA.

Chaired Session, Mid-Atlantic Bight Physical Oceanography and Meteorology (MABPOM) Meeting, October 2003, Fall River, MA.

Co-Organized Natural and Anthropogenic Influences on the Mount Hope Bay Ecosystem Symposium, held at a joint meeting of the New England Estuarine Research Society and the Southern New England Chapter of the American Fisheries Society, May 2003, Fairhaven, MA.

Chaired Session, Natural and Anthropogenic Influences on the Mount Hope Bay Ecosystem Symposium, held at a joint meeting of the New England Estuarine Research Society and the Southern New England Chapter of the American Fisheries Society, May 2003, Fairhaven, MA.

**Academic
Service**

Chairperson, Dept. of Civil and Environmental Engineering (July 2018 – present)

CEN Faculty Search Committee, Chair, 2018-19

Graduate Program Director, CEN, 2018

UMassD Library Committee, January 2017-December 2018

Department (CEN) Curriculum Committee, 2014-18 (Chair 2015-18)

Department (CEN) Graduate Student Committee, 2014-18

Department (CEN) Faculty Evaluation Committee, 2014-18

UMassD PSM in Coastal Ocean Administration, Science and Technology (COAST), Implementation Committee, 2009-2016.

CEN Faculty Search Committee, 2015

ATMC Director Search Committee, 2015

College of Engineering Academic Council, 2014-15

University Calendar Committee, 2006-2014

DEOS Faculty Evaluation Committee, 2005-2006, 2009-2014

UMass School for Marine Science Curriculum Committee, 2006-12

SMAST Graduate Student Review Committee, 2006-12

SMAST Professional Science Masters (PSM) Program Implementation Committee, 2010-11

Search and Screen Committee for SMAST Dean, Oct. 2009 - December 2010

Department (DEOS) and School (SMAST) Curriculum Committees, 2003-2009

(Chair of Department and SMAST Committees 2006-09)

NEASC Working committee for Standard #6 (Students) 2008-09.

**Other
Professional
Activities**

Manuscript Reviewer

ASCE Journal of Hydraulic Engineering, Continental Shelf Research, Environmental Fluid Mechanics, Environmental Science and Technology, Estuaries and Coasts, Estuarine Coastal and Shelf Science, G-Cubed, Geophysical Research Letters, Hydrology Research, IEEE Journal of Oceanic Engineering, Journal of Atmospheric and Oceanic Technology, Journal of Geophysical Research, Journal of Marine Research, Journal of Marine Systems, Journal of Physical Oceanography, Journal of River Basin Management, Marine Environmental Research, Ocean Engineering, Ocean Modeling, Progress in Oceanography, Limnology, RI Seagrass, Water Quality Exposure and Health.

Proposal Reviewer

Coastal Response Research Center, Danish Innovation Foundation, Dansk Center for Havforskning, Marine Science and Technology Foundation, Marine Science and Technology Foundation, National Research Council Collaboration in Basic Science and Engineering (COBASE) Program, National Science Foundation, Science Foundation Ireland.

Review Panels and Technical Advisory Committees

Gulf of Mexico Research Initiative (2017)

National Science Foundation – Physical Oceanography (May 2008, May 2016)

Science Foundation Ireland (2012)

Cape Cod Commission, DCPC Technical Advisor – Renewable Energy Workgroup (2010-11)

Rhode Island Sea Grant (March 2007)

Memberships American Society of Civil Engineers
 American Geophysical Union
 Marine Technology Society

Honors National Science Foundation Graduate Fellow (1994-1999)
 UNH College of Engineering and Physical Sciences Class Marshall (1992)
 UNH Governor's Success Scholar (1988-1992)
 National Merit Scholar (1988)
 Presidential Scholar (1988).

CURRICULUM VITAE

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EDUCATION

1994	Ph.D	Civil and Environmental Engineering, Water Resources Department of Civil and Environmental Engineering Tufts University
1986	S.M.	Civil Engineering, Water Resources Department of Civil Engineering Massachusetts Institute of Technology
1983	B.S	Civil Engineering Department of Civil Engineering University of Massachusetts
1975	B.S	Zoology Department of Zoology University of Massachusetts

AWARDS AND FELLOWSHIPS

1991 Switzer Foundation Environmental Fellowship
Tau Beta Pi National Engineering Honor Society
Chi Epsilon National Civil Engineering Honor Society

PROFESSIONAL ORGANIZATION ACTIVITIES AND AFFILIATIONS

American Geophysical Union, Member

Book Reviewer

Peer Reviewer: Water Resources Research

American Society of Civil Engineers, Member

Water Resources Planning and Management Division:

Water Resources Systems Committee member

Peer Reviewer: Journal of Water Resources Planning and Management

International Association of Hydrological Sciences

Peer Reviewer: Hydrological Sciences Journal

American Water Resources Association, Member

Peer Reviewer: Journal of the American Water Resources Association

Peer reviewer: Journal of Hydrological Processes

PROFESSIONAL EMPLOYMENT

2001-date	Associate Professor of Civil and Environmental Engineering, University of Massachusetts, North Dartmouth, MA. Responsible for developing and teaching graduate and undergraduate courses in water resources engineering, hydrology, fluid mechanics, hydraulics, probability and statistics and engineering ethics.
1995-2001	Assistant Professor of Civil and Environmental Engineering, University of Massachusetts, North Dartmouth, MA.
1988-1995	Senior Hydrologist and Water Resources Engineer, Massachusetts Department of Environmental Protection, Boston, MA. Responsible for conceptualizing, developing and implementing a state-wide water allocation system as required by the Massachusetts Water Management Act. Tasks included formulating and conducting basic research that led to simplified basin and reservoir yield models, streamflow duration curves and time series at ungaged sites. Additional work consisted of devising and developing surface water and groundwater withdrawal permit guidelines and procedures, and modeling potential impacts due to proposed inter-basin water transfers.
1983-date	Consulting Hydrologist and Water Resources Engineer, HYSR, South Dartmouth, MA. Engage in technical water resources policy assessment and development, forensic hydrology, mathematical modeling, computer modeling and analysis of water resources systems.
1990-1994	Research Assistant and Lecturer (part-time), Tufts University Department of Civil and Environmental Engineering, Medford, MA. Conducted basic research with a focus on developing regional flow duration curve and streamflow time series models of daily streamflow for ungauged sites in the Northeast U.S. Research was supervised by Prof. Richard M. Vogel. Taught graduate level Hydrology and Water Resources Engineering and served as a graduate student thesis advisor.
1983-1986	Research Assistant, Massachusetts Institute of Technology Department of Civil Engineering, Cambridge, MA. Conducted basic research on the spatial characteristics of rainstorm depth under the supervision of Prof. Peter S. Eagleson and Prof. Ignacio Rodriguez-Iturbe. Tasks included the development of mathematical and computer models to improve global climate change models.
1982	Hydrologist, Development Analysis Associates, Cambridge, MA. Refined and applied stochastic and physically based water balance and irrigation models for the government of the Kingdom of Saudi Arabia. Efforts resulted in the extension of a desalinated seawater transmission network linking the Arabian Gulf and Riyadh with the city of Buraydah in the province of Qasim.
1976-1980	Water Resources Analyst and Technical Liaison, Development Analysis Associates Cambridge, MA. Assisted with the development and implementation of systems planning models and physically based stochastic hydrological models for the sea-water desalination utility of the government of the Kingdom of Saudi Arabia. Duties included technical liaison with ministerial level government officials. Final planning efforts resulted in the construction of over 350 MGD of seawater desalination capacity, 3,500 MW of electrical generation capacity and associated electrical and water transmission networks.

REFEREED PUBLICATIONS

P. Kirshen, S. Aytur, R. J. Hect, A. Walker, D. Burdeck, S. Jones, N. Fennessey, R. Bourdeau and L. Mather. *Integrated Urban Water Management Applied to Adaptation to Climate Change*. Urban Climate Journal, Vol 24, June, pp. 247-263, 2018.

R. Gyawali, V.W. Griffis, D.W. Watkins and N. M. Fennessey. *Regional Regression models for hydro-climate change impact assessment*. Hydrological Processes, Vol . 29, No. 8, pp. 1972-85, 2015.

Fennessey, N. M., *The Development of and Application of a Decision Support System Model to Test Alternative Instream Flow Augmentation Policies Within the Quinebaug River Watershed*, HYSR Inc., Prepared for Millennium Power Partners, L.P., September 2004.

Fennessey, N. M., R. Baglini, R. Baptista, P. Cordeiro, N. Cordello, C. Hudson, S. Orlowski and C. Vogt, *The Hydrology and Hydraulic Characteristics of the Lakes, Ponds and Reservoirs Within the Quinebaug River Watershed*, UMass-Dartmouth Department of Civil and Environmental Engineering, Hydrology and Water Resources Group Publication, September 2001.

Vogel, R.M., C.J. Bell, R.R. Suresh, and N.M. Fennessey, *Chapter 12 -Regional Assessment of the Impact of Climate Change on the Yield of Water Supply Systems*, in "Risk, Reliability, Uncertainty and Robustness of Water Resources Systems" (editors: J.J. Bogardi and Z.W. Kundzewicz), Cambridge University Press, pp. 101-110, 2001., May 2001.

Fennessey, N. M., *A Frequency and Event Duration Analysis of the State of New Hampshire's Proposed Instream Flow Rules*, HYSR, Inc., Prepared for the New Hampshire Department of Environmental Services, November 2000.

Fennessey, N.M., *Estimating Average Monthly Lake Evaporation in the Northeast United States*, J. of American Water Resources Association, Vol. 36, pp. 759-769, 2000.

Vogel, R.M., C. J. Bell, N.M. Fennessey, *Climate, Streamflow and Water Supply in the Northeast United States*, J. of Hydrology, Vol. 198, pp. 42-68, 1997.

Fennessey, N.M., *An Event Duration Analysis of New Hampshire's Proposed Instream Flow Rules*, J. New England Water Works Association, , Vol. 111, No. 2, pp. 107-126, 1997.

Fennessey, N.M. and R.M. Vogel, *Regional Models of Potential Evaporation and Reference Evapotranspiration in the Northeast U.S.A.*, J. of Hydrology, Vol. 184, pp. 337-354, 1996.

Fennessey, N.M., *Estimating the Firm Yield of a Surface Water Reservoir Supply System in Massachusetts: a Guidance Manual*, Prepared for the Massachusetts Department of Environmental Protection, UMass-Dartmouth Department of Civil and Environmental Engineering, Hydrology and Water Resources Group Publication January 1996.

Vogel, R.M. and N.M. Fennessey, *Flow Duration Curves II: Applications in Water Resources Engineering*, Water Resources Bulletin, Vol. 31, No. 6, pp. 1029-1039, 1995.

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PROCEEDINGS PUBLICATIONS, REPORTS AND THESES

Fennessey, N.M., *A Final Report on the Update of a Regional Streamflow Duration Curve Model for the Northeast United States and the Generation of Estimated Daily Flows Using the QPPQ Transform Method at Ungaged Sites in New Hampshire*, HYSR, Prepared for the New Hampshire Department of Environmental Services, March 2018.

Semra, A., Baker, R., Becker, M., Bourdeau, R., Burdick, D., Hannah, C., Fennessey, N., Hecht, J., Holt-Shannon, M., Johnson, K., Jones, S., Keeley, C., Kirshen, P., Mallory, B., Mather, L., Miller, S., Riley, C., Roseen, R., Stacey, P., Walker, A., Wake, C., Yaindl, C., and Zhao, S. *Collaborative Planning for Climate Change Adaptation: A Case Study in Great Bay National Estuarine Research Reserve*, August 15, 2015.

Fennessey, N.M., *Components of the Lake Sabbatia Lake Management Plan Scope of Work for the Canoe River Aquifer Area of Critical Environmental Concern*. Prepared for the Taunton Municipal Lighting Plant, Taunton, MA. UMass-Dartmouth Department of Civil and Environmental Engineering, Hydrology and Water Resources Group Publication, February 2012.

Finnie, J.I and N.M. Fennessey, *Direct Measurement of Student Outcomes with a Pipe Network Design*, Proceedings of the ASEE Northeast Region Conference, University of Hartford, Hartford, CT, April 29-30, 2011.

Mulligan, K.B, T.L. Duarte and N.M. Fennessey, *A Study of the Potential Impacts on Lake Sabbatia and Mill River Streamflow Due to the Reactivation of the Dever State School Wells in Taunton, MA*. Prepared for the Taunton Municipal Lighting Plant, Taunton, MA. UMass-Dartmouth Department of Civil and Environmental Engineering, Hydrology and Water Resources Group Publication, July 2010.

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Fennessey, N.M., *Recent Studies and Analyses of the Shepaug River and the City of Waterbury Water Supply System*, HYSR Inc., Prepared for Carmody and Torrance, LLP, New Haven, CT, Cicchetti and Tansley, Waterbury, CT and the City of Waterbury, Waterbury, CT, August 2005.

Fennessey, N.M., *History Helping Hydrology in the Quinebaug River Study*, Proceedings of the 2005 Watershed Management Conference, ASCE, Williamsburg, VA. July 19-22, 2005.

Fennessey, N.M., *Assessment of Alternative Streamflow Augmentation Schemes for the Restoration of the Quinebaug River Watershed*, 2005 UCOWR/NIWR Annual Conference Proceedings, River and Lake Restoration: Changing Landscapes, Universities Council on Water Resources/National Institute for Water Resources, Portland, ME. July 12-14, 2005.

Fennessey, N.M., *History Helping Hydrology in the Quinebaug River Study*, HYSR Inc., Prepared for Millennium Power Partners, L.P., December 2004.

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Fennessey, N.M., K. Burlingame, J. Dymont, P. Cordeiro and J. Quintal, *A User's Manual for the Canoe River Aquifer GIS Project CD-ROM*, UMass-Dartmouth Department of Civil and Environmental Engineering, Hydrology and Water Resources Group Publication, March 1999.

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Fennessey, N. M., *A Reliability-Yield Assessment of the Miller's Pond Reservoir Subject to the Potential Impacts of the Proposed Hunts Brook Pond Diversion Facility*. HYSR Inc., Prepared for the Baystate Environmental Consultants, Inc., Longmeadow, MA, August 1998.

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Fennessey, N. M., *Water Management in New Hampshire: An Overview and Preliminary Event Duration Analysis of Proposed Instream Flow Rules*, Proceedings of the 25th. Annual Conference of the Water Resources Planning and Management Division, ASCE, June 8-10, 1998, pp. 345-350.

Fennessey, N.M. and R.M. Vogel, *A Regional Model of Reference Evapotranspiration For the Northeastern United States*, Proceedings of the 24th. Annual Conference of the Water Resources Planning and Management Division, ASCE, April 7-10, 1997, pp. 778-783.

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Kirshen, P.H. and N.M. Fennessey, *The Impact of Potential Climate Change Upon the Water Supply of the Metropolitan Boston Area*, Proceedings of the 21st. Annual Conference of the Water Resources Planning and Management Division, ASCE, May 23-26, 1994, pp. 489-492.

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Fennessey, N.M., *Water Allocation in Massachusetts: Implementing the Water Management Act*, EOS, Transactions of the American Geophysical Union, Vol. 71, No. 43, pp. 1310.

Fennessey, N.M., Areal Coverage of Storm Precipitation: Observations of Air Mass Thunderstorms, S.M. Thesis, Massachusetts Institute of Technology, May 1986.

Eagleson, P.S., R. Caro and N.M. Fennessey, *Assessment of the Water Resources of the Kingdom of Saudi Arabia*, Prepared for the Saline Water Conversion Corporation, Kingdom of Saudi Arabia, August 1980.

PAPER PRESENTATIONS AT CONFERENCES, SEMINARS AND SYMPOSIA

Fennessey, N.M., “Estimating Daily Streamflow at Ungaged Sites in New Hampshire: a Modeling Update”, New Hampshire Department of Environmental Services, Concord, NH, March 29, 2018 (invited speaker).

Fennessey, N.M., “History Helping Science in the Quinebaug River Study” The 8th Annual Science Boot Camp for Librarians, UMass Dartmouth, June 15, 2016 (invited speaker).

Fennessey, N.M., “The Quinebaug River Study 1999-2004” The 15th Annual Thames River Floating Workshop, Sturbridge, MA, June 22, 2015 (invited speaker).

Fennessey, N.M., “History Helping Science in the Quinebaug River Study” The 15th Annual Thames River Floating Workshop, Sturbridge, MA, June 22, 2015 (invited speaker).

Fennessey, N.M., “Potential Climate Change Impacts to Streamflow in the Northeast U.S.,” The 36th Annual Meeting of the New England Association of Environmental Biologists, Falmouth, MA, March 21-23, 2012.

Fennessey, N.M., “Assessing Potential Climate Change Impacts to Streamflow in the Northeast U.S. Using Regional Flow Duration Curve Models,” The National Conference on Engineering & Ecohydrology for Fish Passage, University of Massachusetts, Amherst, MA. June 27-29, 2011.

Finnie, J.I and N.M. Fennessey, *Direct Measurement of Student Outcomes with a Pipe Network Design*, ASEE Northeast Region Conference, University of Hartford, Hartford, CT, April 29-30, 2011.

Fennessey, N.M., “Streamflow Measurement, Analysis, Modeling and Instream Flow Policy Assessment,” University of Connecticut, School of Law, Storrs, CT, March 1, 2011 (invited lecture).

Fennessey, N.M., “Potential Climate Change Impacts to Streamflow in the Northeast U.S.,” ASCE EWRI World Environmental & Water Resources Congress, Providence, RI. May 16-20, 2010.

Fennessey, N.M., “Assessing Potential Climate Change Impacts to Streamflow in the Northeast U.S. Using Regional Flow Duration Curve Models”, 66th Annual Northeast Fish and Wildlife Conference, Newton, MA. April 25-27, 2010.

Fennessey, N.M., "History Helping Hydrology in the Quinebaug River Study", ASCE EWRI, Williamsburg, VA. July 19-22, 2005.

Fennessey, N.M., "Assessment of Alternative Streamflow Augmentation Schemes for the Restoration of the Quinebaug River Watershed", Universities Council on Water Resources/National Institute for Water Resources, Portland, ME. July 12-14, 2005

Fennessey, N.M., "Water Conservation, Consumptive Use and Basin Safe Yield", Annual Conference on Watershed Conservation 2004, University of Massachusetts, Amherst, MA, September 17, 2004 (invited paper).

Fennessey, N.M., P. Parasiewicz and M.T. Goettel, "Assessment of Alternative Streamflow Augmentation Schemes for the Restoration of the Quinebaug River Watershed", World Water and Environmental Resources Congress 2004, ASCE, Salt Lake City, UT, June 27-July 1, 2004.

Parasiewicz, P. Fennessey N. and M. Goettel: "Defining restoration measures for the Quinebaug River, New England." 60th Annual Northeast Fish and Wildlife Conference, Ocean City, MD, April 25-28, 2004.

Fennessey, N.M., "New Hampshire Instream Flow Rules: Lessons from the Recent Past", University of New Hampshire, Durham, N.H., April 27, 2004 (invited lecture).

Parasiewicz, P. Fennessey N. and M. Goettel: "Defining measures to reduce fish habitat degradation in the Quinebaug River, New England." 133rd American Fisheries Society Annual Meeting, Quebec City, Quebec, Canada. August 10-12, 2003.

Sheer, D.P., N.M. Fennessey, K.R. Skov and C. Rooney, "The Conflict Between Instream Flow and Water Supply in Connecticut." 2nd. World Water and Environmental Resources Congress, ASCE, Philadelphia, PA, June 23-26, 2003.

Fennessey, N.M., "History Helping Science in the Quinebaug River Study", Tufts University, Medford, MA., April 23, 2003 (invited lecture).

Fennessey, N.M., "Model Assessment of Connecticut Water Planning Council Instream Flow Rules", University of Massachusetts, *Managing Massachusetts Environment for the Millennium*, Worcester, MA, November 15, 2002.

Fennessey, N.M., "History Helping Science in the Millennium Power Partner Quinebaug River Study", Southbridge Historical Society, Southbridge, MA, November 11, 2002 (invited speaker)

Fennessey, N.M., "The Sensitivity of Reservoir Firm Yield to Proposed Instream Flow Rules", State of Connecticut Water Planning Council, New Britain, CT., June 13, 2002, (invited speaker).

Fennessey, N.M., "The Sensitivity of Streamflow Statistics to Time Scale", State of Connecticut Water Planning Council, New Britain, CT., June 13, 2002, (invited speaker).

Fennessey, N.M., "A Review of Probability and Statistics", State of Connecticut Water Planning Council, New Britain, CT., June 13, 2002, (invited speaker).

Fennessey, N.M., "Estimating Flows on Ungauged Streams in the Northeast U.S.", State of Connecticut Water Planning Council, New Britain, CT., May 30, 2002, (invited speaker).

Fennessey, N.M., "Regional Annual Extreme Precipitation Modeling: Choose Your Parents Wisely", American Geophysical Union, Hydrology Section, Boston, Ma. May 29-June 1, 2001.

Fennessey, N.M., "Water Resource Management in New Hampshire: An Overview and Analysis of Proposed Instream Flow Rules", 1st. World Water and Environmental Resources Congress, ASCE, Orlando, FL., May 20-24, 2001, (invited speaker).

Fennessey, N.M., "The New Hampshire In-Stream Flow Rules: Analysis and New Water Storage Facilities Need". Boston Society of Civil Engineers, (invited). Hydraulics Section Meeting, Boston, Massachusetts, February 21, 2001, (invited speaker)

Fennessey, N.M., "Water Allocation in Massachusetts, a Case Study", Suwannee River Water Management District. Special Workshop on Minimum Streamflows and Levels, Live Oak, Florida, June 7, 2000, (invited speaker).

Fennessey, N.M., "Using Streamflow Duration Curves to Allocate Water in Massachusetts", Suwannee River Water Management District. Special Workshop on Minimum Streamflows and Levels, Live Oak, Florida, June 7, 2000, (invited speaker).

Fennessey, N.M., "Water Resources Planning Streamflows: How Low is the $Q_{7,10}$ Statistic?", American Water Resources Association, Wildland Hydrology Specialty Conference, Bozeman, Montana, June 30-July 2, 1999.

Fennessey, N.M., "The QPPQ Transform for Ungauged Stream Sites in the Northeast U.S.", American Geophysical Union, Hydrology Section, Boston, MA. June 1-4, 1999.

Fennessey, N.M., "A Method to Estimate Mean Monthly Lake Evaporation in the Northeast U.S.A.", Annual Water Resources Conference, American Water Resources Association, Point Clear, Alabama, November 17, 1998

Fennessey, N.M., "Water Management in New Hampshire: An Overview and Preliminary Event Duration Analysis of Proposed Instream Flow Rules", 25th. Annual Conference of the Water Resources Planning and Management Division, ASCE, June 8-10, 1998.

Fennessey, N.M., "Development of a Regional Model of Extreme Precipitation for the Northeast United States", American Geophysical Union, Hydrology Section, Boston, Ma. May 26-29, 1998.

Fennessey, N.M., "A Regional Streamflow Model for the Northeast United States", American Geophysical Union, Hydrology Section, Boston, Ma. May 26-29, 1998.

Fennessey, N.M., "Potential Impacts on Wewiantic River Streamflow Due to Water Withdrawals", 9th Annual Meeting of the Cod Cranberry Grower's Association, Plymouth, MA. February 25, 1998 (invited speaker).

Fennessey, N.M., "A Temperature Based Model to Estimate Reference Grass Evapotranspiration in the Northeast United States", American Geophysical Union, Hydrology Section, Baltimore, Md. May 27-30, 1997.

Fennessey, N.M. and R.M. Vogel, "A Regional Model of Reference Evapotranspiration For the Northeastern United States", 24th. Annual Conference of the Water Resources Planning and Management Division, ASCE, April 1997.

Fennessey, N.M., "The State of New Hampshire's Proposed Instream Flow Rules: Good Environmental Policy or a Regulator's Dream?" Tufts University, Medford, MA., November 4, 1996 (invited lecture).

Vogel, R.M., C. Bell, N. Fennessey, and R. Suresh, Regional Assessment of the Impact of Climate Change on the Reliability and Vulnerability of Water Supply Systems", Third Joint IHP/IAHS George Kovacs Colloquium, UNESCO, International Hydrological Programme, Paris, France, September 19-21, 1996

Fennessey, N.M. and R.M. Vogel, "Quantifying Outdoor Water Requirements for Urban Drought Management Planning in the Northeast U.S.", American Institute of Hydrology Annual Meeting, April 1996.

Vogel, R.M., C.J. Bell and N.M. Fennessey, "Climate, Streamflow and Water Supply in the Northeastern U.S.", American Institute of Hydrology Annual Meeting, April 1996.

Fennessey, N.M., "An Event Duration Analysis of New Hampshire's Proposed Instream Flow Rules", Annual meeting of the New England Water Works Association, Nashua, New Hampshire, January 18, 1996, (invited speaker).

Fennessey, N.M. and R.M. Vogel, "A Regional Model of Potential Evaporation for the Northeastern United States", 22nd. Annual Conference of the Water Resources Planning and Management Division, ASCE, May, 1995.

C.J. Bell, R.M. Vogel and N.M. Fennessey, "The Sensitivity of Water Supply Systems to Change in Climate, Storage, Reliability and Yield", 22nd. Annual Conference of the Water Resources Planning and Management Division, ASCE, May, 1995.

Fennessey, N.M. and R.M. Vogel, "A Regional Model of Streamflow for the Northeastern United States", 21st Annual Conference of the Water Resources Planning and Management Division, ASCE, May, 1994.

Vogel, R.M and N.M. Fennessey, "The Application of Flow Duration Curves in Water Resources Engineering", 21st Annual Conference of the Water Resources Planning and Management Division, ASCE, May, 1994.

Kirshen, P.H. and N.M. Fennessey, "The Impact of Potential Climate Change Upon the Water Supply of the Metropolitan Boston Area", 21st Annual Conference of the Water Resources Planning and Management Division, ASCE, May 1994.

Fennessey, N.M., "The Sensitivity of Reservoir Yield to Model Time Step and Moisture Fluxes", First Annual Meeting of the New England Section of the American Water Resources Association, Nov. 13, 1993, (invited speaker).

Fennessey, N.M., "The Sensitivity of Evapotranspiration and Evaporation to GCM Climate Change Scenarios in New England", Center for Applied Environmental Hydrology, University of Melbourne, Australia. March 21, 1992, (invited lecture).

Fennessey, N.M., "Water Allocation in Massachusetts", Worcester Polytechnic Institute, Worcester, MA. February 20, 1992, (invited lecture).

Kirshen, P.H. and N.M. Fennessey, *Possible Climate Change Impacts on the Water Supply of Boston Metropolitan Area*, First National Conference on Climate Change and Water Resources Management, Albuquerque, NM, May 1991.

Fennessey, N.M., "Water Allocation in Massachusetts: Implementing the Water Management Act", American Geophysical Union, Hydrology Section, San Francisco, CA. December 4-8, 1990.

Fennessey, N.M. and R.M. Vogel, "Flow Duration Curves at Ungauged Sites in Massachusetts", American Geophysical Union, Hydrology Section, San Francisco, CA. December 3-7, 1989.

Fennessey, N.M., "A Water Allocation Withdrawal Control Function", University of Massachusetts, Amherst, MA, May 12, 1989, (invited lecture).

ACADEMIC GRANTS, CONTRACTS AND FELLOWSHIP AWARDS

"Development of a Management Plan for Lake Sabbatia." City of Taunton Municipal Lighting Plant, Taunton, MA. January 15, 2008. \$50,000 in direct funds.

University of Massachusetts Foundation Professional Development Grant to present paper at the Environmental and Water Resources Institute ASCE Conference in Williamsburg, VA, July 19-22, 2005. \$500.

University of Massachusetts Foundation Professional Development Grant to present paper at the World Water and Environmental Resources ASCE Conference in Salt Lake City, UT, June 27-July 1, 2004. \$500.

"Long Pond and Clark Shores Water Resources Study", Town of Lakeville, MA. \$20,000 in direct funds.

"Development of an Operations Model of Sabbatia Lake", L&O Realty, Inc., \$12,000 in direct funds.

“Quinebaug River Restoration”, HYSR, Inc., Mar. 1, 2000-Feb. 28, 2001, \$32,440 in direct funds.

“The Continued Development of a Daily Streamflow Model for the Northeast United States”, HYSR, Inc., July 1, 1999-Feb. 28, 2000, \$10,500 in direct funds.

“Assessment of Non-Point Source Pollution in the Coles Brook Sub-watershed”, Massachusetts Department of Environmental Protection, Feb. 1, 1999-June 30, 1999, \$10,000 in direct funds.

“Development of a Geographical Information System (GIS) Map and Data Base of the Canoe River Aquifer”, Massachusetts Department of Environmental Protection, Feb. 1, 1998-July 31, 1998, \$29,500 in direct funds.

University of Massachusetts Foundation Professional Development Grant to present paper at the Spring Meeting of the American Geophysical Union, Baltimore, MD., May 27-30, 1997, \$500.

"The Continued Development and Application of Regional Hydrologic Models for the Northeast United States." U.S. Geological Survey, August 20, 1996-August 19, 1998, \$79,222 in direct funds.

The Switzer Foundation Environmental Fellowship, Fall 1991, \$10,000.

COURSES TAUGHT AT UNIVERSITY OF MASSACHUSETTS

CEN 303	Fluid Mechanics
CEN 325	Water Resources Engineering
CEN 313	Fluid Mechanics Laboratory
CEN 452	Ethics, Professionalism and Safety
CEN 491	Senior Civil Engineering Project
CEN 496	Directed Civil Engineering Study
CEN 501	Advanced Hydraulics and Open Channel Flow (graduate level)
CEN 428/504	Probability and Statistics for Civil and Environmental Engineers (undergrad. and graduate level)
CEN 453/502	Hydrology (undergraduate and graduate level)

COURSES TAUGHT AT TUFTS UNIVERSITY

CE-112	Hydrology and Water Resources Engineering (undergraduate and graduate level)

Curriculum Vita

EDUCATION

- **Johns Hopkins University**, Baltimore, MD
Ph.D. in Structural Mechanics, 2010
Dissertation Title: Fundamental Solid Mechanics Studies on Plate and Shell Structures with Applications to Vibration Analysis of High-speed Trains
- **Johns Hopkins University**, Baltimore, MD
M.Sc. in Structural Mechanics, 2007
Thesis Title: Classifier-Based Prediction of Strain Concentration in Fiber-reinforcement Composites
- **University of Tehran**, Tehran, Iran
M.Sc. in Structural and Earthquake Engineering, 2002
Thesis Title: A Numerical Investigation of the Behavior of a New Passive Damping System
- **Iran University of Science and Technology**, Tehran, Iran
B.Sc. in Civil Engineering, 2000

ACADEMIC AND PROFESSIONAL HONORS

- **The Civil Engineering Graduate Student Teaching Award**, Department of Civil Engineering, Johns Hopkins University (2008)
- **National Science Foundation and Air Force Office of Research Graduate Student Fellowship**, Travel award to support student participants in Ninth US Theoretical and Applied Mechanics Congress, USTAM (2007)
- **University of Missouri Rolla Graduate Student Fellowship**, Travel award to support student participants in National Science Foundation Design, Service and Manufacturing Grantees Research Conference (2006)
- **First Woman Valedictorian** Department of Civil Engineering, Iran University of Science and Technology (2000)

EXPERIENCE

- **Assistant Professor**, University of Massachusetts Dartmouth (Sept. 2016 – Present)
- **Research Affiliate**, Massachusetts Institute of Technology (Sept. 2016 – Present)
- **Postdoctoral Research Associate**, Massachusetts Institute of Technology (2012 – 2016)
- **Part-time Lecturer**, University of Massachusetts Dartmouth (Spring 2011 & Fall 2012)
- **Postdoctoral Research Fellow**, Johns Hopkins University (2011 – 2012)
- **Research Assistant**, Johns Hopkins University (2004 – 2010)
- **Teaching Assistant**, Johns Hopkins University (2005 & 2008)
- **Civil Engineer**, MAPNA Co. (Iran Power Plant Project Management) (2002 – 2004)

PEER REVIEWED JOURNAL PUBLICATIONS

M. Akbarian, **A. Louhghalam**, M. Tootkaboni, and F.J. Ulm, Hidden Excess Fuel Consumption in Pavement Systems. *submitted*.

M. Botshekan, M. Tootkaboni, and **A. Louhghalam**, Global Sensitivity of Roughness-Induced Fuel Consumption to Road Surface Parameters and Car Dynamic Characteristics. *Accepted for publication in Journal of Transportation Research Record* (2019).

A. Louhghalam, M. Tootkaboni, T. Igusa, and F.J. Ulm, Closed-Form Solution of Road Roughness-Induced Vehicle Energy Dissipation. *Journal of Applied Mechanics*, Vol. 86, No. 1, 011003, (2019).

A. Louhghalam, R.J. Pellenq, and F.J. Ulm, Thermalizing and Damping in Structural Dynamics, *ASME, Journal of Applied Mechanics*, Vol. 85, No. 8, 081001, 2019.

F. Ponzoni, F. Giustozzi, **A. Louhghalam**, J. Gregory, and R. Karchin, Sensitivity Analysis of a Deflection-induced Pavement-Vehicle Interaction model, *Road Materials and Pavement Design*, 1-19, 2018.

A. Kermani, A. Ashrafi, and **A. Louhghalam**, A Modal Approach to Determine Direct Shear of Beams Subjected to Impulse, *Journal of Engineering Structures*, Vol. 156, 46-55, 2018.

J.K Kim, **A. Louhghalam**, G. Lee, B. W. Schafer, D. Wirtz and D. H Kim, Nuclear Lamin A/C Harnesses the Perinuclear Apical Actin Cables to Protect Nuclear Morphology, *Nature Communications*, Vol. 8, No 1, 2123, 2017.

A. Louhghalam, M. Akbarian and F.J. Ulm, Carbon Management of Infrastructure Performance: Integrated Big Data Analytics and Pavement-Vehicle-Interactions, *Journal of Cleaner Production* Special issue on Improving natural resource management and human health to ensure sustainable societal development based upon insights gained from working within "Big Data Environments", Vol. 142, No 2, 489-1130, 2017.

B. Amirzadeh, **A. Louhghalam**, M. Raessi and M. Tootkaboni, A computational framework for the analysis of rain-induced erosion in wind turbine blades, part I: Stochastic rain texture model and drop impact simulations, *Journal of Wind Engineering and Industrial Aerodynamics*, Vol. 163, 33-43, 2017.

B. Amirzadeh, **A. Louhghalam**, M. Raessi and M. Tootkaboni, A computational framework for the analysis of rain-induced erosion in wind turbine blades, part II: Drop impact-induced stresses and blade coating fatigue life, *Journal of Wind Engineering and Industrial Aerodynamics*, Vol. 163, 44-54, 2017.

A. Louhghalam and F.J. Ulm, Risk of Pavement Fracture due to Eigenstresses at Early Ages and Beyond, *Journal of Engineering Mechanics*, Vol. 142, No 12, 2016.

E. Coleri, J.T. Harvey, I. Zaabar, **A. Louhghalam** and K. Chatti, Model Development, Field Section Characterization and Model Comparison for Excess Vehicle Fuel Use Due to Pavement Structural Response, *Transportation Research Record: Journal of the Transportation Research Board*, accepted 2016.

A.S. Fallah, Y. Yang, R. Ward, M. Tootkaboni, R. Brambleby, **A. Louhghalam** and L.A. Louca, Wave propagation in two-dimensional anisotropic acoustic metamaterials of K4 topology, *Wave Motion*, Vol. 58, 2015.

A. Louhghalam, M. Tootkaboni and F.J. Ulm, Roughness-Induced Vehicle Energy Dissipation: Statistical Analysis and Scaling, *Journal of Engineering Mechanics*, Vol. 141, No 11, 2015.

A. Louhghalam, M. Akbarian and F.J. Ulm, Roughness-Induced Pavement-Vehicle Interactions: Key Parameters and Impact on Vehicle Fuel Consumption, *Transportation Research Record: Journal of the Transportation Research Board*, No. 2525, 62-70, 2015.

A. Louhghalam, M. Akbarian and F.J. Ulm, Flugge's Conjecture: Dissipation- vs. Deflection-Induced Pavement-Vehicle Interactions, *Journal of Engineering Mechanics*, Vol. 14, No 8, 2014, *Featured Article*.

A. Louhghalam, T. Igusa and M. Tootkaboni, Dynamic Characteristics of Thin Laminated Composite Cylindrical Shells: Asymptotic Analysis Accounting for Edge Effect, *Journal of Composite Structures*, Vol. 112, 22-37, 2014.

M. M. Gargari, **A. Louhghalam** and M. Tootkaboni, Optimal Folding of Cold Formed Steel Cross Sections under Compression, *Journal of Thin Walled Structures*, Vol. 76, 145-156, 2014.

A. Louhghalam, M. Akbarian and F.J. Ulm, Scaling Relations of Dissipation-Induced Pavement – Vehicle Interactions, *Transportation Research Record: Journal of the Transportation Research Board*, No. 2457, 95-104, 2014.

A. Louhghalam, T. Igusa, C. Park, S. Choi and K. Kim, Analysis of Stress Concentrations in Plates with Rectangular Openings by a Combined Conformal Mapping - Finite Element Approach, *International Journal of Solids and Structures*, Vol. 16, 1991-2004, 2011.

S.R. Arwade, M. Moradi and **A. Louhghalam**, Variance Decomposition and Global Sensitivity for Structural Systems, *Engineering Structures*, Vol. 32, 1-10, 2010.

A. Louhghalam and S.R. Arwade, Prediction of Incipient Damage Sites in Composites Using Classifiers, *International Journal of Damage Mechanics*, Vol. 19, 233-260, 2010.

PEER REVIEWED CONFERENCE PROCEEDINGS

S. Farzanian, **A. Louhghalam**, B.W. Schafer and M. Tootkaboni, Geometric Imperfec-

tions in Shell Finite Element Models of CFS Members, *Proceedings of the Annual Stability Conference of Structural Stability Research Council*, Baltimore, Maryland, April 2018.

A. Louhghalam, T. Petersen and F.J. Ulm, Translating Environmentally-Induced Eigenstresses to Risk of Fracture for Design of Durable Concrete Pavements. *Proceedings of the Euro-C 2018 conference: Computational Modeling of Concrete and Concrete Structures*, Bad Hofgastein, Austria, February 2018.

J. Mack, M. Akbarian, F. J. Ulm, and **A. Louhghalam**, Pavement-Vehicle Interaction Related Research at the MIT Concrete Sustainability Hub, *ASCE Transportation & Development Institute (T&DI) International Conference on Highway Pavements & Airfield Technology*, August 2017, Philadelphia, PA.

A. Boushehrian, **A. Louhghalam**, L. Khazanovich and F.J. Ulm, Assessment of Pavement Deflection-Caused Fuel Consumption Via FWD Data, *Transportation Research Board*, 2016.

M. Akbarian, **A. Louhghalam**, S. Shetty and F.J. Ulm, Network Analysis of Virginia's Interstate Pavement-Vehicle Interactions: Mapping of Roughness and Deflection Induced Excess Fuel Consumption, *Transportation Research Board*, 2015.

M. Akbarian, **A. Louhghalam** and F.J. Ulm, Mapping the Excess-Fuel Consumption due to Pavement Vehicle Interaction: a Case Study of Virginia's Interstate System, *International Symposium on Pavement LCA*, Davis, CA, October 2014.

A. Louhghalam, M. Akbarian and F.J. Ulm, Pavement Infrastructure's Footprint: The Impact of Concrete and Asphalt Pavement Properties on Vehicle Fuel Consumption. *Proceedings of the Euro-C 2014 conference: Computational Modeling of Concrete and Concrete Structures*, St. Anton, Austria, March 2014.

M. Tootkaboni, **A. Louhghalam** and T. Igusa, Statistical Analysis of Variability in Floor Response Spectra Using Random Vibration Theory, *Proceedings of the 11th International Conference on Structural Safety and Reliability (ICOSSAR)*, Columbia University, New York, NY, May 2013.

M. M. Gargari, **A. Louhghalam** and M. Tootkaboni, Optimal Cross Sections for Cold Formed Steel Members under Compression, *Proceedings of the World Congress of Structural and Multidisciplinary Optimization*, Paper No. 5591, May 2013.

T. Igusa, **A. Louhghalam**, S. Choi and C.S. Park, Improved STFT analysis using a kernel method and order spectra, *Proceedings of the Korean Society of Noise and Vibration Engineering*, Annual autumn conference, 133-139, 2008.

A. Louhghalam and S.R. Arwade, Prediction of Damage Initiation Locations in Random Composite Materials Using Classification, *Proceedings of the 18th Engineering Mechanics Conference*, ASCE, Blacksburg, VA, June 2007.

S.R. Arwade, T. Igusa, **A. Louhghalam** and L. Tan, Reduced Order Representation Analysis, and Design of Random Material Microstructures, *Proceedings of the 2006 NSF-DMI grantees conference*, St. Louis, July 2006.

INVITED TALKS

Invited Speaker: “Road roughness identification and pavement roughness-induced vehicle fuel consumption”, MIT-Lafarge day, MIT, Cambridge, Dec 4, 2017

Invited Speaker: “Integration of big data and PVI models for carbon management”, HPC-day, UMASSD, May 2017.

Invited Speaker: “Sustainability of civil infrastructure, Integration of big data and mechanics-based models, CSCVR research day, UMASSD, May 2017.

Invited Speaker: “Quantitative Engineering Sustainability, Handshake of mechanistic models and lifecycle environmental footprint”, Dean’s advisory council, UMass Dartmouth, April 2017.

Seminar Speaker: “Paving the way towards more sustainable roadway network: mechanics based quantitative sustainability”, Worcester Polytechnic Institute, Worcester MA, March, 2017.

Seminar Speaker: “Quantitative Engineering Sustainability: integration of mechanistic models in life cycle footprint”, University of Massachusetts Dartmouth, Joint Seminar for MNE and EAS, Dartmouth, MA, November, 2016.

Seminar Speaker: “Quantitative Engineering Sustainability: Where Mechanistic Models Meet Life Cycle Environmental Footprint”, University of Pittsburgh, Pittsburgh, PA, April 2016.

Seminar Speaker: “Quantitative Engineering Sustainability: Where Mechanistic Models Meet Life Cycle Environmental Footprint”, University of Michigan Ann Arbor, Ann Arbor, MI, February 2016.

Seminar Speaker: “Quantitative Engineering Sustainability: Where Mechanistic Models Meet Life Cycle Environmental Footprint”, University of Illinois Urbana Champaign, Champaign, IL, February 2016.

Seminar Speaker: Mechanics-Based Quantitative Engineering Sustainability: Application to Pavement Infrastructure, Princeton University, Princeton, NJ, April 2015.

Seminar Speaker: Mechanics-Based Quantitative Engineering Sustainability: Application to Pavement Infrastructure, University of Southern California, Los Angeles, CA, March 2015.

Seminar Speaker: Mechanics for Quantitative Engineering Sustainability: Application to Pavement Infrastructure, University of Tennessee Knoxville, Knoxville, TN, March 2015.

Keynote Speaker: Quantification of Pavement Infrastructure Use-Phase Footprint, Progress in Concrete, ACI Quebec and East Ontario Chapter, Quebec City, Dec 2014.

Keynote Speaker: Pavement Environmental Footprint: How Pavement Properties Impact Vehicle Fuel Consumption, Iberoamerican Concrete Pavements Congress, Cancun Mexico, October 2014.

Seminar Speaker: Novel Predictive Models to Study the Behavior of High-Performance Structures, Department of Civil and Environmental Engineering, University of Massachusetts Amherst, Amherst, MA, February 2014.

Seminar Speaker: Novel Predictive Models to Study the Behavior of High-Performance Structures, Department of Civil and Environmental Engineering, New Jersey Institute of Technology, Newark, NJ, February 2014.

Seminar Speaker: Vibration Study of High-Performance Structures, Department of Civil Engineering, Texas A&M University, College Station, TX, April 2012.

Seminar Speaker: Reliability Analysis and Damage Prediction in High-Performance Structural Systems, Department of Civil Engineering, New Mexico State University, Las Cruces, NM, February 2010.

CONFERENCE PRESENTATIONS

X. Wang, M. Botshekan, and A. Louhghalam, Texture and Disorder: Impact on Fracture Properties of Porous Materials, EMI Conference, ASCE, Massachusetts Institute of Technology, Cambridge, MA, May 2018.

M. Botshekan, and A. Louhghalam, Vibrations of Periodically Supported Beams Subjected to Moving Loads: Application to Bridges and Railways, EMI Conference, ASCE, Massachusetts Institute of Technology, Cambridge, MA, May 2018.

M. Botshekan, M. Tootkaboni, and A. Louhghalam, Global Sensitivity of Roughness-Induced Pavement-Vehicle-Interaction to Road Surface Parameters and Car Dynamic Characteristics, EMI Conference, ASCE, Massachusetts Institute of Technology, Cambridge, MA, May 2018.

S. Farzanian, A. Louhghalam, B. Schafer and M. Tootkaboni, Geometric Imperfection Models in Shell FE Analysis of CFS Members: Validation through Data-Drive Stochastic Models, EMI Conference, ASCE, Massachusetts Institute of Technology, Cambridge, MA, May 2018.

A. Louhghalam, T. Petersen and F.J. Ulm, Translating Environmentally-Induced Eigenstresses to Risk of Fracture for Design of Durable Concrete Pavements, Bad Hofgastein, Austria, February 2018.

A. Asadpoure, A. Louhghalam, L. Valdevit, and M. Tootkaboni, Ultra-dissipative multi-phase metamaterials: topological design under uncertainty, SES Conference, Northeastern University, Boston, MA, July 2017.

- A. Louhghalam, T. Petersen, F.-J. Ulm, Effect of thermo-chemo-mechanical eigenstress on durability of concrete: A fracture mechanics approach, SES Conference, Northeastern University, Boston, MA, July 2017.
- A. Louhghalam, M. Tootkaboni and F.J. Ulm, A closed-form solution for road roughness-induced greenhouse gas emission EMI Conference, ASCE, University of California San Diego, San Diego, CA, June 2017.
- A. Asadpoure, A. Louhghalam, and M. Tootkaboni, Design of ultra-dissipative multiphase materials microstructure under uncertainty, Mach Conference, Annapolis, MD, April 2017.
- A. Louhghalam, M. Tootkaboni, M. Gonzalez, F. J. Ulm, Impact of Vehicle Speed and Traffic Flow on Pavement-Vehicle Interaction Emissions at the Network Level, EMI Conference, ASCE, Vanderbilt University, Nashville, TN, May 2016.
- M. Akbarian, A. Louhghalam and F. J. Ulm, Quantitative Assessment of Pavement Use Phase Impacts on Vehicle Fuel Consumption, EMI Conference, ASCE, Vanderbilt University, Nashville, TN, May 2016.
- A. Louhghalam and F. J. Ulm, Risk of fracture at early ages: a criterion for cutting pavement joints, EMI Conference, ASCE, Vanderbilt University, Nashville, TN, May 2016.
- A. Louhghalam, M. Akbarian and F.J. Ulm, Towards sustainable roads: mechanistic PVI models and network data analysis, EMI Conference, ASCE, Stanford University, Stanford, CA, June 2015.
- A. Louhghalam, M. Akbarian and F.J. Ulm, Roughness-Induced Pavement-Vehicle Interactions: Key Parameters and Impact on Vehicle Fuel Consumption, Transportation Research Board, Washington, DC, January 2015.
- M. Akbarian, A. Louhghalam and F.J. Ulm, Mapping the Excess-Fuel Consumption due to Pavement Vehicle Interaction: a Case Study of Virginia's Interstate System, International Symposium on Pavement LCA, Davis, CA, October 2014.
- A. Louhghalam, M. Akbarian and F.J. Ulm, A Mechanistic Model for Roughness-Induced Pavement Vehicle Interaction and its Impact on Vehicle Fuel Consumption, EMI Conference, ASCE, McMaster University, Hamilton, Ontario, August 2014.
- A. Louhghalam, T. Igusa and M. Tootkaboni, Perturbation Analysis of Modal Properties in Laminated Composite Cylinders: Accounting for Edge Effect, First International Conference on Mechanics of Composites, Stony Brook University, NY, June 2014.
- A. Louhghalam, M. Akbarian and F.J. Ulm, Pavement Infrastructure Footprint: The Impact of Concrete and Asphalt Pavement Properties on Vehicle Fuel Consumption. Euro-C 2014 conference: Computational Modeling of Concrete and Concrete Structures, St. Anton, Austria, March 2014.

A. Louhghalam, M. Akbarian and F.J. Ulm, A Mechanistic Approach to Pavement-Vehicle Interaction in the US Roadway Network, EMI Conference, ASCE, Northwestern University, IL, August 2013.

M. Tootkaboni, A. Louhghalam and T. Igusa, Statistical Analysis of Variability in Secondary System Response Spectra in Primary-Secondary Systems, EMI Conference, ASCE, Northwestern University, IL, August 2013.

M. Tootkaboni, A. Louhghalam and T. Igusa, Statistical Analysis of Variability in Floor Response Spectra Using Random Vibration Theory, 11th International Conference on Structural Safety and Reliability (ICOSSAR), Columbia University, NY, May 2013.

M. M. Gargari, A. Louhghalam and M. Tootkaboni, Optimal Cross Sections for Cold Formed Steel Members under Compression, WCSMO-10, Orlando, FL, May 2013.

A. Louhghalam, M. Akbarian and F.J. Ulm, A Mechanistic Approach for Pavement-Vehicle Interaction in LCA: Analysis of Deflection, Meet the CSHub, MIT, Cambridge, MA, February 2013.

A. Louhghalam, M. Tootkaboni and T. Igusa, Perturbation Analysis of Modal Properties of Laminated Composite Cylinders: Accounting for Edge Effect, EMI/PMC Conference, University of Notre Dame, IN, June 2012.

J. Gong, A. Louhghalam and B.W. Schafer, Computational Modeling of Cells and Actin Filament Networks, Cancer Nano-tech Symposium, Johns Hopkins Institute for NanoBioTechnology, Baltimore, MD, May 2011.

A. Louhghalam and T. Igusa, Analysis of Stresses in Plates with Rectangular Openings Using Coarse Finite Element Meshes, New England Workshop on the Mechanics of Materials and Structures, Harvard University, Cambridge, MA, September 2010.

A. Louhghalam and S.R. Arwade, Prediction of Damage Initiation Locations in Random Composite Materials Using Classification, EMI Conference, ASCE, Virginia Polytechnic Institute, Blacksburg, VA, June 2007.

S.R. Arwade, T. Igusa, L. Tan and A. Louhghalam, Classifier based methods for evaluating localization in heterogeneous materials. Ó European Conference on Fracture (CFRAC), Nantes, France, June 2007.

A. Louhghalam, S.R. Arwade and T. Igusa, Representation of Random Composite Materials Using Basis Functions Extracted From Principal Component Analysis, 15th U.S. National Congress on Theoretical and Applied Mechanics, Boulder, CO, June 2006.

TECHNICAL REPORTS

J. Harvey, J.D. Lea, C. Kim, E. Coleri, I. Zaabar, A.Louhghalam, K. Chatti, J. Buscheck, and A. A. Butt, Simulation of cumulative annual impact of pavement structural response

on vehicle fuel economy for California test sections, Technical Report, UCPRC-RR-2015-05, Davis, California, 2016.

T. Igusa and A. Louhghalam, Development of Design Recommendations for Light Car Bodies with High Structural Reliability, KRRI Research Reports, Year 2, August 2009.

T. Igusa and A. Louhghalam, Development of Design Recommendations for Light Car Bodies with High Structural Reliability, KRRI Research Reports, Year 1, August 2008.

GRANTS RECEIVED

1. National Science Foundation, Collaborative Research: A Data-centric Uncertainty-informed Framework for Resilience Analytics of Critical Infrastructure Under Extreme Climate Events, **Principal Investigator** with Mazdak Tootkaboni (UMass Dartmouth, CEN) and Roshanak Nateghi (Purdue University, Industrial Engineering and Environmental and Ecological Engineering), Amount requested by UMass Dartmouth: \$224,341, *awarded*.
2. UMASS president office Technology Development Fund grant, MASSive Road IDentification (MASS-RIDE): Crowd sourcing and real-time Inverse analysis for road roughness characterization and fuel consumption estimation, **Principal Investigator** with Mazdak Tootkaboni (UMass Dartmouth, CEN), submitted a pre-proposal on Dec 4 2017, and a full proposal on Jan 26 2018, selected for the final presentation to the review committee on March 7 2018. \$25,000 *awarded*.
3. National Science Foundation, Session on Fostering Engineering Mechanics Research Community Diversity and Inclusion; 2018 ASCE Engineering Mechanics Institute Conference, **Principal Investigator** with Shirley Dyke (Purdue University CEN) and Sara Wadia-Fascetti (Northeastern University, CEN) Amount requested by UMass Dartmouth: \$44,950, *awarded*.
4. Multidisciplinary Seed Funding: Mechanical behavior of bone in a simulated diabetic state **Co-Principal Investigator** with Lamya Karim (UMass Dartmouth, BNG) and Vijaya Chalivendra (UMass Dartmouth, MNE), \$29,130, *awarded*.
5. CSCVR Seed funding: Novel Base-isolators for Vibration Control, with Alireza Asadpoure, \$5,500, *awarded*.

GRANTS SUBMITTED/UNDER REVIEW

1. National Cooperative Highway Research Program, IDEA grant, Real-time estimation of road surface condition and roughness-induced fuel consumption and GHG emissions via crowd-sourcing, **Principal Investigator**, with Mazdak Tootkaboni (UMass Dartmouth CEN), Amount requested by UMass Dartmouth: \$149,852, *pending*.
2. National Institute of Health, R15 grant, Multi-scale mechanical characterization and cellular assessment of non-enzymatic glycation in human bone, Co-PI with Lamya Karim (UMass Dartmouth BNG), Vijay Chalivendra (UMass Dartmouth MNE) and Maricris Mayes (UMass Dartmouth CHM), Amount requested by UMass Dartmouth: \$300,000, *pending*.

3. Massachusetts Department of Transportation Problem Statement, Developing a Procedure to Quantify the Binder Contribution from Recycled Materials in Asphalt Mixtures with Walaa Mogawer, Mazdak Tootkaboni (UMass Dartmouth, CEN), *pending*.
4. National Institute of Health, R15 grant, Multi-scale mechanical characterization of non-enzymatic glycation and its inhibition in human bone, Co-PI with Lamya Karim (UMass Dartmouth BNG), Vijay Chalivendra (UMass Dartmouth MNE) and Maricris Mayes (UMass Dartmouth CHM), Amount requested by UMass Dartmouth: \$300,000, *declined*.
5. National Science Foundation, MRI: Acquisition of a Nanoindenter for testing wide range of materials across the departments in College of Engineering, Co-PI with Vijaya Chalivendra and Jun Li (UMass Dartmouth MNE), Lamya Karim and Milana Vasudev (UMass Dartmouth BNG), Amount requested by UMass Dartmouth: \$325,621, *declined*.
6. Collaborative Research: La-Z-Walls: Topologically Optimized Meta-Structures for Wind-Induced Vibration Mitigation, **Principal Investigator**, with Alireza Asadpoure, Mazdak Tootkaboni (UMass Dartmouth, CEN) and Lorenzo Valdevit, Haitham Taha (UCI, Mech and Aerospace Eng) Amount requested by UMass Dartmouth as the lead institution: \$398,563, *declined*.
7. Collaborative Research: Collaborative Research: A Data-Centric Approach for Robust Infrastructure Resilience Modeling in High-Dimensional Parameter Space, **Principal Investigator**, with Mazdak Tootkaboni (UMass Dartmouth, CEN) and Roshanak Nateghi, Dan Chavas (Purdue University) Amount requested by UMass Dartmouth: \$279,717, *declined*.
8. Collaborative Research: Meta-Foundations, Topologically Optimized Foundations for Seismic Hazard Mitigation, **Principal Investigator**, with Alireza Asadpoure, Mazdak Tootkaboni (UMass Dartmouth, CEN) and Lorenzo Valdevit (UCI, Mech and Aerospace Eng), National Science Foundation, \$397,148 *declined*.
9. Texas Department of Transportation Problem Statement, Evaluation of the Aging of Concrete Pavements with SCM due to Environmental Exposure in TX Climate: Quantification of Vehicle Stopping Length and Fuel Consumption due to Environment, Driven Deterioration of Pavement Surface with Konrad Krakowiak (UH, CEN), *declined*.

TEACHING EXPERIENCE

- **Assistant Professor**, University of Massachusetts Dartmouth
 - Mechanical Vibrations (MNE 441), undergraduate level (Fall 2016, 2018)
 - Mechanics of Materials (CEN202), undergraduate level (Spring 2017)
 - Engineering Reliability (CEN430, CEN530, MNE490, MNE591), undergraduate/graduate level (Fall 2017)
- **Part-time Lecturer**, University of Massachusetts Dartmouth
 - Analysis and Design of Reinforced-Concrete Structures, undergraduate (Fall 2012)
 - Earthquake Engineering and Structural Dynamic (Spring 2011)

- **Teaching Assistant**, Johns Hopkins University
 - Dynamics, undergraduate level (2008)
 - Structural Reliability, graduate level (2005)
 - Structural Mechanics, graduate level (2005 and 2008)

OTHER PROFESSIONAL ACTIVITIES

· Referee of Scholarly Journals:

1. International Journal of Engineering Fracture Mechanics
2. International Journal of Pavement Engineering
3. Journal of Nanomechanics and Micromechanics, ASCE
4. International Journal of Solids and Structures
5. Journal of Engineering Mechanics (ASCE)
6. Journal of Nanomechanics and Micromechanics, ASCE
7. Journal of Thin-Walled Structures
8. Journal of Applied Mathematical Modeling
9. Journal of Transportation Research Board
10. International Journal of Pavement Engineering

· Course Work/Workshop Attendance:

1. Attended one day workshop, focusing on grant writing and NSF different programs, Bangor, ME, October 2016
2. Marseille Winter School on Multiscale Porous Materials, Jan 23-27, 2017, Marseille, France.
3. Bayesian Model Updating and Uncertainty Quantification: Theory, Computational Tools, and Applications, UCSD, San Diego, CA, June 2017.
4. STAR (Scholarship Teaching Academics Recognition) symposium, a full day workshop for teaching excellence with the focus on pedagogical approaches.

· Conference Session Chair:

1. Organizer of Panel Session on Fostering Engineering Mechanics Research Community Diversity and Inclusion (Sponsored by National Science Foundation), MIT May 2018.
2. Organizer of Mini-Symposium on General Engineering Mechanics, MIT May 2018, with with Franz-Josef Ulm (MIT)
3. Organizer of Mini-Symposium on Quantitative Engineering Sustainability and Resilience, Physics-Based and Data-Driven Modeling and Prediction, MIT May 2018, with with Franz-Josef Ulm (MIT), Roger Ghanem (USC) Marta Gonzales (MIT)
4. Organizer of Mini-Symposium on Quantitative Engineering Sustainability

Engineering Mechanics Conference, UCSD, June 2017, with Franz-Josef Ulm (MIT), Roger Ghanem (USC) Marta Gonzales (MIT)

Engineering Mechanics Conference, Vanderbilt University, May 2016, with Franz-Josef Ulm (MIT), Roger Ghanem (USC) Marta Gonzales (MIT) and Ram Rajagopal (Stanford)

Engineering Mechanics Conference, Stanford University, June 2015, with Marta Gonzales (MIT) and Roger Ghanem (USC)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- Associate Member, American Society of Civil Engineers, ASCE
- Member, Engineering Mechanics Institute, EMI
- Elected Member, Probabilistic Mechanics Committee (PMC)¹ of EMI
- Elected Member, Mechanics of Pavement Committee ² of EMI
- Core Faculty Member, Computational Solid and Structural Mechanics (CS2M)³ Group

¹PMC is a technical committee of Engineering Mechanics Institute and promotes and fosters research in uncertainty analysis, model validation methods and risk-informed decision-making

²The goal of this committee is to promote the advancement of knowledge and understanding in the mechanics of pavement structures and paving materials by conducting fundamental and applied research using analytical, experimental, and/or computational methods.

³CS2M is under auspices of UMass Dartmouth Scientific Computing Group and focuses on computational modeling of solids and structures

WALAA S. MOGAWER, Ph.D., P.E., F. ASCE

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Professor - Department of Civil & Environmental Engineering
University of Massachusetts Dartmouth
285 Old Westport Rd. North Dartmouth, MA 02747



AND



Director - Highway Sustainability Research Center (HSRC)
University of Massachusetts Dartmouth
151 Martine Street, Fall River, MA 02723

EDUCATION & PROFESSIONAL DEVELOPMENT

- Ph.D. *Civil Engineering*: Studying the effects of deicing additives on the properties of asphaltic materials in terms of their resistance to permanent deformation, moisture damage and low temperature cracking.
University of Rhode Island, Kingston, RI, May 1989.
- M.Sc. *Civil Engineering - University of Rhode Island, Kingston, RI, May 1984.*
- B.Sc. *Civil Engineering - Kuwait University, Kuwait, May 1981.*

Professional Development

1. *Techniques for Pavement Rehabilitation*. Hosted by American Society of Civil Engineers (ASCE) in Orlando, Florida. November 15-17, 2006.
2. *An Introduction to Mechanistic-Empirical Pavement Design*. Hosted by Vermont Agency of Transportation (VTrans). June 2005.
3. *Pavement Preservation: Integrating Pavement Preservation Practices and Pavement Management*. Hosted by Federal Highway Administration (FHWA) and MassDOT. January 2006.
4. *Pavement Preservation: Selecting Pavements for Preventative Maintenance*. Hosted by Applied Pavement Technology, INC in Concord, NH. 2005.
5. *SuperPave Mixture Test Equipment*. The Asphalt Institute, Lexington, Kentucky.
6. *Superpave Binder Test Equipment*. The Asphalt Institute, Lexington, Kentucky.
7. *NHI Course 13114 - Highway Pavements*, Michigan State University, East Lansing, Michigan.
8. *Professor Training Program in Asphalt Technology*. National Center for Asphalt Technology, Auburn University, Auburn.
9. *AutoCAD Level One - Operating Systems and Applications*. New England Institute of Technology, Warwick, Rhode Island.
10. *Instron's Operator Training Course No. 2150 OP-0121*. Canton, Massachusetts.

PROFESSIONAL ACADEMIC EXPERIENCE

2014 - Present	Department Chair	Department of Civil and Environmental Engineering <i>University of Massachusetts Dartmouth</i>
2002 – Present	Professor	Department of Civil and Environmental Engineering <i>University of Massachusetts Dartmouth</i>
2002 – Present	Director & Founder	Highway Sustainability Research Center (HSRC) <i>University of Massachusetts</i>
2002 – 2004	Department Chair	Department of Civil and Environmental Engineering <i>University of Massachusetts Dartmouth</i>
1989 – 2004	Adjunct Professor	Civil and Environmental Engineering <i>University of Rhode Island</i>
1996 – 2001	Associate Professor	Department of Civil and Environmental Engineering <i>University of Massachusetts Dartmouth</i>
1989 – 1996	Assistant Professor	Department of Civil and Environmental Engineering <i>University of Massachusetts Dartmouth</i>
1988 – 1989	Instructor	Civil and Environmental Engineering <i>University of Rhode Island</i>
1982 – 1987	Teaching & Research Assistant	Civil and Environmental Engineering <i>University of Rhode Island</i>

FOUNDING & DEVELOPMENT OF THE UNIVERSITY OF MASSACHUSETTS HIGHWAY SUSTAINABILITY RESEARCH CENTER

Date	Milestone
1990	Dr. Mogawer established the Pavement Materials Laboratory as part of the University of Massachusetts Dartmouth Civil and Environmental Engineering Department. Prior to this time, no existing research resources (instrumentation or space) were available for this type of research. Laboratory was started without monetary support from the University.
1993	Dr. Mogawer began securing outside funding with a National Science Foundation (NSF) grant through the Major Research Instrumentation (MRI) program. First major piece of research instrumentation acquired and dedicated laboratory space established.
1994	Dr. Mogawer proposes many new research endeavors to the Massachusetts Department of Transportation (MassDOT) [Formerly known as MassHighway].
1995 - 2000	Dr. Mogawer secures and completes seven research projects for MassDOT totaling approximately \$810,000 in funding. Numerous undergraduate Civil Engineering students hired to work on these projects at the Pavement Materials Laboratory under the direction of Dr. Mogawer. Many critical pieces of pavement related research instrumentation acquired for these projects.
2001	Due to success in establishing an active research program, Dr. Mogawer is invited to move the Pavement Materials Laboratory to the University's new research facility in Fall River Massachusetts called the Advanced Technology & Manufacturing Center (ATMC). The laboratory facility space was expanded greatly in order to accommodate the research instrumentation obtained through years of funded research.

HSRC Founding & Development Timeline (Continued)

Date	Milestone
2001 - 2003	Dr. Mogawer proposed new research to outside funding sources. Dr. Mogawer was successful in securing funding from MassDOT, Chelsea Center for Recycling and Economic Development, and the New England Transportation Consortium. In total six new research projects were awarded totaling approximately \$881,000. Many undergraduate Civil Engineering students were hired to work on these projects and many critical pieces of pavement related research instrumentation acquired.
2003	Due to success in securing research funding, Dr. Mogawer hired a full time research engineer to assist with the research projects and operations of the laboratory. This professionally registered research engineer still currently works with Dr. Mogawer at the HSRC.
2003	The Pavement Materials Laboratory earned accreditation by the American Association of State Highway and Transportation Officials (AASHTO) AMRL program in areas of aggregate and hot mix asphalt testing.
2003 -2005	Dr. Mogawer was successful in securing funding from MassDOT, the Vermont Agency of Transportation and the New England Transportation Consortium. In total seven new research projects were awarded totaling approximately \$626,000. Many undergraduate Civil Engineering students were hired to work on these projects.
2006	Dr. Mogawer was successful in securing funding the first pooled fund research for the laboratory through the Transportation Pooled Fund (TPF) program. This research project totaling \$365,000 was performed for the state Department of Transportation agencies for Massachusetts, New York, Connecticut, New Jersey, New Hampshire and Rhode Island. Due to the addition of a graduate program, both graduate and undergraduate Civil Engineering students were hired to work on this project.
2007	The Pavement Materials Laboratory began conducting sponsored research with private entities (private companies, contractors, etc.). Through Dr. Mogawer's efforts, approximately \$562,000 of private research funding has been secured since 2007.
2007	Dr. Mogawer successfully teamed with Advanced Asphalt Technologies, LLC (AAT) as a Co-PI for the National Cooperative Research Program (NCHRP) Project 9-43: Mix Design Practices for Warm Mix Asphalt
2008	The Pavement Materials Laboratory name was formally changed to the Pavement Research Institute of Southeastern Massachusetts (PRISM).
2009	Due to active research program and funding, the Pavement Research Institute of Southeastern Massachusetts (PRISM) was formally recognized by the University of Massachusetts as a research center. The PRISM name was formally changed by decree of the University of Massachusetts President to the Highway Sustainability Research Center (HSRC).
2009 - Present	Dr. Mogawer was successful in securing funding from existing and new sources. Funding sources include MassDOT, MassDOT & Federal Highway Administration Massachusetts Division, Federal Aviation Administration, Transportation Pooled Fund Program, Rhode Island DOT and New England Transportation Consortium.

PROFESSIONAL SPONSORED RESEARCH EXPERIENCE

I. Ongoing Sponsored Research

ROLE	TITLE	SPONSOR	DURATION	AMOUNT
PI	Characterization of Reclaimed Asphalt Pavement (RAP) for HMA Surface Courses in Massachusetts	MassDOT	2017-2020	\$783,997
PI	Pavement Condition Survey & Preservation Treatment Selection for the Town of Wellesley, MA	Town of Wellesley	2017-2018	\$51,825
PI	Development of a Hamburg Wheel Tracking Device (HWTB) Test Criterion for MaineDOT Asphalt Mixtures	MaineDOT	2016-2018	\$72,308
PI	MassDOT Implementation of SHRP 2 Technologies: Preservation Approaches for High Traffic Volume Roadways - Product R26	FHWA/MassDOT	2014 - 2017	\$119,979
			Total =	\$1,028,109

II. Completed Sponsored Research

ROLE	TITLE	SPONSOR	DURATION	AMOUNT
PI	HMA Mixtures Containing Recycled Asphalt Shingles (RAS): Low Temperature and Fatigue Performance of Plant-Produced Mixtures	New England Transportation Consortium	2014-2017	\$249,784
PI	Selection of Pavement Preservation Strategies for Wellesley, MA	Town of Wellesley Massachusetts	2009-2017	\$33,817
PI	Evaluating the Performance of a Typical New England Asphalt Mixture Designed Using Asphalt Binders Modified with Re-refined Engine Oil Bottoms	FHWA/MassDOT	2015 - 2016	\$550,000
PI	Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology	New England Transportation Consortium	2013-2017	\$150,000
PI	Evaluation of the Effect of Reduced Gyrotory Compaction Level on Massachusetts Superpave Mixtures	FHWA/MassDOT	2013-2017	\$400,000
PI	Preventive Maintenance and Timing of Applications	New England Transportation Consortium	2013-2017	\$242,000
PI	Using "Green" Technology to Provide a Crack Resistant Thin Overlay for Rhode Island	RIDOT	2012-2014	\$90,000

II. Completed Sponsored Research (Continued)

ROLE	TITLE	SPONSOR	DURATION	AMOUNT
PI	Determination of the Virgin Binder Grade for RAP-HMA Mixes Utilizing High Percentages of RAP	FHWA/MassDOT	2012-2015	\$499,954
PI	TPF-5(146) Evaluation of Modified Performance Grade Binders in Thin Lift Maintenance Mixes, Surface Mix, and a Reflective Crack Relief Layer Mix	MassDOT NYSDOT ConnDOT NJDOT NHDOT RIDOT	2006-2013	\$365,000
PI	Continued Services for MassDOT - Highway Division Pavement Management Activities	FHWA/ MassDOT	2010-2012	\$267,000
PI	Evaluation of Specialized Hot Mix Asphalt Mixes for Massachusetts	FHWA/ MassDOT	2008-2012	\$405,070
PI	Fix it First: Utilizing the Seismic Property Analyzer and MMLS to Develop Guidelines for the Use of Polymer Modified thin Lift HMA vs. Surface Treatments	New England Transportation Consortium	2006-2012	\$203,323
Co-PI	NCHRP 9-43: Mix Design Practices for Warm Mix Asphalt	National Cooperative Highway Research Program	2007-2009	\$73,784
PI	Continued Operation of the MassHighway Pavement Profiler Certification Site and Annual Completion of Certification Procedures	MassHighway	2009	\$100,000
PI	Laboratory and Field Evaluation of Warm Mix Asphalt Technology	MassHighway	2005-2007	\$47,337
PI	Validation and Correlation of Pavement Profiling Devices for QC/QA	MassHighway	2003 - 2007	\$170,774
PI	Relating HMA Pavement Density to Performance	New England Transportation Consortium	2001 - 2009	\$103,524
Co-PI	Determining the Effective PG Grade of Binder in RAP Mixes	New England Transportation Consortium	2004 - 2007	\$39,483
Co-PI	Evaluation of a Field Permeameter as a Longitudinal Joint Quality Indicator	New England Transportation Consortium	2003-2006	\$8,773

II. Completed Sponsored Research (Continued)

ROLE	TITLE	SPONSOR	DURATION	AMOUNT
PI	Design of Superpave HMA for Low Volume Roads	New England Transportation Consortium	2001 - 2003	\$123,000
PI	Evaluation of Asphaltic Expansion Plug Joints	New England Transportation Consortium	2001 - 2003	\$62,236
PI	Evaluation of Permeability of Superpave Mixes	New England Transportation Consortium	2000 - 2001	\$100,002
PI	Updating MassHighway Distress Manual	MassHighway	2000 - 2001	\$30,162
PI	Phase I: Implementation of Superpave	MassHighway	1997 - 2000	\$404,000
PI	A Procedure for Correlating Distress/Ride Indices	MassHighway	1995 - 1997	\$100,396
PI	Freeze and Thaw Study	MassHighway	1996 - 1997	\$60,000
PI	Evaluation of the Road System in Massachusetts	MassHighway	1996 - 1997	\$100,000
PI	Phase Two: ADA Compatible Soft-Surface Multi-use Trail	MassHighway	1996 - 1997	\$40,000
PI	ADA-Compatible and Environmentally Sensitive Soft-Surface Trail Materials for Construction of Multi-Use Trails	MassHighway	1995 - 1996	\$60,000
Co-PI	Structural Numbers for Reclaimed Base Course Mix	MassHighway	1994 - 1995	\$45,000
PI	Enhancing the Materials Testing Laboratory	National Science Foundation	1993 - 1994	\$120,000
			Total =	\$5,244,419

III. Sponsored Research for Private Entities

ROLE	TITLE	SPONSOR	DURATION	AMOUNT
PI	Evaluating Rejuvenating Agents and Warm Mix Additives	Warner Babcock Institute for Green Chemistry	2014	\$13,880
PI	Evaluating the Performance of Hot Mix Asphalt Mixtures Designed with Asphalt Rubber Products	Tinna Group of Companies	2013	\$50,640
PI	Testing Services for Auburn-Candia 20995 Project – Highway for Life	Pike Industries NH	2012-2013	\$127,146
PI	Innovative Pavement Preservation Materials and Technologies for the New York State Thruway Authority (Thruway)	New York State Thruway Authority (Thruway)	2012	\$75,000
PI	On-Site Hot Mix Asphalt (HMA) Testing Services	JH Lynch	2012	\$18,000
PI	Evaluating Rejuvenating Agents and Warm Mix Additives	Sonneborn Inc.	2012	\$13,880
PI	Laboratory Evaluation of Foamed Asphalt Binder & Mixtures	Palmer Paving Corporation	2012	\$27,200
PI	Laboratory Evaluation of Foamed Asphalt Binder & Mixtures	PJ Keating	2012	\$27,200
PI	Performing Workability Tests for Mixtures with Evotherm	MeadWestvaco Corporation	2012	\$45,000
PI	Polymer-Modified Thin Overlay with RAP	Kraton Polymers LLC	2011	\$32,640
PI	Marshall Mix Designs	Mario Susi HMA	2008	\$54,821
PI	On-Site Hot Mix Asphalt (HMA) Testing Services	JH Lynch	2008	\$14,150
PI	Moisture Susceptibility Testing	PQ Corporation	2008	\$7,668
PI	Evaluation of ADVERA® WMA Aluminosilicate – Phase 1	PQ Corporation	2007 - 2008	\$42,288
PI	Polymer Modified Asphalt Mix Designs	Hudson Liquid Asphalts Incorporated	2007 - 2008	\$26,634
			Total =	\$576,147

IV. Private Consulting Experience

Date	Project	Sponsor
2002	Existing Conditions and Pavement Design Recommendations for Route 3 North Transportation Improvement Project	VHB/Vanassee Hangen Brustlin, Inc. Middletown, Connecticut.
2002-2003	Evaluation of Complex Polymer-Modified Asphalt Binders Using the FHWA ALF	SaluT, Inc. / Federal Highway Administration
2000 - 2001	Evaluation of Complex Polymer-Modified Asphalt Binders	Federal Highway Administration
2000	Preparing Superpave Specimens using Different SGC Angles	The Asphalt Institute
1995 – 1999 (4 Separate Engagements)	Validation of Superpave Binder and Mixture Tests and Other Mixture Tests Using the FHWA's Accelerated Loading Facility	Federal Highway Administration
1994	Effects of Different Mineral Fillers on Stone Matrix Asphalt Properties	Federal Highway Administration
1993	Study of Stone Mastic Asphalt Gradations	Federal Highway Administration
1992	Evaluation of Stone Mastic Asphalt Mixtures versus Dense Graded Mixtures	Federal Highway Administration
1991	Evaluation of Test Methods Used to Quantify Sand Shape and Texture	Federal Highway Administration

PUBLICATIONS

I. Refereed Journal Publications

W. Mogawer and A.J. Austerman. “Effects of Using Re-Refined Engine Oil Bottoms as an Asphalt Binder Modifier.” Accepted for publication for International Conference on Advances in Materials and Pavement Performance Prediction (AM₃P), 2018.

W. Mogawer, A.J. Austerman, K. Stuart, M. Marasteanu and M. Nazzal. “Influence of Asphalt Binder Formulation and Source on the Performances of Binders with the Same Continuous PG.” Accepted for publication Journal of the Association of Asphalt Paving Technologist (AAPT) 2018.

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M. Zokaei Ashtianai, **W. Mogawer**, and A. J. Austerman. “A Mechanical Approach to Quantify Blending of Aged Binder from Recycled Materials in New Hot-Mix Asphalt Mixtures” Accepted for publication in Transportation Research Record (TRR): Journal of the Transportation Research Board, Transportation Research Board, Washington, D.C., 2018.

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E. Holcombe, M. Nazzal, **W.S. Mogawer**, A. J. Austerman and S. Kaya. “Evaluating Asphalt Binders Prepared with Different Processes to Meet the Same Performance Grade: Use of Atomic Force Microscope ” Transportation Research Record (TRR): Journal of the Transportation Research Board, No. 2632, Transportation Research Board, Washington, D.C., 2017, pg. 99-109.
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W.S. Mogawer, A.J. Austerman, and S. Underwood. “Effect of Binder Modification on the Performance of an Ultrathin Overlay Pavement Preservation Strategy” In Transportation Research Record (TRR): Journal of the Transportation Research Board, No. 2550, Transportation Research Board, Washington, D.C., 2016, pg. 1-7.

M. Nazzal, **W.S. Mogawer**, A.J. Austerman, L. Qtaish, and S. Kaya “Multi-scale Evaluation of the Effect of Rejuvenators on the Performance of High RAP Content Mixtures” Construction and Building Materials 101, 2015, pp.50–56.

W.S. Mogawer, E. H. Fini, A. J. Austerman, A. Booshehrian, and B. Zada “Performance Characteristics of High Reclaimed Asphalt Pavement Containing Bio-Modifier.” Journal of Road Materials and Pavement Design (RMPD), Vol. 17- Issue 3, 201, pg. 753-767.

W.S. Mogawer, A.J. Austerman, R. Roque, S. Underwood, L. Mohammad, and J. Zou “Aging and Rejuvenators: Understanding Their Impact on High RAP Mixtures Fatigue Cracking Characteristics Using Advanced Mechanistic Models and Testing Methods” International Journal of Road Materials and Pavement Design (RMPD), Vol. 16, Supplement 2, Special Issue: Papers from the 90th AAPT, 2015, pp. 1-28.

W.S. Mogawer, T. Bennert, A.J. Austerman and C. Ericson “Investigating the Aging Mitigation Capabilities of Rejuvenators in High RAP Mixtures Using Black Space Diagrams, Binder Rheology and Mixture Tests” Journal of the Association of Asphalt Paving Technologist (AAPT), Vol. 84, 2015, pg. 705-738.

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I. L. Howard, G L. Baumgardner, W S. Jordan, A. M. Menapace, **W S. Mogawer**, and J M. Hemsley. "Haul Time Effects on Unmodified, Foamed, and Additive Modified Binders Used in Hot Mixed Asphalt." In Transportation Research Record (TRR): Journal of the Transportation Research Board, No. 2347, Transportation Research Board, Washington, D.C., 2013, pg. 88-95.

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W.S. Mogawer, A.J. Austerman, R. Kluttz and M. Roussel. "Performance and Workability Characteristics of High Performance Thin Lift Overlays Incorporating High RAP Content and Warm Mix Asphalt Technology" Transportation Research Record (TRR): Journal of the Transportation Research Board, No. 2293, Transportation Research Board, Washington, D.C., 2012, pg. 18-28.

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W.S. Mogawer, A.J. Austerman and G.J. Doyle. “Design, Construction and Implementation of Superpave Pilot Projects under a Quality Assurance Program”. International Journal of Pavement Engineering (IJPE). Volume 11 - Issue 1, pg. 71-82, February 2010.

G. Al-Khateeb, K. Stuart, **W. S. Mogawer** and N. Gibson, “Fatigue Performance: Asphalt Binders versus Mixtures versus Full-Scale Pavements,” Canadian Journal of Transportation (CJT), Vol. 2, Part 1, 2008, pp. 13-33. <http://journals.hil.unb.ca/index.php/CJT/article/view/5927/11862>.

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A. Shenoy, K. D. Stuart and **W. S. Mogawer**. “Do Asphalt Mixtures Correlate Better with Mastics or Binders in Evaluating Permanent Deformation?” Transportation Research Record: Journal of the Transportation Research Board, No. 1829, Bituminous Binders 2003, Transportation Research Board, Washington, D.C., 2003, pp 16-25.

K.D. Stuart and **W.S. Mogawer**. “Validation of the Superpave Asphalt Binder Fatigue Binder Cracking Parameter Using the FHWA's Accelerated Loading Facility.” Journal of the Association of Asphalt Pavement Technologists (AAPT), Vol. 71, 2002.

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K.W. Lee, and **W.S. Mogawer**. "Utilization of Oil Spill Cleanup Debris into Bituminous Concrete Mixtures." Australian Road Research Board, 1988, pp. 54-64.

II. Refereed Conference/Proceedings Publications

W.S. Mogawer, A. Soliman, and A. J. Austerman "Understanding Influence of Moisture on Performance of Plant-Produced High Reclaimed Asphalt Pavement Content Mixtures Incorporating Warm-Mix Asphalt Technologies." Transportation Research Board 96th Annual Meeting, Washington D.C., January 2017.

W.S. Mogawer, M. Ashtiani and A. J. Austerman "Performance Characterization of Asphalt Mixtures Incorporating Recycled Asphalt Shingles: Mechanical Approach to Asphalt Binder Degree of Blending" Transportation Research Board 96th Annual Meeting, Washington D.C., January 2017.

W.S. Mogawer, A.J. Austerman, and R. Bonaquist "Using Space Diagrams to Evaluate the Effect of Softer Binder and Warm Mix Technologies in Reclaimed Asphalt Pavement Mixtures" Transportation Research Board 95th Annual Meeting, Washington D.C., January 2016.

W.S. Mogawer, A.J. Austerman, and S. Vahidi "Characteristics of Asphalt Mixtures Modified with Treated Rubber Added During the Mixing Process" Transportation Research Board 95th Annual Meeting, Washington D.C., January 2016.

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W.S. Mogawer, A.J. Austerman, R. Kluttz and L. Mohammad. "Performance Based Specifications for High Performance Thin Overlay Mixtures Incorporating Reclaimed Asphalt Pavement." Transportation Research Board 93rd Annual Meeting, Washington D.C., January 2014.

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W.S. Mogawer, A.J. Austerman and M. Roussel “Performance Characteristics of Asphalt Rubber Mixtures Containing RAP and Warm Mix Asphalt Technology.” 2nd International Warm-Mix Asphalt Conference Proceedings, St. Louis MO, October 11-13, 2011.

W.S. Mogawer, A.J. Austerman, B.E. Engstrom, and R. Bonaquist. “Incorporating High Percentages of Recycled Asphalt Pavement (RAP) and Warm Mix Asphalt (WMA) Technology into Thin Hot Mix Asphalt Overlays to be Utilized as a Pavement Preservation Strategy”. Transportation Research Board (TRB) 88th Annual Meeting. January 2009. Paper #09-1275. CDROM.

A.J. Austerman, **W.S. Mogawer** and R. Bonaquist. “Evaluating the Effects of Warm Mix Asphalt Technology Additive Dosages on the Workability and Durability of Asphalt Mixtures Containing Recycled Asphalt Pavement”. Transportation Research Board (TRB) 88th Annual Meeting. January 2009. Paper #09-1279. CDROM.

A.J. Austerman, **W.S. Mogawer**, and R. Bonaquist. “Investigation of the Influence of Warm Mix Asphalt Additive Dose on the Workability, Cracking Susceptibility, and Moisture Susceptibility of Asphalt Mixtures Containing Reclaimed Asphalt Pavement.” Canadian Technical Asphalt Association (CTAA) Proceedings. Moncton - New Brunswick, pg. 51-71, November 2009.

W.S. Mogawer, A.J. Austerman, and R. Bonaquist. “Laboratory Development and Field Trials of Thin-Lift Hot Mix Asphalt Overlays Incorporating High Percentages of Reclaimed Asphalt Pavement with Warm Mix Asphalt Technology.” Canadian Technical Asphalt Association (CTAA) Proceedings. Moncton - New Brunswick, pg. 73-97, November 2009.

W.S. Mogawer and A.J. Austerman. Laboratory and Field Evaluation of Warm Mix Asphalt Technology”. International Society for Asphalt Pavements (ISAP). Proceedings of the International ISAP Symposium, Switzerland, August 18th-20th, 2008.

W.S. Mogawer and A.J. Austerman. Massachusetts Inertial Profiler Certification Utilizing AASHTO Specifications and Cross Correlation”. Transportation Research Board (TRB) 86th Annual Meeting. January 2007. Paper #07-0493. CDROM.

W.S. Mogawer and A.J. Austerman “Evaluation of Asphaltic Expansion Joints for Bridges in New England.” Transportation Research Board (TRB) 85th Annual Meeting Annual Meeting, January 2006 Paper #06-0627. CDROM.

J. A. Sherwood, X. Qi, P. Romero, K. D. Stuart, and **W. S. Mogawer**. “Full-Scale Pavement Testing from FHWA Superpave Validation Study” International Conference on Accelerated Pavement Testing, Reno, NV, October 18-20, 1999.

K. D. Stuart, **W. S. Mogawer**, and P. Romero. “Validation of the Superpave Asphalt Binder Rutting Parameter.” American Society of Civil Engineers, Proceedings of the Fifth ASCE Materials Engineering Congress, Cincinnati, OH, May 10-12, 1999.

III. Technical Reports

W.S. Mogawer, and A.J. Austerman. “Field Monitoring of Experimental Hot Mix Asphalt Projects Placed in Massachusetts” Final Report. Massachusetts Department of Transportation. June 30th, 2017.

W.S. Mogawer, and A.J. Austerman. “Evaluating the Performance of a Typical Massachusetts Asphalt Mixture Designed Using Asphalt Binders Modified with Re-refined Engine Oil Bottoms (REOB)” Final Report. Massachusetts Department of Transportation. December 31st, 2016.

W.S. Mogawer, A.J. Austerman. T.Pauli, S. Salmans, and J. Planche “Determination of the Binder Grade and Performance of High Percentage RAP-HMA Mixes” Final Report. Massachusetts Department of Transportation. December 31st, 2015.

W.S. Mogawer and A.J. Austerman. “Evaluation of Modified Performance Grade Binders in Thin Lift Maintenance Mixes and a Reflective Crack Relief Layer Mix” Final Report. Massachusetts Highway Department. Final report for Transportation Pooled Fund Study TPF-5(146), December 31st, 2013.

W.S. Mogawer and A.J. Austerman. “Evaluation of Specialized Hot Mix Asphalt Mixes for Massachusetts” Final Report. Massachusetts Highway Department. December 31st, 2012.

W.S. Mogawer, J.S. Daniel, A.J. Austerman, B. Engstrom “Fix It First: Utilizing the Seismic Property Analyzer and MMLS to Develop Guidelines for the Use of Polymer Modified Thin Lift HMA vs. Surface Treatments” Report NETCR 91. Project No. NETC 03-6. September 2012.

W.S. Mogawer, A.J. Austerman, and J.S. Daniel. “Relating Hot Mix Asphalt Pavement Density to Performance” New England Transportation Consortium (NETC). Report NETCR 76. Project No. NETC 02-1. April 1st, 2010.

W.S. Mogawer and A.J. Austerman. “Validation and Correlation of Pavement Profiling Devices for Quality Assurance” Final Report. Massachusetts Highway Department. May 31st, 2007.

W.S. Mogawer, A.J. Austerman, and J.J. Gazzi. “Shared Use Path Fencing Usage”. Final Report. Vermont Agency of Transportation (VTrans). May 1st, 2007.

W.S. Mogawer and A.J. Austerman. “Laboratory and Field Evaluation of Warm Mix Asphalt Technology to Determine its Applicability for Massachusetts”. Final Report. Massachusetts Highway Department. December 2006.

W.S. Mogawer and A.J. Austerman. “Phase II: Implementation of Superpave Technology in Massachusetts”. Final Report. Massachusetts Highway Department. December 2006.

W.S. Mogawer and A.J. Austerman. “Evaluation of Asphaltic Expansion Joints”. New England Transportation Consortium (NETC). Report NETCR 50. Project No. NETC 99-2. November 30th, 2004.

K. D. Stuart and **W. S. Mogawer**. “Comparison of the Fatigue Cracking Performances of Pavements to the Continuous Intermediate-Temperature Grades of the Asphalt Binders,” Federal Highway Administration, McLean, VA, January 2004, 17 pp.

W.S. Mogawer, R.B. Mallick, M.R. Teto, and W.C. Crockford. “Evaluation of Permeability of Superpave Mixes.” New England Transportation Consortium (NETC). Report NETCR 34. Project No. NETC 00-2, July 2002.

W.S. Mogawer, P. Cordeiro, M.G. Austerman, C. Fung and N. Perlov. “Implementation of Superpave in Massachusetts”. Final Report. MassHighway December 2001.

K. D. Stuart, J. S. Youtcheff, and **W. S. Mogawer**. “Understanding the Performance of Modified Asphalt Binders in Mixtures: Evaluation of Moisture Sensitivity.” Publication No. FHWA-RD-02-029, Federal Highway Administration, McLean, VA, October 2001, 17 pp.

K. D. Stuart and **W. S. Mogawer**. “Understanding the Performance of Modified Asphalt Binders in Mixtures: Permanent Deformation Using a Mixture with Diabase Aggregate.” Publication No. FHWA-RD-02-042, Federal Highway Administration, McLean, VA, December 2001, 57 pp.

K. D. Stuart, **W. S. Mogawer** and P. Romero. “Validation of Asphalt Binder and Mixture Tests That Measure Rutting Susceptibility Using the Accelerated Loading Facility.” Publication No. FHWA-RD-99-204, Federal Highway Administration, McLean, VA, November 1999, 348 pp.

K. D. Stuart, **W. S. Mogawer**, and P. Romero. “Validation of the Superpave Asphalt Binder Fatigue Cracking Parameter Using The FHWA’s Accelerated Loading.” Publication No. FHWA-RD-01-093, Federal Highway Administration, McLean, VA, April 2001, 87 pp.

W.S. Mogawer “Freeze and Thaw Study.” University of Massachusetts Amherst Transportation Center, UMTC-97-17, December 1997.

W.S. Mogawer “Evaluation of the Road System in Massachusetts.” University of Massachusetts Amherst Transportation Center, UMTC-97-11, December 1997.

W.S. Mogawer “Phase Two: ADA Compatible Soft-Surface Multi-Use Trail.” University of Massachusetts Amherst Transportation Center, UMTC-97-19, December 1997.

W.S. Mogawer “Correlation of Pavement Distress/Ride Indices.” University of Massachusetts Amherst Transportation Center, UMTC-96-7, December 1997.

K. D. Stuart and **W. S. Mogawer**. “Evaluation of Natural Sands Used in Asphalt Mixtures.” FHWA-RD-93-070, Federal Highway Administration, McLean, VA, August 1993, 56 pp.

K. D. Stuart and **W. S. Mogawer**. “Laboratory Evaluation of Verglimit and PlusRide.” FHWA-RD-90-013, Federal Highway Administration, McLean, VA, March 1991, 119 pp.

T.J. Kim, K.W. Lee, G. E. Veyera, **W.S. Mogawer**, and J. Zheng. “Utilization of a Waterjet Cutting Unit for Infrastructure Management.” Final Report to the Region One University Transportation Center, Department of Civil and Environmental Engineering, University of Rhode Island, Kingston, RI, January, 1990.

INVITED PRESENTATIONS

“Influence of Production Considerations on Balanced Mixture Designs” MassDOT Innovation + Mobility Exchange, Worcester MA, April 10th, 2018.

“Effects of Using Re-refined Engine Oil Bottoms as an Asphalt Binder Modifier” Advances in Materials and Pavement Performance Prediction (AM₃P), Doha, Qatar, April 16th, 2018.

“Influence of Asphalt Binder Formulation & Source on the Performances of Binders with the Same Continuous PG” Association of Asphalt Paving Technologist (AAPT), 93rd Annual Meeting & Technical Sessions, Jacksonville, FL. March 21st, 2018.

“Highway Sustainability Research Center - Overview” Bay State Roads HMA Pavement Specifications for Municipalities: Chapter 90 Mixtures Training, Taunton, MA March 1st, 2018.

“Influence of Production Considerations on Balanced Mixture Designs” Presentation at the 97th Annual Meeting of the Transportation Research Board, Washington, D.C., January 10th, 2018.

“Investigating the Performances of Plant-Produced High RAP Content Warm Mix Asphalts” Presentation at the 97th Annual Meeting of the Transportation Research Board, Washington, D.C., January 9th, 2018.

“Thinlay Specifications” Massachusetts Asphalt Aggregate Association (MAAPA) Lunch & Learn, Norwood, MA October 26th, 2017.

“Performances of Plant-Produced High-Reclaimed Asphalt Pavement Content Warm Mix Asphalts” Northeast Asphalt User Producer Group Meeting, Hartford, CT, October 19th, 2017.

“High RAP Content in Surface Mixtures” Norfolk-Bristol-Middlesex Highway Association 2017 Fall Technical Session, Dedham, MA October 4th, 2017.

“Update on SHRP2 Renewal 26 Pavement Preservation Showcase Project: Massachusetts Route 3 Northbound” Northeast Pavement Preservation Partnership 2017 Annual Meeting, Portland, Maine, May 9th, 2017.

“Preventive Maintenance and Timing of Applications” Northeast Pavement Preservation Partnership 2017 Annual Meeting, Portland, Maine, May 9th, 2017.

“Performance Characteristics of Asphalt Mixtures Incorporating Treated Ground Tire Rubber Added During the Mixing Process” Association of Asphalt Paving Technologist (AAPT), 92nd Annual Meeting & Technical Sessions, Newport Beach, CA. March 21st, 2017.

“Effect of Asphalt Binder Formulations and Sources on Binder and Mixture Performance” Northeast Asphalt User/Producer Group Meeting, Newark, DE, October 19th, 2016.

“Utilizing SHRP2 Renewal 26 Technologies: Preservation Approaches for High Traffic Volume Roadways in the Northeast” Northeast Asphalt User/Producer Group Meeting, Newark, DE, October 19th, 2016.

“Using Binder and Mixture Space Diagrams to Evaluate the Effect of REOB on Binders and Mixtures after Aging” Presented at the 2016 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions in Indianapolis, IN on March 15th, 2016.

“Effect of Binder Modification on the Performance of an Ultrathin Overlay Pavement Preservation Strategy” Presentation at the 95th, Annual Meeting of the Transportation Research Board, Washington, D.C., January 13th, 2016.

“Using Polymer Modification and Rejuvenators to Improve the Performance of High Reclaimed Asphalt Pavement Mixtures” Presentation at the 95th, Annual Meeting of the Transportation Research Board, Washington, D.C., January 11th, 2016.

“Effect of Binder Modification on the Performance of an Ultrathin Overlay Pavement Preservation Strategy” Northeast Asphalt User/Producer Group, Burlington, VT October 22nd, 2015.

“Using Binder and Mixture Space Diagrams to Evaluate the Effect of REOB on Binders and Mixtures after Aging” Northeast Asphalt User/Producer Group, Burlington, VT October 22nd, 2015.

“Evaluating the Influence of Aging on the Chemical and Performance Properties of REOB Modified Asphalt Binders & Mixture” FHWA Asphalt Binder Expert Task Group, (ETG) Meeting, Fall, River, MA April 9th, 2015.

“High Performance Thin Overlay” Massachusetts Aggregate and Asphalt Pavement Association (MAAPA) Annual Meeting, Worcester, MA April 2015.

“Hot Mix Asphalt/Rejuvenators & High RAP Mixtures” MassDOT Innovation + Tech Transfer Exchange, Worcester, MA March 12th, 2015.

“Investigating the Aging Mitigation Capabilities of Rejuvenators in High RAP Mixtures Using Black Space Diagrams, Binder Rheology and Mixture Tests.” Presented at the 2015 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions in Portland, OR on March 10th, 2015.

“Aging and Rejuvenators: Understanding Their Impact on High RAP Mixtures Fatigue Cracking Characteristics Using Advanced Mechanistic Models and Testing Methods.” Presented at the 2015 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions in Portland, OR on March 10th, 2015.

“Reclaimed Asphalt Pavement, Rubber & Recycled Asphalt Shingles” EBC Ninth Annual Construction and Demolition Materials Regional Summit, Framingham, MA January 29th, 2015.

“Aging & Rejuvenators: Understanding Their Impact on High RAP Mixtures Performance” Northeast Asphalt User/Producer Group, Framingham, MA October 23rd, 2014.

“Aging and Rejuvenators: Understanding Their Impact on High RAP Mixtures Fatigue Cracking Characteristics Using Advanced Mechanistic Models and Testing Methods” Asphalt Institute Summer 2014 Seminar on Performance Testing of Asphalt Mixtures, Boston, MA, August 2014.

“Performance-Based Specifications for High-Performance Thin Overlay Mixtures Incorporating Reclaimed Asphalt Pavement” Presentation at the 93rd, Annual Meeting of the Transportation Research Board, Washington, D.C., January 15th, 2014.

“Development and Validation of Performance Based Specifications for High Performance Thin Overlay Mix” Presentation at the 93rd, Annual Meeting of the Transportation Research Board, Washington, D.C., January 14th, 2014.

“Laboratory & Field Evaluation of High Performance Thin Lift Overlays Incorporating RAP & WMA” Presentation at the 93rd, Annual Meeting of the Transportation Research Board, Washington, D.C., January 12th, 2014.

“Performance Characteristics of Asphalt Mixtures Incorporating Treated Ground Tire Rubber Added During the Mixing Process” Northeast Asphalt User/Producer Group, Portsmouth, NH October 23rd, 2013.

“Balancing the Softening Effects of Asphalt Rejuvenators with Polymer Modified Asphalt in High RAP Content Mixtures” Northeast Asphalt User/Producer Group, Portsmouth, NH October 23rd, 2013.

“Performance Comparisons of Two High Performance Wearing Course Mixtures” Northeastern States’ Materials Engineers Association (NESMEA) Meeting, Portsmouth, NH October 23rd, 2013.

“Evaluation of High RAP-WMA Asphalt Rubber Mixtures” The 6th Rubber Modified Asphalt Conference, Tempe, Arizona on October 15-17, 2013. . **[Sponsored Presentation]**

“Polymer Modified Asphalt Binders (PMAB) and Next Generation PMAB” 2013 Massachusetts Pavement Preservation Techniques Showcase, Marlborough, MA , June 12th, 2013.

“Evaluation of High RAP-WMA Asphalt Rubber Mixtures.” Presented at the 2013 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions in Denver, CO on April 9th, 2013.

“Using the Texas Overlay Tester in Mix Design and Cracking Performance Predictions” - Leading Edge Workshop A Practical Look at Tests for Cracking at Intermediate Temperatures, Presented at the 2013 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions in Denver, CO on April 7th, 2013.

“Performance and Workability Characteristics of High Performance Thin Lift Overlays Incorporating High RAP Content and Warm Mix Asphalt Technology” The 40th Annual Rocky Mountain Asphalt Conference & Equipment Show, Denver CO, February 27th, 2013.

“Development, Implementation, and Verification of Performance Based Specifications for High Performance Thin Lift Overlay Mixtures” Poster presentation at the 92nd, Annual Meeting of the Transportation Research Board, Washington, D.C., January 15th, 2013.

“Development of Balanced and Eco-Friendly Thin Lift Asphalt Mixtures Incorporating Sustainable Materials” National Pavement Preservation Conference, Nashville TN, Wednesday August 29th, 2012.

“Performance Characteristics of Plant Produced High RAP Mixtures” Presented at the 2012 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions in Austin, TX on April 4th, 2012.

“Performance and Workability Characteristics of High Performance Thin Lift Overlays Incorporating High RAP Content and Warm Mix Asphalt Technology” Massachusetts Institute of Technology - Special Seminar in Cambridge, MA on March 26th, 2012.

“Performance Characteristics of High RAP Bio-Modified Asphalt Mixtures” Poster presentation at the 91st, Annual Meeting of the Transportation Research Board, Washington, D.C., January 24th, 2012.

“Determining the Influence of Plant Type and Production Parameters on the Performance of Plant Produced RAP Mixtures” Presented at the 91st, Annual Meeting of the Transportation Research Board, - Washington, D.C., January 23rd, 2012.

“Performance and Workability Characteristics of High Performance Thin Lift Overlays Incorporating High RAP Content and Warm Mix Asphalt Technology” Presented at the 91st, Annual Meeting of the Transportation Research Board, Washington, D.C., January 23rd, 2012.

“Research Update TPF-5(230): Evaluation of Plant-Produced High-Percentage RAP Mixtures in the Northeast” Presented at the Pennsylvania Asphalt Pavement Association- The 52nd Annual Asphalt Paving Conference in Hershey, PA on December 15th, 2011. **[Sponsored Presentation]**

“Green Sustainable Thin Lift Overlays as a Pavement Preservation Strategy” Presented at the University of Massachusetts Amherst CEE 695T Transportation Seminar Series Fall 2011 in Amherst, MA on December 8th, 2011.

“Green Sustainable Thin Lift Overlays as a Pavement Preservation Strategy” Presented at the Northeast Pavement Preservation Partnership Meeting in Boston, MA on November 9th, 2011.

“Green Sustainable Thin Lift Overlays as a Pavement Preservation Strategy” Presented at the University of Rhode Island CVE Graduate Seminar - Fall 2011 in Kingston, RI on November 7th, 2011.

“Performance Characteristics of Asphalt Rubber Mixtures Containing RAP and Warm Mix Asphalt Technology” Presented at the 2nd International Warm-Mix Conference in St. Louis, MO on Tuesday October 11th, 2011.

“A Practical Method of Determine the Proper Aging Time for Warm Mix Asphalt” Presented at the Northeast Asphalt User Producer Group (NEAUPG) Meeting in Providence, RI on October 5th, 2011.

“WMA Activities and Research” Presented at the Warm Mix Asphalt Technical Working Group Meeting in Irvine, CA on May 12th, 2011. **[Sponsored Presentation]**

“Research Update for TPF-5(230): Evaluation of Plant-Produced High-Percentage RAP Mixtures in the Northeast” Presented at the Northeast Asphalt User Producer Group (NEAUPG) Steering committee Meeting in Rocky Hill, CT on April 19th, 2011.

“Moisture Damage Characterization of Warm Mix Asphalt Mixtures” Presented at the 2011 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions in Tampa, FL on March 30th, 2011.

“Performance Characteristics of Thin Lift Overlay Mixtures Containing High RAP Content, RAS, and Warm Mix Asphalt Technology ”Presented at the 90th Annual Meeting of the Transportation Research Board, Washington, D.C., January 27th, 2011.

“Evaluating Effect of Warm-Mix Asphalt Technologies on Moisture Characteristics of Asphalt Binders and Mixtures” Presented at the 90th Annual Meeting of the Transportation Research Board, Washington, D.C., January 25th, 2011.

“Performance Characteristics of Thin Lift Overlay Mixtures Containing High RAP Content, RAS, and Warm Mix Asphalt Technology” Presented at the Northeast Pavement Preservation Partnership (NEPPP) Annual Meeting in Portsmouth, NH on November 11th, 2010.

“Overview of Research Conducted for MassDOT” Presented at the MassDOT Transportation Research Symposium in Boston, MA on June 14th, 2010.

“Performance Characteristics of Asphalt Rubber Mixtures Containing RAP and Warm Mix Asphalt Technology” Presented at the Northeast Asphalt User/Producer Group (NEAUPG) Annual Meeting. Saratoga Springs, New York. October 7th, 2010.

“Performance Characteristics of Thin Lift Overlay Mixtures Containing High RAP Content, RAS, and Warm Mix Asphalt Technology” Presented at the Northeast Asphalt User/Producer Group (NEAUPG) Annual Meeting. Saratoga Springs, New York. October 7th, 2010.

“Evaluating the Effect of Aging Time and Temperature on the Moisture Characteristics of WMA Mixtures” Presented at the Warm Mix Asphalt Technical Working Group (TWG) Meeting. Auburn, Alabama. May 18th, 2010. **[Sponsored Presentation]**

“Pavement of Tomorrow” Presented at the 11th Annual UMass Amherst ITE Technical Day. Amherst, Massachusetts. March 11th, 2010.

“Laboratory Development and Field Trials of Thin-Lift Hot Mix Asphalt Overlays Incorporating High Percentages of Reclaimed Asphalt Pavement with Warm Mix Asphalt Technology.” Worcester County Highway Association Meeting. Fall River, MA. November 10th, 2009.

“Evaluation of the Effects of HMA Density on Mixture Fatigue and Rutting Performance.” Presented at the Northeast Asphalt User/Producer Group (NEAUPG) Annual Meeting. South Portland, Maine. October 8th, 2009.

“Pavement Research at the Highway Sustainability Research Center.” 20th New England Materials & Research Meeting. New Hampshire. June 9th, 2009.

“Asphalt Research at the Highway Sustainability Research Center.” Transportation Research Board (TRB) Committee AFK10 Meeting. Jonsson Center, Woods Hole, MA. April 28th, 2009

“Massachusetts Research at the Highway Sustainability Research Center.” Massachusetts Mobility Compact Meeting. Fall River, MA February 26th, 2009.

“Incorporating High Percentages of Recycled Asphalt Pavement (RAP) and Warm Mix Asphalt (WMA) Technology into Thin Hot Mix Asphalt Overlays to be Utilized as a Pavement Preservation Strategy”. Presented at the 88th Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2009.

“Evaluating the Effects of Warm Mix Asphalt Technology Additive Dosages on the Workability and Durability of Asphalt Mixtures Containing Recycled Asphalt Pavement.” Presented at the 88th Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2009.

“Developing Green Hot Mix Asphalt Using High Percentages of RAP and Warm Mix Asphalt Technologies” Presented at the Massachusetts Aggregate and Asphalt Pavement Association (MAAPA) Annual Meeting October 15th, 2008.

“Hot Mix Asphalt Thin Lift Overlay Research” Presented at the Northeast Pavement Preservation Partnership (NEPPP) Annual Meeting, Enfield Connecticut, October 21st, 2008.

“Laboratory and Field Evaluation of Warm Mix Asphalt Technology”. International Society for Asphalt Pavements (ISAP). Presented at the International ISAP Symposium, Switzerland, August 2008.

“Evaluation of Incorporating Different Dosages of ADVERA® Warm Mix Asphalt (WMA) Technology on HMA Volumetric and Workability” Presented at the 2008 Pavement Prediction Symposium, Peterson Asphalt Conference, Western Research Institute. Laramie, Wyoming. July 18th, 2008.

“Optimizing the Use of Recycled Asphalt Pavement in Thin Lift HMA Mixtures Using Warm Mix Asphalt Technology” Presented at the 2008 Pavement Prediction Symposium, Peterson Asphalt Conference, Western Research Institute. Laramie, Wyoming. July 18th, 2008.

“Overview of UMass Dartmouth Pavement Research Institute of Southeastern Massachusetts (PRISM)” Presented at the 2008 Plymouth County Highway Association Meeting, Bridgewater Massachusetts. June 12th, 2008.

“Thin Lift Overlay Research” Presented at the Northeast Pavement Preservation Partnership (NEPPP) Annual Meeting, Warwick Rhode Island, December 11th, 2007.

“Use of Modified Asphalts in Thin Lift HMA Applications” Presented at the Northeast Asphalt User/Producer Group (NEAUPG) Meeting, Mystic Connecticut, October 17th, 2007.

“Hot Mix Asphalt Research in Massachusetts” Presented at the Massachusetts Aggregate and Asphalt Pavement Association (MAAPA) Annual Meeting, Sutton Massachusetts, April 12th, 2007.

“Evaluating the Performances of Modified Asphalt Binders with Identical High-Temperature PG’s but Varied Polymer Chemistries,” Presented at the 83rd Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2004.

“Do Asphalt Mixtures Correlate Better with Mastics or Binders in Evaluating Permanent Deformation” Presented at the Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2003.

"A New look at the Use of Open Graded Friction Course in Massachusetts" Presented at the North Eastern States’ Materials Engineers Association (NESMEA) Meeting, 2002.

"Evaluation of the Superpave Asphalt Binder Fatigue Binder $G^*/\sin\delta$ " Presented at the 2000 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions in St. Paul, MN.

"Evaluation of the Superpave Asphalt Binder Specification for High-Temperature Pavement Performance" Presented at the 2000 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions in St. Paul, MN.

“Validation of Asphalt Binder and Mixture Tests that Predict Rutting Susceptibility Using the Federal Highway Administration’s Accelerated Loading Facility.” Presented at the 1997 Association of Asphalt Paving Technologists (AAPT) Annual Meeting and Technical Sessions.

"Effect of Coarse Aggregate Content on Stone Matrix Asphalt (SMA) Rutting and Draindown” Presented at the Transportation Research Board 74th Annual Meeting, Washington, DC, January 1995.

"Evaluation of Stone Matrix Asphalt Mixtures versus Dense-Graded Mixtures” Presented at the Transportation Research Board 73rd Annual Meeting, Washington, DC, January 1994.

"Evaluation of Test Methods Used to Quantify Sand Shape and Texture" Presented at the Transportation Research Board 71st Annual Meeting, Washington, DC, January 1992.

"An Evaluation of Deicing Additives on Properties of Asphalt Mixtures" Presented at the Transportation Research Board 68th Annual Meeting, Washington, DC, January 1989.

HOSTED PROFESSIONAL CONFERENCES/SEMINARS

Hosted “**Federal Highway Administration (FHWA) Asphalt Mixture Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Center for Innovation and Entrepreneurship (CIE) on May 8-9th, 2018.

Hosted “**Federal Highway Administration (FHWA) Asphalt Binder Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Center for Innovation and Entrepreneurship (CIE) on May 9-10th, 2018.

Hosted “**Federal Highway Administration (FHWA) Asphalt Binder Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Center for Innovation and Entrepreneurship (CIE) on September 14-15th, 2016.

Hosted “**Federal Highway Administration (FHWA) Asphalt Mixture Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Center for Innovation and Entrepreneurship (CIE) on September 12-13th, 2016.

Hosted “**Federal Highway Administration (FHWA) Asphalt Binder Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Advanced Technology & Manufacturing Center (ATMC) on April 9-10th, 2015.

Hosted “**Federal Highway Administration (FHWA) Asphalt Mixture Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Advanced Technology & Manufacturing Center (ATMC) on April 7-8th, 2015.

Hosted “**Federal Highway Administration (FHWA) Asphalt Binder Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Advanced Technology & Manufacturing Center (ATMC) on September 17-20, 2013.

Hosted “**Federal Highway Administration (FHWA) Asphalt Mixture Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Advanced Technology & Manufacturing Center (ATMC) on September 17-20, 2013.

Hosted “**Federal Highway Administration (FHWA) Asphalt Binder Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Advanced Technology & Manufacturing Center (ATMC) on September 21-22, 2011.

Hosted “**Federal Highway Administration (FHWA) Asphalt Mixture Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Advanced Technology & Manufacturing Center (ATMC) on September 20-21, 2011.

Hosted “**Federal Highway Administration (FHWA) Asphalt Model Expert Task Group (ETG)**” meeting at the University of Massachusetts Dartmouth Advanced Technology & Manufacturing Center (ATMC) on September 19-20, 2011.

Organized and hosted a conference entitled “**Warm Mix Asphalt Technologies: Performance, Prequalification and Specifications**” at the University of Massachusetts Dartmouth Advanced Technology & Manufacturing Center (ATMC) on November 3rd, 2010. This conference had over 100

attendees representing various federal highway agencies, state highway agencies, contractors, private industry, and academia.

PROFESSIONAL REGISTRATION

Registered Professional Engineer (PE) in the State of Rhode Island.

PROFESSIONAL AWARDS

- Transportation Research Board (TRB) 2014 K.B. Woods Award for Outstanding Paper Published in the Field of Design and Construction of Transportation Facilities.

Paper Title - “Strategies for Incorporating Higher Recycled Asphalt Pavement Percentages: Review of Implementation Trials in Northeast States”

- Based on professional accomplishments was elected an American Society of Civil Engineers (ASCE) Fellow (2011).
 - Awarded University of Massachusetts Dartmouth Dean of Engineering Recognition Award (2004).
 - Awarded Eisenhower Faculty Fellowship, U.S. Department of Transportation (1994, 1995 & 2005).
 - Awarded Federal Highway Administration (FHWA) Outstanding Technical Accomplishment Award (1989).
 - Awarded Federal Highway Administration (FHWA) Graduate Research Fellowship (1987-1988) to direct research projects to examine the effects of higher tire pressures on flexible pavement using the Accelerated Loading Facility (ALF), and to study the effects of PlusRide and Verglimit deicing additives on asphalt pavement performance.
 - Member of Tau Beta Bi Engineering Honor Society.
 - Member of Tau Alpha Pi National Honor Society.
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PROFESSIONAL MEMBERSHIP & SERVICE

I. Current Membership

- Transportation Research Board (TRB)
 - Committee AFK30: Characteristics of Nonasphalt Components of Asphalt Paving Mixtures (Committee research coordinator)
 - Member Subcommittee AFD70 (1): Interlayer System to Control Reflective Cracking
 - Committee AFK10: Characteristics of Nonasphalt Components of Asphalt Paving Mixtures
- Association of Asphalt Paving Technologists (AAPT)

- American Society of Civil Engineers (ASCE) - Member Bituminous Materials Committee
- International Society for Asphalt Pavements (ISAP)
- International Society of Asphalt Pavement Reclaimed Asphalt Pavement Working Group (ISAP RAP WG), 2010 to Present
- National Society of Professional Engineers
- American Society of Engineering Education (ASEE)

II. Former Membership

- Transportation Research Board (TRB) Committee AFK50: Characteristics of Bituminous Paving Mixtures to Meet Structural Requirements (2006 Through Spring 2012)

III. Professional Paper Reviewer

- Journal of the Association of Asphalt Paving Technologists (AAPT)
- Transportation Research Board (TRB)
- International Society for Asphalt Pavements (ISAP)
- American Society of Civil Engineers (ASCE)
- American Society of Testing Materials (ASTM)
- Construction and Building Materials

PROFESSIONAL COURSE DEVELOPMENT & INSTRUCTION

Superpave Technology – Funded by MassHighway Department (MassDOT)

A course was developed that covered the Superpave grading system for binders and the Superpave mixture design methodology. Also, construction experience with placing Superpave mixes was included.

Hot Mix Asphalt Technology – Funded by MassHighway Department (MassDOT)

A course was developed that covered developing a working knowledge of HMA construction, developing an understanding of how construction affects performance, good construction practices, identification of problems and subsequent solutions, and construction communication and cooperation.

New Specifications for Municipal Asphalt: Mixtures, Superpave Design, Warm Mix Asphalt, and Safety Edge

Instructed “Asphalt Mixture Volumetrics” portion of this Baystate Roads Program course developed for members of municipal agencies. Course was held in six different locations located throughout Massachusetts between May and June 2012.

ACADEMIC COURSE DEVELOPMENT

I. Graduate Courses Developed

- Pavement Design
- Hot Mix Asphalt Materials: Design, Construction, and Characteristics
- Pavement Management

II. Undergraduate Courses Taught/Developed

- Highway Engineering

- Introduction to Transportation Engineering
- Materials of Construction Laboratory
- Traffic Engineering
- Engineering Economy
- Statics
- Geotechnical Laboratory

GRADUATE ADVISEES

Name	Title of Thesis/Project	Degree	Date
Alexander J. Austerman	Laboratory and Field Evaluation of Warm Mix Asphalt	MS - Thesis	2009
Bryan Engstrom	Design of High Percentage Recycled Asphalt Pavement in Hot Mixture Asphalt with Warm Mix Technology for Thin Lift Applications	MS - Thesis	2009
Monir Haggag	Fatigue Cracking Resistance Evaluation of Warm Mix Asphalt and Hot Mix Asphalt Mixtures Using Uniaxial Cyclic Tension Compression Text	MS - Thesis	2010
Jason T. Lema	Relating the Effects of Hot Mix Asphalt (HMA) Pavement Density to Fatigue and Rutting Performance	MS - Thesis	2012
Abbas Booshehrian	Characteristics of Sustainable Hot Mix Asphalt and the Effect of Rejuvenators on the Performance and Degree of Blending	MS - Thesis	2013
Siavash Vahidi	Evaluating the Effects of Crumb Rubber Modifier (CRM) Modified Asphalt and Dry Added Treated CRM on Performance Characteristics of RAP Mixtures	MS - Thesis	2013
Suren Parajuly	Performance Characteristics of Treated Ground Tire Rubber Added During the Mixing Process	MS - Project	2014
Emile Tayeh	Development of a Distress Manual	MS - Project	2014
Tony Khoury	OXPET In Wax-Based WMA	MS - Project	2015
Keivan Ghobadi	Evaluating the Effects of Ground Tire Rubber (GTR) Modified Asphalt and Modified Dry Treated GTR on Performance Characteristics of HMA Mixtures	MS - Thesis	2016
Mark Brum	Effect of Binder Modification and Recycled Asphalt Pavement on the Performance of Open Graded Friction Course	MS - Thesis	2017
Milad Ashtiani	Quantifying the Degree of Binder Blending in Designing Asphalt Mixtures Containing RAP or RAS	MS - Thesis	2017
Siavash Aval	Effect of Rejuvenator Type and Dosage on the Performance of a Highly Sustainable Balanced Mixture Design	MS - Thesis	2017
Ahmed Soliman		PhD - Dissertation	2018

The graduate program was established in 2006.

UNIVERSITY SERVICE

- Chair - Department of Civil and Environmental Engineering (2014-Present)
- Chair - Faculty Evaluation Committee
- Chair - Faculty Search and screen committee – (Fall 2015 – Spring 2016)
- Chair - College of Engineering Academic Council
- Graduate Coordinator for Civil and Environmental Engineering Department (2007-2009)
- Advisor - American Society of Civil Engineers
- Chair - Search and Screen committee for the Dean of the College of Engineering
- Chair – Faculty Evaluation Committee (1996 – Current)
- ASCE Advisor (1989 – 1997)

MAJOR HSRC RESEARCH INSTRUMENTATION ACQUIRED THROUGH SPONSORED RESEARCH

I. Asphalt Binder

- TA Instruments DHR-2 Dynamic Shear Rheometer (DSR)
- TA Instruments AR2000 Dynamic Shear Rheometer (DSR)
- Prentex Pressure Aging Vessel (PAV) and Degassing Oven
- ATS Rolling Thin Film Oven (RTFO)
- Brookfield Thermosel Digital Rheometer
- Cannon Instrument Company Thermoelectric Bending Beam Rheometer Model TE-BBR (x2)
- Instron Model 5525 AsphaltPro Direct Tension Testing System
- Anton Paar Digital Ductility Meter DDA 3

II. Flexible Pavement

- Pine Instrument Company AFG2S Gyratory Compactor
- Pine Instrument Company AFGB1A Brovold Gyratory Compactor
- IPC Global PRSbox – Laboratory Asphalt Beam Compactor
- Thermolyne NCAT Asphalt Content Tester Series 1087
- InstronCorelok
- Rotavapor Extraction and Recovery Device
- Laboratory Asphalt Permeameter
- Humboldt Marshall Load Frame & Breaking Heads
- Cincinnati SubZero Environmental Chamber (x2)

- IPC Global Asphalt Mixture Performance Tester (AMPT)
- OEM Thermal Stress Restrained Specimen Test (TSRST)
- IPC Global Pneumatic Beam Fatigue Apparatus
- PTI Asphalt Pavement Analyzer (APA) and APA Junior
- Troxler Hamburg Wheel Tracking Device (HWTD) – (x2)
- Shedworks Overlay Tester (OT)
- Testquip Disc-shaped Compact Tension (DCT) Machine
- Testquip Illinois Flexibility Index (IFIT) Machine
- Instrotek Moisture Induced Stress Tester (MiST)
- Model Mobil Load Simulator (MMLS3)
- MTS Universal Testing Machine with Environmental Chamber
- Asphalt Workability Device (AWD)*

****HSRC Developed Device Patent Application No. 12/503630***

Heather J. Miller, Ph.D., P.E.

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N. Dartmouth, MA 02747
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e-mail: hmill@umassd.edu

EDUCATION

- Ph.D. Engineering
University of New Hampshire, Durham, NH, 1989-1994
Concentration: Geotechnical Engineering
- M.E. Civil Engineering
University of Virginia, Charlottesville, VA, 1984-1986
Concentration: Geotechnical Engineering
- B.S. Civil Engineering
Northeastern University, Boston, MA, 1980-1984

PROFESSIONAL EXPERIENCE:

- 1994 - Present University of Massachusetts Dartmouth, North Dartmouth, MA.
Department of Civil & Environmental Engineering
- 2011 - Present **Professor**
- 2000 – 2011 **Associate Professor**
- 1994 - 2000 **Assistant Professor**
- Taught the following Civil Engineering courses:
CEN 552: Advanced Soil Mechanics, CEN 533/433: Special Topics in Geotechnical Engineering, CEN 491: Civil Engineering Design Project, CEN 432: Design of Foundations & Earth Structures, CEN 323 Geotechnical Engineering, CEN 305/403: Soil Mechanics, CEN 315/413: Soil Mechanics Laboratory, CEN 302: Mechanics of Materials, CEN 312: Mechanics of Materials Laboratory, and CEN 252: Ethics & Professionalism.
- 1991-1994 University of New Hampshire, Durham, NH.
Research Assistant in Geotechnical Engineering
Research project involved development of instrumentation and study of the small strain behavior of sands.
- 1991-1992 **Geotechnical Consultant** for the following clients:
Town of Arundel and City of Biddeford, ME

**PROFESSIONAL
EXPERIENCE (continued)**

- 1989-1991 University of New Hampshire, Durham, NH
Teaching Assistant
Undergraduate Materials Testing Lab and Soil Mechanics courses.
- 1987-1989 Parsons, Brinckerhoff, Quade & Douglas, Boston, MA
Geotechnical Engineer
Provided geotechnical analyses, designs, and recommendations for foundations, lateral earth support systems, highway structures, and embankments. Wrote technical reports regarding geotechnical issues associated with various large civil engineering projects. Prepared contract documents and specifications for subsurface exploration and lab testing programs. Monitored subsurface exploration and construction activities.
- 1986-1987 Haley & Aldrich, Inc., Cambridge, MA
Assistant Engineer
Provided construction monitoring services for field activities including subgrade preparation, compaction of structural fill, installation of underdrain systems, and installation and performance evaluation of lateral earth retaining systems, various types of pile foundations, and caissons. Performed routine geotechnical analyses. Prepared drafts of geotechnical reports.
- 1985-1986 University of Virginia, Charlottesville, VA
Teaching Assistant
Undergraduate Soil Mechanics, Statics, and Mechanics of Materials courses.

**HONORS AND
AWARDS**

- 1996 UMass Dartmouth, College of Engineering Teaching and Advising Award
- 1993 Graduate Dissertation Fellowship
Sponsored by the University of New Hampshire
- 1990 Summer Research Fellowship for Teaching Assistants
Sponsored by the University of New Hampshire
- 1986 Tau Beta Pi Honor Society
- 1984 Chi Epsilon Honor Society

REGISTRATION/ MEMBERSHIPS

Registered Professional Engineer,
New Hampshire (#07975) & Massachusetts (#39069)
American Society of Civil Engineers (ASCE)
Boston Society of Civil Engineers (BSCE)
ASCE GeoInstitute
ASCE Highway Construction Committee
ASCE Cold Regions Engineering Division (CRED)
TRB Committee AFB 30, Low-Volume Roads Committee
TRB Committee AFP 50 - Seasonal Climatic Effects on
Transportation Infrastructure Committee

FUNDED RESEARCH PROJECTS

7/18/16-7/17/19	\$495,273	Co-PI: <i>Freeze-Thaw Transition Heterogeneity in Landscapes with Low Volume Road Networks</i> . Subcontract on NASA Grant # NNX16AN34G. (Total Grant = \$495,273 shared among 4 collaborators; UMD portion = \$87,387)
5/23/16-7/30/18	\$99,600	Co-PI: <i>RFID Technology for Low Cost Monitoring of Soil Moisture and Temperature</i> . FS Agreement No 16-PA-11138100-005. USDA Forest Service, San Dimas Technology & Development Center.
2/15/14-2/14/17	\$783,508	Co-PI: <i>Expansion of Remote Sensing Using Radio Frequency Identification (RFID) Technology for Seasonal Load Restriction (SLR) Timing</i> . Cooperative Agreement No RITARS-14-H-UMDA. US Department of Transportation (DOT) Commercial Remote Sensing & Spatial Information (CRS&SI) Technologies Program. Note: \$391,751 funds from DOT and \$391,757 in-kind partner matching funds.
7/1/13-6/30/16	\$198,154	Co-PI: <i>In-Place Response Mechanisms of Recycled Layers due to Temperature and Moisture Changes</i> . Subcontract on Grant # NETC07-1 funded by New England Transportation Consortium. (Total Grant = \$198,154 shared among 4 collaborators; UMD portion = \$26,900)
7/1/11-9/30/13	\$771,049	Co-PI: <i>Use of Remote Sensing for Seasonal Load Restriction (SLR) Application & Removal</i> . Cooperative Agreement No RITA-RS-11-H-UMDA. US Department of Transportation (DOT). Note: \$385,524 funds from DOT and \$385,525 in-kind partner matching funds.

FUNDED RESEARCH PROJECTS (continued)

9/30/08-9/30/10	\$8,267	Principal Investigator, <i>Infrastructure Sustainability: Properties of S.E. Massachusetts Soils</i> , Thompson Farland.
9/1/03–9/1/06	\$144,960	Principal Investigator, <i>Evaluation of Cement-Stabilized Full-Depth Recycled Base Materials for Frost and Early Traffic Conditions</i> , Recycled Materials Resource Center (RMRC)/Federal Highway Administration (FHWA). Note: \$99,960 provided by RMRC and \$45,000 in-kind provided by Portland Cement Association.
3/1/05 – 6/30/06	\$20,000	Co-PI: <i>Investigation of Material Properties of Portland Cement Concrete Combined with Recycled Asphalt Pavement (RAP)</i> . UMD College of Engineering Research Seed Program.
9/1/03 – 9/30/04	\$13,008	Principal Investigator, <i>Phase B: Assessment of Innovative Ground Modification Techniques</i> , Massachusetts Highway Department.
9/1/03 – 9/1/04	\$16,000	Principal Investigator, <i>Development of New Integrated Tools for Predicting, Monitoring and Controlling Movements due to excavations</i> , funded by Northwestern University as subcontract from National Science Foundation Grant.
1/1/03 – 6/30-03	\$4,985	Principal Investigator, <i>International Science Collaboration Program (Australia)</i> , National Science Foundation (NSF) and the American Association for the Advancement of Science (AAAS).
8/1/01 – 8/31/03	\$103,387	Principal Investigator, <i>Phase A: Assessment of Innovative Ground Modification Techniques</i> , Massachusetts Highway Department.
8/1/01 – 7/1/03	\$50,000	Principal Investigator, <i>Field Evaluation of a New Compaction Device</i> , New England Transportation Consortium (NETC).
1/1/01 – 6/30/02	\$3,040	Principal Investigator, <i>Research on Settlement of Geosynthetic Reinforced Soils</i> , UMass Dartmouth Foundation.
1/1/01 – 1/1/02	\$2,200	Co-Principal Investigator, <i>The Built Environment in Civil Engineering: UMD Outreach to Middle/High Schools</i> , Boston Foundation for Architecture/The Engineering Center.

FUNDED RESEARCH PROJECTS (continued)

7/1/99 – 7/1/00	\$46,000	Co-Principal Investigator, <i>Use of Scrap Tire Chips as Substitute for Gravel in Residential Soil Absorption Systems: A Field Study</i> , Chelsea Center for Recycled Materials.
11/30/98–6/30/00	\$14,765	Principal Investigator, <i>Recycled HDPE Timber Retaining Wall Investigation</i> , Chelsea Center for Recycled Materials.
4/1/99 – 7/1/99	\$ 8,000	Co-Principal Investigator, <i>Preliminary Investigation of the Use of 2" Waste Tire Chips Instead of Gravel in Residential Subsurface Leaching Field Systems</i> , Chelsea Center for Recycled Materials.
8/1/97 – 6/31/98	\$16,111	Principal Investigator, <i>ChemSensor/Well Purge Study</i> , ST ategic E nviron t echnology P artnership (STEP).
8/1/97 – 6/31/98	\$ 4,000	Principal Investigator, <i>AccuSensor AAM Evaluation</i> , ST ategic E nviron t echnology P artnership (STEP).
9/1/96 – 6/31/97	\$ 5,000	Principal Investigator, <i>ORS/Sippican Project</i> , ST ategic E nviron t echnology P artnership (STEP).

PEER-REVIEWED PUBLICATIONS

Kraatz, S., Miller, H., and Jacobs, J. *Remotely sensed freeze-thaw from the Soil Moisture Active Passive instrument to inform the timing of Seasonal Load Restrictions in Alaska*. Under final review for Transportation Research Record, Journal of the Transportation Research Board, 2019.

Kraatz, Simon & Jacobs, Jennifer & J. Miller, Heather. (2018). *Spatial and temporal freeze-thaw variations in Alaskan roads*. Cold Regions Science and Technology. Volume 157, Pages 149-162 (January 2019, in press). doi.org/10.1016/j.coldregions.2018.10.006.

Eftekhari, S., Miller, H., Kraatz, S., Jacobs, J. and Kestler, M. *Use of a Pavement Surface-Temperature Prediction Model for SLR Application*. Proceedings of the Transportation Research Board 97'th Annual Meeting (Paper No. 18-01481), 2018.

Miller, H., Daniel, J. S., Eftekhari, S., Kestler, M. and Mallick, R. B., *Research on Sustainable Pavements: Changes in In-Place Properties of Recycled Layers Due to Temperature and Moisture Variations*. ASCE-T&DI International Conference on Highway Pavements and Airfield Technology. Philadelphia, PA. August 27–30, 2017

**PEER-REVIEWED
PUBLICATIONS (continued)**

Daniel, J. S., Jacobs, J. M., Miller, H., Stoner, A., Crowley, J., Khalkhali, M., and Thomas, A., *Climate change: potential impacts on frost-thaw conditions and seasonal load restriction timing for low-volume roadways*, Road Materials and Pavement Design, DOI:0.1080/14680629.2017.1302355, 2017.

Fortier, P. J., Balasubramanian, R., Miller, H., Viall, B., Igoe, P. and Eftekhari, S., *Wireless Subsurface Sensors Supporting Remote Roadway Management*. Geotechnical Frontiers 2017: Walls and Slopes. ASCE Geotechnical Special Publication GSP 278. DOI: <http://dx.doi.org/10.1061/9780784480458>, 2017.

Duffy, B., Orr, D., and Miller, H. J., paper number 16-4160, *Enhancements to a Simple Pavement Frost Model*, Transportation Research Record, Journal of the Transportation Research Board, DOI 10.3141/2579-09, 2016.

Miller, H. J., Cabral, C., Peabody, D., Colson, S., Eaton, R. A. and Berg, R. L., *Case Study: Solar Effects on Frost-Thaw Patterns at Two Adjacent Roadway Test Sections*. Proceedings of the American Society of Civil Engineers Cold Regions Engineering Conference, Salt Lake City Utah, July 17-22, 2015.

Miller, H. J., Cabral, C., Orr, D. P., Kestler, M. A., Berg, R. L. and Eaton, R. A., *Modification of the U.S. Army Corps of Engineers Model 158 for Prediction of Frost-Thaw Profiles in Northern New England*. Transportation Research Record, Journal of the Transportation Research Board, No. 2473, July 2015.

Miller, H. J., Cabral, C., Kestler, M. A. and Berg, R. L., *Aurora SPR-3(042)-Phase 1: Review of Seasonal Weight Restriction Models for Comparison and Demonstration Project*. Proceedings of the Transportation Research Board 94'th Annual Meeting. Washington, D.C., January 11-15, 2015

Miller, H. J., Cabral, C., Kestler, M. A., Berg, R. L. and Eaton, R. A., *Comparative Analyses of Methods for Posting Spring Load Restrictions*. Proceedings of the 10th International Symposium on Cold Regions Development, Anchorage, Alaska June 2-5, 2013.

O'Connor, S., Balasubramanian R., Zarrillo M., Miller H., Wang H., *Modeling and Decision Support System to Determine When to Impose Seasonal Load Restrictions (SLR)*. Proceedings of the International Workshop on Applied Modeling and Simulation, Rome, Italy, September 24-27, 2012.

Miller, H. J., Cabral, C., Kestler, M. A., Berg, R. L. and Eaton, R. A., *Calibration of a Freeze-Thaw Prediction Model for Spring Load Restriction Timing in Northern New England*. Proceedings of the 15'th International Conference on Cold Regions Engineering, Quebec, Canada, August 19-22, 2012.

Zarrillo M., Miller H., Balasubramanian R., Wang H., Berg, R., Eaton, R. and Kestler, M. *Preliminary Development of a Real Time Seasonal Load Restriction System for Remote Sites*. Proceedings of the 15'th International Conference on Cold Regions Engineering, Quebec, Canada, August 19-22, 2012.

**PEER-REVIEWED
PUBLICATIONS (continued)**

Miller, H. J., Rodriguez, A., Kestler, M. A., Berg, R. L. and Eaton, R. A., *Evaluation of a Freeze-Thaw Index Model for Predicting Frost Penetration in Soils*, Paper No. 12-2519. Proceedings of the Transportation Research Board 91st Annual Meeting. Washington, D.C., January 22-26, 2012.

Jingfang Huang, Ikechukwu Azogu, Anusha Sunkara, Hong Liu, Honggang Wang, Heather Miller, *Seamless Data Visualization for Frost Detection*. IWCMC 2011 Multimedia over Wireless Symposium and IEEE XPlore.

Miller, H. J., Kestler, M. A., Amatrudo, M., Eaton, R. A., Hall, A., *Field Comparison of Low Volume Roadway Test Sections Reconstructed with Conventional Techniques and Full Depth Reclamation*. Transportation Research Record, Journal of the Transportation Research Board, No. 2204, Low Volume Roads, Volume 2, 2011.

Kestler, M. A., Berg, R. L., Miller, H. J., Steinert, B. C., Eaton, R., Larson, G., Haddock, J., *Keeping Springtime Low-Volume Road Damage to a Minimum: A Toolkit of Practical Low-Cost Methods for Road Managers*. Transportation Research Record, Journal of the Transportation Research Board, No. 2205, Low Volume Roads, Volume 3, 2011.

Miller, H. J., Amatrudo, M., Kestler, M. A., Guthrie, W. S., *Mechanistic Analysis of Reconstructed Roadways Incorporating Recycled Base Layers*, Paper No. 11-2612. Proceedings of the Transportation Research Board 90th Annual Meeting. CD-ROM. Washington, D.C., January 23-27, 2011.

Miller, H. J., Amatrudo, M., Eaton, R. A., Hall, A., Kestler, M. A., *Field Evaluation of Reconstructed Roadways Incorporating Full Depth Reclamation*, Paper No. 10-1791. Proceedings of the Transportation Research Board 89th Annual Meeting. CD-ROM. Washington, D.C., January 10-14, 2010.

Eaton, R. A., Hanscom, A., Kestler, M. A., Hall, A., Miller, H. J. and Berg, R. L., *Spring Thaw Predictor and Development of Real Time Spring Load Restrictions*, Proceedings of the American Society of Civil Engineers 14th International Conference on Cold Regions Engineering, Duluth MN, August 30-September 2, 2009.

Eaton, R. A., Berg, R. L., Hall, A., Miller, H. J. and Kestler, M. A., *Initial Analysis of the New Hampshire Spring Load Restriction Procedure*, Proceedings of the American Society of Civil Engineers 14th International Conference on Cold Regions Engineering, Duluth MN, August 30- September 2, 2009.

Miller, H. J., Stetson, K. P., Benoit, J., Hajduk, E. L., and Connors, P.J., *In Situ Testing for Site Characterization and QA/QC for Deep Dynamic Compaction*. Civil Engineering Practice, Journal of the Boston Society of Civil Engineers Section/ASCE, Volume 22, Number 2, 2007.

**PEER-REVIEWED
PUBLICATIONS (continued)**

Bradshaw, A. S., Miller, H. J. and Baxter, C. D. P., *A Case Study of Ground Movements Observed During Construction of a Braced Cut in Providence Silt*, ASCE Geotechnical Special Publication No. 175: Proceedings of the 7th International Symposium on Field Measurements in Geomechanics. Boston, MA, September 24-27, 2007; American Society of Civil Engineers.

Guthrie, W. S., Smith, B., Crane, R. A., and Miller, H. J. *Design and Construction of Pavements in Cold Regions: Questionnaire Survey of State Departments of Transportation. Paper No. 07-2720.* Proceedings of the Transportation Research Board 86th Annual Meeting. CD-ROM. Washington, D.C., January 21-25, 2007.

Miller, H. J., Stetson, K. P., Benoit, J., Hajduk, E. L., and Connors, P.J., *Comparison of DMT and CPT Testing on a Deep Dynamic Compaction Project.* Proceedings of the 2nd International Conference on the Flat Dilatometer, Washington, D.C., April 2-5, 2006.

Miller, H. J., Guthrie, W. S., Kestler, M., and Carbo, C., *Cement Treatment of Frost-Susceptible New England Base Materials Blended with Reclaimed Asphalt Pavement.* Proceedings of the American Society of Civil Engineers 13th International Conference on Cold Regions Engineering. CD-ROM. Orono, ME, July 23-26, 2006.

Miller, H. J., Stetson, K. P., and Benoit, J. *Site Characterization and QA/QC of Deep Dynamic Compaction Using an Instrumented Dilatometer.* Proceedings of the 2nd International Conference on Site Characterization (ISC-2), Porto, Portugal, September 19-22, 2004.

Hajduk, E. L., Connors, P. J., Miller, H. J., Meng, J. *Verification Testing of Deep Dynamic Compaction Between Steel Sheet Piling Using Cone Penetration Testing.* Proceedings of International Symposium on Ground Improvement (ASEP-GI 2004), Paris France, September 9-10, 2004.

Miller, H. J., Stetson, K. P., and Benoit, J. *DMT Testing for Site Characterization and QA/QC on a Deep Dynamic Compaction Project.* ASCE Geotechnical Special Publication No. 126: Geotechnical Engineering for Transportation Projects: Proceedings of Geo-Trans 2004, p. 1805-1812. American Society of Civil Engineers, 2004.

Sengupta, S. and Miller, H. J. *Evaluation of Recycled Tire Shreds as Substitute for Gravel in Residential Soil Absorption Systems.* Civil Engineering Practice, Journal of the Boston Society of Civil Engineers Section/ASCE, Volume 19, Number 1, p. 33-52, 2004.

Sengupta, S. and Miller, H. J. *Investigation of Tire Shreds for Use in Residential Subsurface Leaching Field Systems: A Field Scale Study* Proceedings of 33rd Mid-Atlantic Industrial & Hazardous Waste Conference, Manhattan College, Riverdale, NY, June 18-20, 2001.

**PEER-REVIEWED
PUBLICATIONS (continued)**

Miller, H. J. *Research On Well Purging Effects Using An Innovative Field Screening Tool And Traditional Methodologies*. Contaminated Soils (2001), Volume 6, p.1-16, Amherst Scientific Publishers, Amherst, MA, 2001.

Miller, H. J., *Well Purging Protocols for Sampling Dissolved Petroleum Hydrocarbons*. ASCE Hazardous, Toxic, and Radioactive Waste Management Practice Periodical, Vol. 4, No. 2, p. 44-52, American Society of Engineers, Reston, VA, 2000.

Miller, H. J. and Gifford, M. M., *Two Innovative Instruments for Measuring Contaminants in Groundwater*. Proceedings of Society of Women Engineers National Convention, Albuquerque, New Mexico, 1997.

Miller, H. J., DeAlba, P., and Baldwin, K. C., *Cyclic Simple Shear Apparatus for Low-Strain Soil Tests*. Transportation Research Record, No. 1548, p. 9-15, National Academy Press, Washington, DC, 1996.

**RESEARCH
REPORTS**

Miller, H.,J. and Eftekhari, S. Task No. 5 (Deliverable #36 and #43): *Laboratory Tests on Soils from Presque Isle Field Site*. OASRTRS-14-H-UMDA, March 2, 2016.

Eftekhari, S. and Miller, H.,J., *Evaluation of TempW Model* (Supplemental Deliverable for Task 7: Evaluation of SLR Timing Forecasting Models). OASRTRS-14-H-UMDA, October 19, 2015.

Miller, H.,J., Deliverable #27: *Evaluation of SLR Timing Forecasting Models*. OASRTRS-14-H-UMDA, February 25, 2015.

Eftekhari, S. and Miller, H.,J., *Evaluation of FASST Model* (Supplemental Deliverable for Task 7: Evaluation of SLR Timing Forecasting Models). OASRTRS-14-H-UMDA, October 26, 2014.

Cabral, C., Miller, H. J., Berg, R. L., Kestler, M. A. and Eaton, R. A., *Report on Task #9: Evaluation of Predictive Models & Protocols for SLR Timing*; submitted to US Department of Transportation for Cooperative Agreement No RITA-RS-11-H-UMDA, 2013.

Miller, H. J., Cabral, C., Berg, R. L., Eaton, R. A. and Stalcup, T. F., *Report on Task #5: Establishment of Field Test Sites*; submitted to US Department of Transportation for Cooperative Agreement No RITA-RS-11-H-UMDA, 2013.

Miller, H. J., Guthrie, W. S., Crane, R. A., and Smith, B. *Evaluation of Cement-Stabilized Full Depth Recycled Base Materials for Frost and Early Traffic Conditions*. Final Research Report, University of New Hampshire Recycled Materials Resource Center, Durham, NH, 2006.

**RESEARCH
REPORTS (continued)**

Miller, H.J. *Phase B: Assessment of Innovative Ground Modification Techniques*. Final Research Report submitted to Massachusetts Highway Department, Boston, MA, 2006.

Miller, H.J. *Phase A: Assessment of Innovative Ground Modification Techniques*. Final Research Report submitted to Massachusetts Highway Department, Boston, MA, 2006.

Miller, H.J., *Providence CSO Excavation Case Studies*, prepared for Northwestern University as part of their report to National Science Foundation (NSF), 2005.

Miller, H.J., *Field Evaluation of A New Compaction Device*. Report No. NETCR 42, New England Transportation Consortium, Storrs, CT, 2003.

Sengupta, S. and Miller, H.J., *Use of Scrap Tire Chips as Substitute for Gravel in Residential Soil Absorption Systems: A Field Study*. Chelsea Center for Recycling and Economic Development, Chelsea, Massachusetts, 2000.

Miller, H.J., *Recycled HDPE Timber Retaining Wall Investigation*. Chelsea Center for Recycling and Economic Development, Chelsea, Massachusetts, 1999.

Sengupta, S. and Miller, H.J., *Preliminary Investigation of Tire Shreds for use in Residential Subsurface Leaching Field Systems*. Chelsea Center for Recycling and Economic Development, Chelsea, Massachusetts, 1999.

Miller, H.J., *ChemSensor/Well Purge Study*. Advanced Technology Center, UMass Dartmouth, 1998.

Miller, H.J., and Mogawer, W.S., *Phase Two: ADA Compatible Soft-Surface Multi-Use Trails*. Final Research Report #UMTC-97-18, University of Massachusetts Transportation Center, Amherst, MA, 1997.

Miller, H.J., *AccuSensor Alternative Analytic Methodology (AAM) Evaluation*. Advanced Technology Center, University of Massachusetts Dartmouth, 1997.

Miller, H.J., Murphy, D.J., and Cooper, D., *Technology Assessment Report of Ariano Technologies, Inc.* Advanced Technology Center, University of Massachusetts Dartmouth, 1997.

PROFESSIONAL ACTIVITIES

PROFESSIONAL PRESENTATIONS

Projected Impact of Climate Change on Frost-Thaw Profiles beneath Roadways in Northern Maine. Transportation Research Board's First International Conference on Surface Transportation System Resilience to Climate Change and Extreme Weather Events. National Academy of Sciences, Washington, D.C., September 16-18, 2015.

Case Study: Solar Effects on Frost-Thaw Patterns at Two Adjacent Roadway Test Sections. Presented at the the American Society of Civil Engineers Cold Regions Engineering Conference, Salt Lake City Utah, July 17-22, 2015.

Modification of the U.S. Army Corps of Engineers Model 158 for Prediction of Frost-Thaw Profiles in Northern New England. Presented at the Transportation Research Board Low Volume Roads Conference, Pittsburg, PA July, 2015

Comparative Analyses of Methods for Posting Spring Load Restrictions. Presented at the 10th International Symposium on Cold Regions Development, Anchorage, Alaska June 2-5, 2013.

Preliminary Development of a Real Time Seasonal Load Restriction System for Remote Sites. Presented at the 15'th International Conference on Cold Regions Engineering, Quebec, Canada, August 19-22, 2012.

Calibration of a Freeze-Thaw Prediction Model for Spring Load Restriction Timing in Northern New England. Presented at the 15'th International Conference on Cold Regions Engineering, Quebec, Canada, August 19-22, 2012.

Evaluation of a Freeze-Thaw Index Model for Predicting Frost Penetration in Soils, Paper No. 12-2519. Presented at the Transportation Research Board 91'th Annual Meeting, Session #507: Freeze-thaw Issues Related to Soils and Pavements. Washington, D.C., January 24, 2012.

Data Collection via CRS&SI Technology to Determine when to Impose Spring Load Restrictions (SLR). Presented at the Transportation Research Board 91'th Annual Meeting, Session #184: Sensing Technologies for Transportation Applications. Washington, D.C., January 22, 2012.

Field Evaluation of Reconstructed Roadways Incorporating Full Depth Reclamation. Presented at the Transportation Research Board 89'th Annual Meeting. Washington, D.C., January 11, 2010.

Cement Treatment of Frost-Susceptible New England Base Materials Blended with Reclaimed Asphalt Pavement. Presented at the American Society of Civil Engineers 13'th International Conference on Cold Regions Engineering. Orono, ME, July 26, 2006.

PROFESSIONAL PRESENTATIONS (continued)

Field Evaluation of a New Compaction Monitoring Device, invited speaker at the 44th Meeting of the Northeast States Geotechnical Engineers, Burlington, VT, September 22nd & 23rd, 2003 (travel funds provided by the Federal Highway Administration)

Proposed International Science Collaboration: Innovative Geotechnical In Situ Testing, Presented at the University of Sydney, Sydney, Australia March 18, 2003

Proposed International Science Collaboration: Innovative Geotechnical In Situ Testing, Presented at Monash University, Melbourne, Australia March 11, 2003

Research on Well Purging Effects Using an Innovative Field Screening Tool and Traditional Methodologies, presented at the 16'th International Conference on Contaminated Soils, Sediments and Water, October 16-19, 2000, Amherst, MA.

Use of Scrap Tire Chips as Substitute for Gravel in Residential Soil Absorption Systems, presented at Technical Research Symposium sponsored by Chelsea Center for Recycling and Economic Development, April 14, 2000

PEER REVIEWER (1997 – present)

National Research Council *Transportation Research Record*

American Society for Testing Materials (ASTM) *Geotechnical Testing Journal*

American Society of Civil Engineers *Journal of Geotechnical and Geoenvironmental Engineering*

Canadian Geotechnical Journal

National Science Foundation panels for technical review of proposals submitted to the Geotechnical and Geoenvironmental Engineering Division

ACADEMIC SERVICE

GRADUATE STUDENT ADVISING

2014-2018	Major advisor for PhD student Somayeh Eftekhari
2015-2017	Served on Master's Thesis Committee for Steven Brown (UMass Dartmouth, ECE)
2014-2015	Served on Master's Thesis Committee for Zaidan Sheabar (UMass Dartmouth, ECE)
2014-2015	Served on Master's Thesis Committee for Brandon Malaguti (UMass Dartmouth, ECE)
2014-2015	Major advisor for MS Project advisor for Benjamin Mitsmenn

ACADEMIC SERVICE (continued)

GRADUATE STUDENT ADVISING

<i>2011-2013</i>	Major advisor for Master's Thesis for Christopher Cabral
<i>2012</i>	Served on the Master's Project Committee of Emile Tayeh
<i>2010-2011</i>	Major advisor for Master's Project for Andrew Rodriguez
<i>2008</i>	Served on the Master's Thesis Committee of Bryan Engstrom
<i>2008</i>	Served on the Master's Thesis Committee of Alex Austerman
<i>2006-2008</i>	Major advisor for Master's Project for Joseph Iaccarino
<i>2006</i>	Served on the Master's Thesis Committee of Aly Fahmy
<i>2005</i>	Served on the PhD Dissertation Committee of Yong Tan (UMass Lowell, Department of Civil Engineering)
<i>2003</i>	Served on the Master's Thesis Committee of Assem Elsayed (UMass Lowell, Department of Civil Engineering)

UNDERGRADUATE STUDENT ADVISING (Academic)

<i>2015-2016</i>	Major Advisor for Honors Thesis for Ashley Thomas
<i>2003-present</i>	Advisor to portions of Civil Engineering Freshman, Sophomore, Junior and Senior Classes (averaged approximately 25 to 45 students per semester)
<i>Fall 2001</i>	Advisor to entire Civil Engineering Freshman Class and entire Civil Engineering Sophomore Class
<i>1999-2000</i>	Advisor to entire Civil Engineering Junior Class
<i>1998-1999</i>	Advisor to entire Civil Engineering Sophomore Class
<i>1995-1998</i>	Advisor to entire Civil Engineering Freshman Class

ADVISING (Student Professional Societies)

<i>1994-2001</i>	Faculty Advisor to SWE Student Chapter
<i>1994-1997</i>	Faculty Advisor to ASCE Student Chapter

ACADEMIC SERVICE (continued)

COMMITTEE ASSIGNMENTS

<i>2014 – present</i>	Civil Engineering Curriculum Committee (Chair : 2014-2015)
<i>2008 – present</i>	Civil Engineering ABET Committee
<i>2000 – present</i>	Civil Engineering Department Faculty Evaluation Committee
<i>2015 – 2016</i>	Review Team for the Evaluation of the Boivin Center for French Language and Culture (wrote Chapter 3 of the Report)
<i>2006 – 2014</i>	Civil Engineering Graduate Program Committee (Co-Director : 2009-2011)
<i>2013</i>	College of Engineering Academic Council
<i>2011 – 2012</i>	Member, Faculty Federation Grievance Hearing Committee
<i>1994 – 2012</i>	Civil Engineering Curriculum Committee (Chair : 2005–2006, 2008-2009, 2011-2012)
<i>2009-2010</i>	Search and Screen Committee for new faculty hire in Civil Engineering Department (structures position)
<i>2008 –2009</i>	College of Engineering Curriculum Committee
<i>Fall 2007</i>	Faculty Federation Parking Needs Committee
<i>2003 – 2006</i>	College of Engineering Academic Council
<i>2004 – 2005</i>	Review Team for the Evaluation of the Center for Business Research
<i>2003 – 2004</i>	College of Engineering Alumni Task Force
<i>2001 – 2002</i>	Review Team for the Evaluation of the Center for Portuguese Studies and Culture
<i>2001 – 2002</i>	Civil Engineering Master's Program Proposal Committee
<i>1998 –2002</i>	Committee for the Status of Women (Chair , 2000 - 2001)
<i>2000 – 2001</i>	University task force for UMass Dartmouth's accreditation review by the New England Association for Schools and Colleges (NEAS&C)

COMMITTEE ASSIGNMENTS (continued)

<i>2000 - 2001</i>	Chair , Search and Screen Committee for new faculty hire in Civil Engineering Department
<i>2000 - 2001</i>	Chair , Search and Screen Committee for Chair of Civil Engineering Department
<i>2000 - 2001</i>	Search and Screen Committee for new faculty hire in Textile Science Department
<i>2000 - 2001</i>	Search and Screen Committee for Chair of Textile Science Department
<i>1995 – 1999</i>	College Curriculum Committee (Chair , 1997 – 1999)
<i>Spring 1999</i>	SWE Scholarship Award Committee
<i>1995 – 1998</i>	Student/Faculty Academic Affairs Committee
<i>Fall 1997</i>	Search and Screen Committee for Assistant Director of Advanced Technology Center
<i>Spring 1995</i>	Search and Screen Committee for new faculty hire in Civil Engineering

PUBLIC SERVICE

<i>2016-2017</i>	City of New Bedford Provided pro bono consultation services, along with three UMassD CEN students, to evaluate potential options for off-site reuse material from the solids drying beds at the New Bedford Quittacas Water Treatment Plant (WTP). The students conducted the bulk of the work on this project. My role included supervision of their laboratory testing of soil samples from the WTP and providing advice regarding applicable engineering codes and standards. Additionally, I performed substantial editing of a draft report (prepared by the students) prior to its submission to CDM Smith and the City of New Bedford.
<i>2016-2017</i>	NOAA's Northeast Regional Climate Center (NRCC) Provided pro bono consultation services. Worked with the Director and staff of the NRCC to put their climate data to use for the benefit of the transportation sector. Collectively, we created a roadway freeze-thaw map interface that allows road managers in the northeast to better assess when load restrictions should be applied or suspended.
<i>2015-2017</i>	Mattapoisett Bike Path Provided pro bono consultation services for the benefit of the Mattapoisett Bike Path extension. Provided advice to engineers at CLE Engineering regarding in situ testing, stress analysis, potential

settlement issues for an approach fill, and downdrag forces on pile foundations.

- 2014-2016 Mattapoisett Land Trust and Goodspeed Island Pier Committee
Provided pro bono consultation services and directed student groups on several projects for the Mattapoisett Land Trust including retrofitting an eroded seawall and proposed modifications at the Mill Pond Dam. Provided engineering analysis of a proposed pier, and recommendations in terms of the Commonwealth of Massachusetts 310 CMR 9.37 Engineering and Construction Standards.
- 2007-2011 State of New Hampshire, Department of Transportation
Provided pro bono consultation services with regard to Spring Load Restriction (SLR) Research Project; My work included site visits, analysis of the field data, and providing geotechnical engineering guidance and recommendations. Results of this work led to improved tools and methods for applying and removing spring load restrictions.
- 1998 Town of Mattapoisett, Massachusetts
Provided pro bono consultation services with regard to plume delineation at a BTEX contaminated site adjacent to the Police Station.
- 1995 Town of Dartmouth, Massachusetts
Served in advisory capacity regarding development of a neighborhood park for the Baker Village Community Association.

SUKALYAN SENGUPTA, Ph. D., P.E.

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University of Massachusetts Dartmouth
North Dartmouth, MA 02747
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Fax: (508) 999-8964
ssengupta@umassd.edu

EDUCATION

Ph.D. Civil (Environmental) Engineering (January 1994)
Lehigh University, Bethlehem, Pennsylvania, USA.

M.S. Civil (Environmental) Engineering (January 1991)
Lehigh University, Bethlehem, Pennsylvania, USA

B.S. Civil Engineering (July 1985)
Bengal Engineering College, Calcutta University, India.

INTERESTS

- Novel materials for physico-chemical (Ion-exchange, Adsorption and Fiber/Membrane-aided) processes in water/wastewater/hazardous waste decontamination systems and in-situ soil/slurry decontamination processes.
- Environmental sustainability - macronutrient recovery from agricultural waste, nonpoint source and municipal wastewaters.
- Biological nitrification and denitrification in decentralized wastewater treatment and stormwater treatment systems.
- New pedagogies in engineering education.
- Reuse of tire-shreds and other solid wastes in environmental applications.

PATENT ISSUED

1. U.S. Patent # 7,575,686. Issued 8/29/09, "Process for Autotrophic Perchlorate Reduction Using Elemental Sulfur and Mollusk Shells", S. Sengupta, S. J. Ergas, K. Nusslein, and A. K. Sahu.

PATENT FILED

1. U. S. Utility Patent Application # 11/643,739, "Process for Autotrophic Denitrification Using Elemental Sulfur and Mollusk Shells", S. Sengupta and S. J. Ergas, filed 12/21/2006.

EXPERIENCE

Teaching

- 06/2014 – Present Professor, Department of Civil & Environmental Engineering
University of Massachusetts Dartmouth
North Dartmouth, MA 02747
- 01/2011 – 05/14 Professor & Chairperson, Dept. of Civil & Env. Engineering
University of Massachusetts Dartmouth
North Dartmouth, MA 02747
- 09/2006 – 12/10 Professor, Department of Civil & Environmental Engineering
University of Massachusetts Dartmouth
North Dartmouth, MA 02747
- 09/2003 – 08/06 Associate Professor & Chairperson
Department of Civil & Environmental Engineering
University of Massachusetts Dartmouth
North Dartmouth, MA 02747
- 09/99 – 08/2003 Associate Professor, Department of Civil & Environmental
Engineering
University of Massachusetts Dartmouth
North Dartmouth, MA 02747
- 01/94 – 7/99 Assistant Professor, Department of Civil & Environmental
Engineering
University of Massachusetts Dartmouth
North Dartmouth, MA 02747

Courses/Labs Developed (at UMass Dartmouth)

- CEN 564 - Environmental Chemistry
- CEN 514 – Hazardous Waste Management
- CEN 524 - Physico-Chemical Treatment Methods
- CEN 304 - Introduction to Environmental Engineering
- CEN 314 – Environmental Engineering Lab
- CEN 411 – Water Treatment
- CEN 412 – Wastewater Treatment
- EGR 111 – Introduction to Engineering & Computing
- EGR 303 – Engineering Economics
- CEN 499 - Numerical Analysis Techniques in Civil Engineering

Scholarship

- Editor** Volume 4 – Wastewater Treatment and Water Reuse – of Comprehensive Water Quality and Purification, Elsevier. Released in October 2013. The volume has 15 chapters, including two by me that are listed in “Chapters in Books”.
- Section Editor** Water Pollution section of *Current Pollution Reports*, a Springer Science journal. This journal provides in-depth review articles contributed by international experts on the most significant developments in the field. By presenting clear, insightful, balanced reviews that emphasize recently published papers of major importance, the journal elucidates current and emerging approaches to identification, characterization, management, treatment, and prevention of environmental pollution, including but not limited to water, soils, sediments, air, noise, thermal, and nuclear.
- Author** *Hazardous Waste Management*, published by Momentum Press. This book will be available for sale in August 2017.
- Author** *Water Treatment: Theory and Practice*, published by Momentum Press. This book will be available for sale in January 2017.

Publications

Peer-review journals

- Nawaz, T., **Sengupta, S.**, and Yang, C. (2018). Silver recovery as Ag⁰ nanoparticles from ion-exchange regenerant solution using electrolysis. *Journal of Environmental Sciences*, <https://doi.org/10.1016/j.jes.2018.09.012>.
- Nawaz, T., & **Sengupta, S.** (2017). Silver recovery from greywater: Role of competing cations and regeneration. *Separation and Purification Technology*, 176, 145-158.
- Nawaz, T., & **Sengupta, S.** (2017). Silver recovery from laundry washwater: the role of detergent chemistry. *ACS Sustainable Chemistry & Engineering*, 6(1), 600-608.

Nawaz, T., Jassal, M., **Sengupta, S.**, & Bhowmick, S. (2017). Functional group penetration thickness and intraparticle diffusivity of electrospun poly (acrylonitrile) ion-exchange fibers. *Colloid and Polymer Science*, 295(10), 2069-2075.

Sengupta, S., Ergas, S., Cunningham, J., Goel, R., Feldman, A., & Chen, Y. H. (2017). Concept Inventory for Fundamentals of Environmental Engineering Courses: Concept Inventory Development and Testing. *Environmental Engineering Science*, 34(12), 895-907.

Jassal, M., Boominathan, V. P., Ferreira, T., **Sengupta, S.**, & Bhowmick, S. (2016). pH-responsive drug release from functionalized electrospun poly (caprolactone) scaffolds under simulated in vivo environment. *Journal of Biomaterials science, Polymer edition*, 27(13), 1380-1395.

S. Sengupta & T. Nawaz, "Silver Recovery from Greywater: Role of Competing cations and Regeneration", *Separation and Purification Technology*, available online on December 11, 2016.
<http://dx.doi.org/10.1016/j.seppur.2016.11.076>

M. Jassal, **S. Sengupta**, & S. Bhowmick, "Functionalization of Electrospun Poly(caprolactone) Fibers for pH-controlled Delivery of Doxorubicin Hydrochloride", *Journal of Biomaterials Science, Polymer Edition*, 26:18, 1425-1438 (2015).

S. Sengupta, T. Nawaz, & J. Beaudry, "Nitrogen and Phosphorus Recovery from Greywater", *Current Pollution Reports*, 1(3): 155-166 (2015).

M. Jassal, **S. Sengupta**, S. Bhowmick, P. Patra, & D. Walker, "Hydrolyzed Poly(acrylonitrile) Electrospun Ion Exchange Fibers", *Environmental Engineering Science*, 31(6): 288-299 (2014).

M. Jassal, **S. Sengupta**, S. B. Warner, and S. Bhowmick, "Quantitative characterization of functionally modified micron-submicron fibers for tissue regeneration: A review", *Textile Research Journal*, 83(19): 1999-2022 (2013).

S. Sengupta & A. Pandit, "Selective Removal of Phosphorus from Wastewater Combined with its Recovery as a Solid-Phase Fertilizer", *Water Research*, 45(11): 3318-3330 (2011).

S. Ergas, **S. Sengupta**, R. Siegel, A. Pandit, Y. Yao, and X. Yuan, "Bioretention Systems for Non-Point Nitrogen Source Control", *ASCE Journal of Environmental; Engineering*, 136(10): 1105-1112 (2010).

**Peer-review journals
(contd.)**

V. Kunduru, M. Bothara, J. Grosch, **S. Sengupta**, P. K. Patra, and S. Prasad, "Nanostructures Surfaces for Enhanced Protein Detection Towards Clinical Diagnostics", *Nanomedicine: NBM*, doi:10.1016/j.nano.2010.03.002 (2010).

A. K. Sahu, S. J. Ergas, and **S. Sengupta**, "Onsite Wastewater Denitrification Using a Hydrogenotrophic Hollow-Fiber Membrane Bioreactor", *Water Environment Research*, 81(7):680-686 (2009).

V. Kunduru, J. Grosch, S. Prasad, P. K. Patra, and **S. Sengupta**, "Immuno Assay Based MicroElectrode Platformed Protein Sensors: A Comparative Study of Polystyrene Beads vs. Nanofibers", in *"Responsive Biomaterials for Biomedical Applications, MRS Proceedings Volume 1095E (Electronic Content Only - No Book Published)"*, Editors: J. Cheng, A. Khademhosseini, H. -Q. Mao, M. Stevens, & C. Wang, (2008).

S. Sengupta, S. J. Ergas, and E. Lopez-Luna, "Investigation of Solid-Phase Buffers for Sulfur-Oxidizing Autotrophic Denitrification", *Water Environment Research*, 79(13):2519-2526 (2007).

S. Sengupta, S. J. Ergas, E. Lopez-Luna, J. Wood, A. K. Sahu, and K. Palaniswamy, "Autotrophic Biological Denitrification for Complete Removal of Nitrogen from Septic System Wastewater", *Water, Air, and Soil Pollution: Focus* 6: 111-126 (2006).

S. Sengupta and H. Miller, "Evaluation of Recycled (Journals/Books) Tire Shreds as Substitute for Gravel in Residential Soil Absorption Systems", *Civil Engineering Practice*, Journal of the Boston Society of Civil Engineers Section/ASCE, 19:1, Spring/Summer (2004).

Sengupta, S. and A. K. SenGupta, "Chelating Ion-Exchangers Embedded in PTFE: A Novel Application Scenario", *Journal of Colloids and Surfaces, A: Physicochemical and Engineering Aspects*, 191, 79-95, (2001).

S. Sengupta, "Electro-Partitioning with Composite Ion-Exchange Material: An Innovative In-Situ Decontamination Process", *Reactive & Functional Polymers*, 40/3 pp263-273 (1999).

**Peer-review journals
(contd.)**

S. Sengupta and A. K. Sengupta, "Heavy Metal Separation from Sludge Using Chelating Ion-Exchangers with Non-Traditional Morphology", *Reactive & Functionalized Polymers*, Vol. 35, 111-134, (1997).

S. Sengupta and A. K. Sengupta, "Solid Phase Metal Separation in an Unfavorable Background Environment by Composite Membranes", *Hazardous Waste and Hazardous Materials*, Vol. 13, Number 2, (1996).

S. Sengupta and A. K. Sengupta, "Treatment of Heavy-Metal-Laden Sludges by a New Class of Sorptive/Desorptive Membranes", *The 1994 Membrane Technology Reviews*.

S. Sengupta and A. K. Sengupta, "Characterizing a New Class of Sorptive/Desorptive Ion-Exchange Membranes for Decontamination of Heavy-Metal-Laden Sludges", *Env. Sci. & Tech.*, Vol. 27, 10, 2133-2140, (1993).

Chapters in books

S. Sengupta and T. Nawaz, "Solid-Phase Heavy-Metal Separation with Selective Ion Exchangers: Two Novel Morphologies", in *Ion Exchange and Solvent Extraction: A Series of Advances, Volume 22*, Arup K. SenGupta (ed), CRC Press, 2016.

S. Sengupta and A. K. Sengupta, "Metal-Impregnated Ion Exchanger for Selective Removal and Recovery of Trace Phosphate", in *Advanced Separations by Specialized Sorbents*, Ecaterina S. Dragan (ed), CRC Press, 2014.

S. Sengupta, Chapter on "Overview of wastewater Treatment", Volume 4 – Wastewater Treatment and Water Reuse – of Comprehensive Water Quality and Purification, Elsevier. Released in October 2013.

S. Sengupta, Chapter on "Reaction Kinetics and Reactors", Volume 4 – Wastewater Treatment and Water Reuse – of Comprehensive Water Quality and Purification, Elsevier. Released in October 2013.

Chapters in books (contd.)

S. Sengupta, "Macronutrient removal and recovery from tertiary treatment of wastewater." *ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY*. Vol. 243. 1155 16TH ST, NW, WASHINGTON, DC 20036 USA: AMER CHEMICAL SOC, 2012.

S. Sengupta and A. K. Sengupta, Chapter on "Ion Exchange" in *Encyclopedia of Chemical Processing*, edited by S. Lee, Marcel Dekker, Inc., New York (2006).

S. Sengupta and A. K. Sengupta, Chapter on "Ion Exchange Resin" in *Encyclopedia of Chemical Processing*, edited by S. Lee, Marcel Dekker, Inc., New York (2006).

S. Sengupta and A. K. Sengupta, "Trace Heavy Metal Separation by Chelating Ion Exchangers", in *Environmental Separation of Heavy Metals: Engineering Processes*, Edited by A. K. SenGupta, Lewis Publishers, (2002).

S. Sengupta and A. K. Sengupta, "Decontamination of Heavy Metal Laden Sludges and Soils Using a New Ion-Exchange Process", in *Remediation of Hazardous Wastes Contaminated Soils, 2nd Edition*, edited by Wise, Trantolo, Cichon, Inyang, and Stottmeister, Marcel Dekker, Inc., Jan. (2000).

Technical Reports

S. Sengupta, "Street Sweeping Reuse at MassHighway – Barriers, Economics, and Opportunities", Final Report prepared for Massachusetts Transportation Research Program, SPRII.01.12, (2007).

S. Sengupta and H. Miller, "Investigation of Tire Shreds for Use in Residential Subsurface Leaching Field Systems", *Technical Report # 32*, The Chelsea Center for Recycling & Economic Development, (2000).

S. Sengupta and H. Miller, "Preliminary Investigation of Tire Shreds for Use in Residential Subsurface Leaching Field Systems", *Technical Report # 12*, The Chelsea Center for Recycling & Economic Development, (1999).

Technical Reports

(contd.)

S. Sengupta, "Removal of Hexavalent Chromium and Heavy Metal Cations from Groundwater of an Electroplating Site", *Technical Report*, Advanced Technology Center, UMass Dartmouth, July (1998).

I. J. Kugelman, V. G. Guida, **S. Sengupta**, et al, "Waste Treatment and Energy Recovery in Closed-Cycle Aquaculture Systems", *Technical Report*, Environmental Studies Center, Lehigh University, January (1992).

Book Editor

S. Sengupta and M. Paranjape eds., "The Cyclonic Swami: Vivekananda in the West" , Samvad India Foundation, ISBN-10: 8190131826; ISBN-13: 978-8190131827, (2005).

Conference Proceedings

S. Sengupta and **T. Nawaz** (2015), "Silver Recovery from Wastewater", 2nd New England Graduate Student Water Symposium, September 11-13, University of Massachusetts Amherst.

S. Sengupta and **T. Nawaz** (2015), "Silver Removal and Recovery from Waste Streams: Role of Co-contaminants and Regenerants and Purity of Silver Recovered", 250th American Chemical Society National Meeting & Exposition, August 16-20, Boston, MA.

S. Sengupta, J. Cunningham, S. Ergas, R. Goel, D. Ozalp, & **T. Reed-Rhoads** (2013), "Development of a Concept Inventory for Introductory Environmental Engineering Courses", 120th ASEE Annual Conference & Exposition, June 23-26, Atlanta, GA.

S. Sengupta (2013), "Decentralized Wastewater Treatment Coupled with Nutrient Recovery", Indo-US Workshop on Water Quality and Sustainability, NSF-DST Joint Program, January 7-11, Indian Institute of Technology Chennai, India.

Conference Proceedings (contd)

S. Sengupta, J. Cunningham, S. Ergas, and R. Goel (2012), "Fundamentals of Environmental Engineering Concept Inventory (FEECI)", *AEESP Frontiers of Education in Environmental Engineering*, October 18-19, St. Louis, Missouri.

S. Sengupta (2012), "Macronutrient Removal and Recovery from Tertiary Treatment of Wastewater", 243 rd ACS National Meeting, March 25-29, San Diego, CA.

S. Sengupta & A. Pandit (2011) "Selective Removal of Phosphorus from Wastewater Combined with its Recovery as a Solid-Phase Fertilizer", *242nd American Chemical Society (ACS) National Meeting*, Denver, CO, August 29 - September 1.

S. Sengupta. (2011) "Onsite Treatment Methods for the Removal and Recovery of Macronutrients (N/P) from Wastewater" *American Chemical Society Global Innovation Imperatives Workshop on Water Supply and Sustainability*, New Delhi, India, January 17-20.

S. Sengupta & A. Pandit (2010) "Selective Removal of Phosphorus from Wastewater Combined with its Recovery as a Solid-Phase Fertilizer", *Water Environment Federation Technical Conference (WEFTEC)*, New Orleans, LA, October 2-6.

S. Sengupta. (2010) "Ion Exchange Nanofibers", Nanofibers for the 3rd Millennium, Raleigh, North Carolina, August 30 - September 1.

S. Sengupta. (2010). "Nutrient Removal Systems in Wastewater Treatment", NSF International Program: Workshop on Interface Between Water Quality and Water-Borne Diseases, Jan. 4-8, 2010, Indian Institute of Science, Bangalore, India

P. K. Patra & **S. Sengupta**. (2009) "Ion Exchange Functional Nanofibers", Materials Research Society 2009 fall meeting, Boston, MA, November 30-December 4, 2009.

Conference Proceedings (contd)

S. Sengupta, S. J. Ergas, R. Siegel, Y. Yao, and A. Pandit. (2009) "Use of Bioretention Systems to Control Nonpoint Sources of Nitrogen", New England Water Environment Association Spring Conference, Boston, MA.

S. J. Ergas, **S. Sengupta**, R. Siegel, Y. Yao, A. Pandit, & X. Yuan. (2009) "Denitrifying Bioretention Systems for Control of Non-Point Nitrogen Sources", 82nd Annual Water Environment Federation Technical; Exhibition and Conference, October 10-14, Orlando, FL.

S. J. Ergas, **S. Sengupta**, R. Siegel, Y. Yao, and A. Pandit (2008). "Bioretention Systems for Control of Nonpoint Sources of Nitrogen," Water Resources Research Center Meeting, UMass Amherst, April 8.

V. Kunduru, S. Prasad, P.K. Patra, **S. Sengupta** (2008). "‘Lab on a chip’ Label Free Protein Sensor Systems Based on Polystyrene Bead and Nanofibrous Solid Supports", Nanotechnology 2008: Microsystems, Photonics, Sensors, Fluidics, Modeling, and Simulation - Technical Proceedings of the 2008 NSTI Nanotechnology Conference and Trade Show, Volume 3.

A. K. Sahu, S. J. Ergas, and **S. Sengupta**, (2007) "Hydrogenotrophic Denitrification of Wastewater Using a Hollow Fiber Membrane Bioreactor," *Proc. International Conference on Membranes for Water and Wastewater Treatment*, Harrogate, U.K., May 15-17.

R. Siegel, S. J. Ergas, **S. Sengupta**, and K. Palaniswamy, (2007) "Use of Denitrifying Bioretention Systems to Control Non-point Sources of Nitrogen", *18th Annual Nonpoint Source Pollution Conference*, Newport, RI, May 21-23.

R. Siegel, S. J. Ergas, and **S. Sengupta**, (2006) "Use of Denitrifying Bioretention Systems to Control Non-point Sources of Nitrogen", *The 22nd Annual International Conference on Soils, Sediments, and Water*, UMass Amherst, October 16-19.

Conference Proceedings (contd).

S. Sengupta, (2006) "Ion Exchange Fibers: Synthesis & Characterization", *Proceedings of the Frontiers and Interfaces of Ion Exchange*, Antalya, Turkey, June 11-15.

E. Lopez-Luna, S. J. Ergas, and **S. Sengupta**, (2005) "Autotrophic Sulfur Oxidizing Denitrification for Total Nitrogen Removal in Onsite Wastewater Treatment Systems," *Proceedings of the 78th Annual Meeting of the Water Environment Federation (WEFTEC 05)*, Oct. 29-Nov. 2, Washington, DC.

A. K. Sahu, S. J. Ergas, and **S. Sengupta**, (2005) "Hydrogenotrophic Wastewater Denitrification Using a Hollow Fiber Membrane Bioreactor (HFMB)," *Proceedings of the 78th Annual Meeting of the Water Environment Federation (WEFTEC 05)*, Oct. 29-Nov. 2, Washington, DC.

S. Sengupta, S. J. Ergas, E. Lopez-Luna, J. Wood, and K. Palaniswamy, (2004) "Autotrophic Biological Denitrification for Complete Removal of Nitrogen from Septic System Wastewater," *Proceedings of the 36th Mid-Atlantic Industrial and Hazardous Waste Conference*, October 7-8, Storrs CT.

S. Sengupta, (2004) "Novel Physico-Chemical Process for Nutrient (N/P) Removal from Wastewater with Simultaneous Extraction of N/P Fertilizer", Extracts of the *Annual Conference of the American Chemical Society, Division of Environmental Chemistry, Philadelphia, PA, August 22-25*.

S. Sengupta and H. Miller, (2001) "Use of Scrap Tire Shreds as a Substitute for Gravel in Subsurface Wastewater Treatment Systems: A Field Scale Study, *33rd Mid-Atlantic Industrial and Hazardous Waste Conference*, Riverdale, NY.

S. Sengupta, (1999) "Investigation of Innovative Technologies for Removal of Copper from Textile wastewater", *Proceedings of the 31st Mid-Atlantic Industrial and Hazardous Waste Conference*, Storrs, Connecticut.

S. Sengupta, (1998) "Case Study: Investigation of Innovative Technologies for Removing Cr(VI) and HM from a Contaminated Site", *Proceedings of the 30th Mid-Atlantic Industrial and Hazardous Waste Conference*, Villanova, Pennsylvania, July (1998).

Conference Proceedings (contd).

S. Sengupta and T. Rose, (1997) "Nitrogen and Phosphorus (N/P) Removal from Wastewater Combined with Extraction of N/P fertilizer", *Proceedings of the Twenty-Ninth Mid-Atlantic Industrial and Hazardous Waste Conference*, Roanoke, Virginia.

S. Sengupta and A. K. Sengupta, (1997) "Electro-Membrane-Partitioning: An Innovative In-Situ Heavy Metal Decontamination Process", *Proceedings of the Twenty-Ninth Mid-Atlantic Industrial and Hazardous Waste Conference*, Roanoke, Virginia.

S. Sengupta and A. K. Sengupta, (1995) "Separation of Heavy Metals from Solid Phase by Composite Membranes", *Proceedings of the Twenty-Seventh Mid-Atlantic Industrial and Hazardous Waste Conference*, Lehigh University, Pennsylvania.

S. Sengupta and A. K. Sengupta, (1995) "Solid Phase Heavy Metal Separation Under Unfavorable Background Conditions by Composite Membranes", *Proceedings of "Applications of Chemical Engineering Fundamentals to Environmental Problems"*, AIChE Summer Conference, Boston, Massachusetts.

S. Sengupta and A. K. Sengupta, (1994) "Application of Composite Sorptive/Desorptive Ion Exchange Membrane in Selective Heavy-Metal Solid-Phase Separation", *"Recent Developments in Adsorption and Ion Exchange"*, AIChE Annual Conference, San Francisco, California.

S. Sengupta and A. K. Sengupta, (1994) "Chelating Composite Membrane: Its Application in Selective Heavy-Metal Solid Phase Separation", *Proceedings of the 1994 National Conference on Environmental Engineering*, Environmental Engineering Division of the American Society of Civil Engineers, Boulder, Colorado.

S. Sengupta and A. K. Sengupta, (1993) "Application of a New Class of Composite Membranes Towards Heavy Metal Decontamination", *25th Mid-Atlantic Industrial and Hazardous Waste Conference*, University of Maryland, College Park, Maryland.

Conference Proceedings (contd).

S. Sengupta and A. K. Sengupta, (1993) "Composite Sorptive/Desorptive Membrane for Sludge Decontamination", *205th ACS National Meeting, Division of Industrial & Engineering Chemistry*, Denver, Colorado.

Research Grants - PI

US-Israel Binational Agricultural Research & Development (BARD)
PI: Closing the nutrient cycle through sustainable agricultural waste management
October 1, 2016 – September 30, 2019

National Science Foundation – CBET Program
PI: Collaborative Proposal – GOALI: Sustainable Phosphorus Recovery from Agricultural Waste
July 1, 2015 – June 30, 2018

National Science Foundation – CBET Program
PI: Joint NSF/DST Workshop on Implementation of Sustainable Technologies for Water and Wastewater Treatment & Water Reuse
September 2012 – August 2014.

National Science Foundation - Transforming Undergraduate Education in Science, Technology, Engineering, and Mathematics (TUES) Program
PI: Development and Testing of a Fundamentals of Environmental Engineering Concept Inventory
Co-PIs: S. Ergas & J. Cunningham, USF; PK Imbrie & T. Reed-Rhoads, Purdue; R. Goel, UU.
August 2011 - July 2014

National Science Foundation - Major Research Instrumentation (MRI) Program
PI: Acquisition of Nanospider for Development of Next Generation of Polymeric Nanofibers
Co-PI: Sankha Bhowmick, MNE, UMass Dartmouth
August 2011 - July 2012

Research Grants –PI (contd.)

National Science Foundation - Partnerships for Innovation Program

PI: Development of Fiber-Based Technology for Creating New Opportunities in Economically – Depressed Northeastern U.S.
Co-PIs: R. Peck & S. B. Warner, UMD; P. K. Patra, UB-C; A. K. SenGupta, Lehigh.

February 2008 - January 2013

Cooperative Institute for Coastal & Estuarine Environmental Technology (CICEET)

PI: Use of Sulfur-oxidizing Denitrifying Systems for Control of Non-point Sources of Nitrogen

Co-PI: S. Ergas, UMass Amherst

September 2006 – February 2009

Massachusetts Highway Department

PI: Processing & Reuse of Street Sweepings and Catchbasin Cleanings

July 2005 – December 2007

UMass Dartmouth College of Engineering Research Seed Grant

PIs: S. Sengupta & S. Bhowmick

Environmental Engineering and Bioengineering cluster

March 2005 - December 2005

Cooperative Institute for Coastal & Estuarine Environmental Technology (CICEET)

PI: Autotrophic Biological Denitrification Using Hydrogen or Sulfur for Complete Removal of Nitrogen from a Septic System Wastewater

September 2003 – August 2005

Strategic Envirotechnology Partnership (STEP)

PI: Electrochemical Treatment of Textile Dye bath effluent
July 2003 - June 2004.

National Science Foundation, BES Division, SGER Program

PI: A Novel Physico-chemical Process for Wastewater Nutrient (N/P) Removal with Simultaneous Extraction of N/P Fertilizer

October 2001 – September 2002

Research Grants – PI (contd.)

Cranberry Grants Program

PI: Use of Lignocellulosics to Remove Trace Concentration of Pesticides, Herbicides, Insecticides, and Orthophosphorus from Cranberry Bog Supplies.

July 2001 – June 2003.

Strategic Envirotechnology Partnership (STEP)

PI: Treatment and Recovery of Phosphorus from Subsurface Wastewater Treatment Systems

July 2000 - June 2003.

UMass Lowell Research Consortium on Sustainable Technologies

PIs: S. Sengupta & B. R. Singh, "Synthetic, 'Green' Dyes for the Textile Industry

July 2000 – June 2002.

Chelsea Center for Recycling and Economic Development

PI: Use of Shredded Tires as a Substitute for Gravel in Leaching Field of Title V Systems

December 1998 – June 2000

Strategic Envirotechnology Partnership (STEP)

PI: Buoyant Microbead Biofilter in Recirculating Aquaculture Systems

July 1998 - June 2000.

UMass President's Office

PI: Use of an Advanced Oxidation Process (Fenton's Reagent) for Removal of Trace Concentration of Toxic Organic Contaminants from Cranberry-bog Water Supplies

July 1998 – June 1999.

Duro Finishing Corporation, Fall River, MA

PI: Study of Technologies for Removal of Copper from Textile Wastewater

November 1998 – April 1999.

Swan Finishing Company, Fall River, MA.

PI: Study of Technologies for Removal of Copper from Textile Wastewater

November 1998 – April 1999.

Research Grants – PI (contd.)

Strategic Envirotechnology Partnership (STEP)
PI: Use of Innovative Technologies for Heavy Metal
Decontamination from Industrial Sites: A Study of Remedial
Options at a Metal Plating Facility
July 1997 - June 1998.

Strategic Envirotechnology Partnership (STEP)
PI: Characterization and Treatability Studies of Wastewater
Generated by Beauty Salons
October 1996 - September 1997.

College of Engineering, University of Massachusetts Dartmouth
PI: Removal of Nitrogen and Phosphorus (N/P) from Cranberry-
bog Effluent Combined with N/P Recovery by an Innovative
Electro-Partitioning Process
June 1996 - May 1997

UMass Dartmouth Research Foundation and Department of
Civil and Environmental Engineering
PI: An Innovative Process for Nitrogen Removal from
Wastewater by Induced Electric Gradient Followed by Nitrate
Selective Membrane.
January 1995 – December 1995.

Research Grants – Co-PI

National Science Foundation, CMS Division, MRI Program
Co-PI: Acquisition of Instrumentation for Material
Characterization
PI: C. Papakonstantinou, CEN, UMD.
July 2005 – June 2007.

United States Environmental Protection Agency (USEPA)
Co-PI: Environmentally Benign Synthesis of Sodium
Hydroxide Without Chlorine Using Ion-Exchange Fibers
PI: A. K. SenGupta, Lehigh University
December 2003 – November 2006.

Strategic Envirotechnology Partnership (STEP)
Co-PI: Instrumentation for Monitoring and Control of
Decentralized Wastewater Treatment Facilities
July 1997 - June 1998.

Research Grants – Co-PI

National Science Foundation
Instrumentation and Laboratory Improvement Program (ILI-IP)
Co-PI: Southeastern Massachusetts Environmental Technology
Instrumentation Project
June 1997 - May 1999.

Membership in Professional Societies

American Chemical Society (ACS) – Environmental Chemistry Division
American Society of Civil Engineers (ASCE)
Association of Environmental Engineering & Science Professors
(AEESP)

Appendix B

Graduate Handbook



UMass

Dartmouth

COLLEGE OF ENGINEERING

Civil and Environmental
Engineering Department

Handbook for Graduate Students

Master of Science in Civil and Environmental Engineering

Prepared by:

Mazdak Tootkaboni, Alireza Asadpoure
Arghavan Louhghalam

Date:

Jan 29th, 2018

Table of Contents

Foreword	3
Introduction.....	4
General Information.....	4
Eligibility	4
Advising and Registration.....	4
Course Load Guidelines.....	5
Satisfactory Academic Progress	6
Continuous Registration Requirements	6
Termination of Studies.....	6
Transfer of Credit.....	7
Financing a Graduate Education.....	7
Master of Science in Civil and Environmental Engineering	8
MSCE Course Requirements:	8
MSCE Degree Tracks	8
Thesis Track.....	8
Project Track.....	9
Course work Track.....	9
5-Year BS/MS option	10
Milestones to MSCE Degree	10
Selection of the Graduate Advisor	10
Selection of the Thesis/Project Committee	10
Project/Thesis Agreement.....	11
Thesis Proposal	11
Project/Thesis Oral Presentation.....	11
Project Final Report	11
Thesis Format/Approval	12
Appendix A.....	13
SELECTION OF GRADUATE ADVISOR.....	14
SELECTION OF GRADUATE COMMITTEE.....	15
THESIS AGREEMENT	16
PROJECT AGREEMENT	17
MSCE ORAL PRESENTATION	18
PETITION FOR WAIVER OF A REQUIREMENT	19

Foreword

The Department of Civil and Environmental Engineering (CEN) at the University of Massachusetts Dartmouth offers a graduate program leading to the Master of Science in Civil and Environmental Engineering (MSCE).

This handbook describes a number of procedures for graduate students and states various departmental regulations. Information provided in this handbook is intended as a supplement to, and not a substitute for, the University of Massachusetts Dartmouth Graduate Catalog. The Graduate Catalog contains general rules and regulations governing the University's graduate programs. The department web site and the Graduate Office home page are located at <http://www.umassd.edu/engineering/cen> and <http://www.umassd.edu/graduate>, respectively.

Introduction

This handbook is published as a guide for graduate students who are seeking a Master of Science degree in Civil and Environmental Engineering. The goal of this document is to inform students of the necessary requirements and milestones along the way to their degree objectives. Appendix A contains forms that can be used if needed.

This handbook should be used together with the latest copy of the UMass Dartmouth Graduate Catalog (<http://catalog.umassd.edu/index.php?catoid=50>), which is the official source of information about the university's graduate academic programs (excluding law), its approved courses, and associated policies and procedures.

Additional guidance provided by the following offices can assist you: the Office of Student Affairs, the Center for Access and Success, Writing and Reading Center, Computing and Information Technology Services, and the Office of the Registrar.

General Information

Eligibility

Individuals with a BS degree in Civil and Environmental Engineering from an accredited institution and a GPA of at least 2.5 are eligible to apply to the MSCE program. Those with BS degrees in other fields or a BS in Civil and Environmental Engineering from a non-accredited institution need to have successfully passed the following courses before being considered for the graduate program:

- One year (2 semesters) of Physics + One year (2 semesters) of Chemistry + One year (2 semesters) of Calculus
- EGR 241: Engineering Mechanics I (Statics)
- EGR 242: Engineering Mechanics II (Dynamics)
- CEN 202: Mechanics of Materials
- CEN 303: Fluid Mechanics

Some of the above courses could possibly be waived in consultation with the academic advisor and the graduate program director. Enrollment in CEN grad courses, however, requires that the pre-requisites put in place by the CEN faculty teaching the course be met.

Advising and Registration

Once accepted into a graduate program, the first step is to choose a graduate advisor based on your personal interests through consultation with the department graduate program director. After the graduate advisor is identified, the student must prepare a preliminary plan of study based on the

degree requirements. The course listings provided in the Graduate Catalog will help you develop a preliminary plan of study. Planning will help ensure that you have the necessary prerequisites for the courses you need at the times they are offered. After you make a draft plan, you should meet with your advisor to discuss it.

When you arrive on campus, go to the Civil and Environmental Engineering Department Office (Violette Bldg., room 108) where the secretary will direct you to the CEN Graduate Program Director who will help you in the process of initiating your discussions with different faculty members towards identifying a graduate advisor. Selection of graduate advisor is important since he or she will be the person who advises you on your thesis, project, or course selection and guides your program to completion. You must file a Selection of a Graduate Advisor form with the CEN Graduate Program Director before the end of your first semester. Failure to do so may result in forfeiture of any teaching assistantship (TA) or research assistantship (RA) and inability to register for courses.

The selection of courses including independent studies as well as the thesis or project research topic should be done in consultation with the graduate advisor and with the approval of the graduate program director. It is, however, your responsibility, not your graduate advisor's, to make sure that the planned program meets all requirements stipulated in the graduate handbook. If deficiencies are found during certification for graduation, your graduation will be delayed until the deficiencies are removed.

A Thesis or Project Agreement form must be completed before completing 15 credits. You and your advisor will then agree on a sequence of courses that will give you the best preparation for your thesis or project as quickly as possible.

Pre-registration periods are specified by the university each semester. Graduate students are strongly encouraged to enroll for the next semester at those times. After consultation with their advisor, students are expected to register themselves for courses using the university online system (www.umassd.edu/coin/). Departmental RAs and TAs will not be renewed unless students pre-register and file all appropriate paperwork. The pre-registration period is also a time to review your graduate program of study and to make whatever changes are appropriate in consultation with your advisor. Pre-registration helps ensure that you will have a place in a course if enrollment is large and that a course you wish to take does not get canceled due to a low enrollment. In addition, if you hold a summer assistantship, you cannot get paid unless you have pre-registered for the fall semester. Fall assistantships will not be renewed if you are not pre-registered, with a Selection of Advisor form on file with the CEN Graduate Program Director.

Course Load Guidelines

A course load of 9 credits per semester is considered minimum for full-time status at UMass Dartmouth. Students awarded full-time graduate assistantships may take no more than 9 credits (including research thesis or project) per semester. These course load guidelines must be followed unless approval is obtained in writing from your advisor and the Graduate Program Director.

Satisfactory Academic Progress

Students are expected to make appropriate progress toward completion of their degrees, and those who do not are subject to review for warning, probation or possible dismissal as indicated under Academic Sanctions in graduate catalog:

<http://catalog.umassd.edu/content.php?catoid=50&navoid=4008>

Unsatisfactory academic progress results from failure to meet the requirements stipulated in graduate catalog under Graduate Degree Requirements and or and/or failure to complete the following:

- For students who enroll in thesis/project track: (1) filing a project or thesis proposal; (2) scheduling the project or thesis presentation; (3) producing final copies of the master's thesis/project; (4) passing the minimal number of required credits
- For students who enroll in course work track: (1) passing a comprehensive written or oral examination after a maximum of two trials; (2) passing the minimal number of required credits

Please note that course credits have a longevity of 6 years from the time course is completed. Only graduate courses in which the student receives a grade of C or better will count towards the degree. However, all grades are averaged into the student's GPA. Required courses in which a student received a grade of C minus or less must be repeated in order for the student to graduate.

Continuous Registration Requirements

To maintain status as an MS degree candidate, it is necessary to be enrolled continuously (exclusive of summers) or receive an approved Leave of Absence (if you must interrupt progress towards your degree). If you continue to work on your thesis or project after completing formal course requirements and 3 or 6 credits of research for project or thesis, respectively, you must enroll in zero-credit "Continuation" for every semester until the thesis/project is completed, including the semester in which final approvals are given.

Termination of Studies

Withdrawal from the University permanently removes the student from the program and is therefore a serious procedure. Any student considering withdrawal should consult with their advisor. If the student subsequently decides to withdraw from the University, she/he should do so formally through the normal University procedure. Withdrawing students who hold University appointments should also submit a letter of resignation to the CEN Graduate Program Director. Students who do not register for any courses or continuing studies, or do not request a Leave of Absence, will be automatically withdrawn from the University.

Students who have withdrawn from the University and wish to return must apply for re-admission. Application for re-admission is made by written request to the Office of Graduate Studies. Re-admission is granted subject to the approval of the CEN Graduate Committee, the CEN Department Chairperson, and the Dean of the College of Engineering.

Transfer of Credit

A maximum of 6 credits may be transferred from another institution. The Transfer Credit Evaluation form is available at the Office of Registrar. All transfer requests must be accompanied by official transcripts (not copies). Supporting information, such as syllabi and detailed course descriptions, that could be useful in the evaluation of transfer credit should be included with the request. Course credits applied in the attainment of another degree from any institution, including UMass Dartmouth, cannot be counted towards the 30 credits needed to obtain the MSCE degree at UMass Dartmouth, unless a student is enrolled in the 5-year BS/MS program. Students in the 5-year BS/MS program are allowed to have 6 credits of upper level (400 or higher) courses count towards both the BS and MS degrees. Students may submit a Waiver of Requirement (Appendix A) request if they believe they have already taken a course satisfying a CEN degree requirement during the completion of another degree program. It should, however, be noted that a waiver does not reduce the total number of credits required for completion of the M.S. degree. Only courses in which a grade of B minus or better was obtained are eligible to be transferred.

Financing a Graduate Education

A limited number of research and teaching assistantships are available each year. These assistantships, which are available only to MS students on thesis track (see below), are awarded based on academic merit and are very competitive. All Teaching Assistantships (TAs) are recommended by the CEN department's graduate committee, are approved by CEN chair or the graduate program director and are awarded by the Dean of the College of Engineering. Research Assistantships (RAs) are awarded by a faculty sponsor, signed by graduate program director and approved by the Dean of College of Engineering. A graduate assistantship may include a full or partial waiver of tuition depending on the type of assistantship and the funding source.

If you receive any form of assistantships, you need to contact the CEN Department secretary as soon as you arrive on campus to sign the necessary paperwork to initiate payments. If you receive an RA, contact your faculty sponsor to learn the scope of your assistantship. Renewal of assistantships beyond the initial contract period is determined by the department or the faculty sponsor and the college. Assistantship renewal is contingent upon maintain an acceptable academic record (e.g., a cumulative GPA of at least 3.0 for TAs) and satisfactory progress towards the degree (see above). Performance in performing the duties associated with the assistantship and availability of funds are also criteria for continuation.

A full-time graduate assistant is expected to work 20 hours per week “for the assistantship” she or he is receiving during the academic year. Note, this is not necessarily equal to the number of hours the student needs to commit to research in order to maintain satisfactory progress towards degree completion. Full time support in the summer assumes 40 hours per week commitment.

Master of Science in Civil and Environmental Engineering

The Master of Science in Civil and Environmental Engineering (MSCE) assists the region's, the state's and the nation's industries, small businesses, and governmental agencies by providing an accessible source of graduate education. The need for advanced degrees in Civil and Environmental Engineering is both regional and global. Our master's degree program aims at providing students with the knowledge, the skills and the confidence that are needed to address the challenges of today and future.

The program offers small classes, close contact with a diverse and international faculty, and easy access to well supported research facilities to provide state-of-the-art learning and research experiences. Courses are scheduled to permit either fulltime or part-time study.

MSCE Course Requirements:

A total of thirty (30) credits, selected with the approval of the Graduate Advisor, are required. In general, the courses must be designated as CEN courses, although courses taken from other departments may be accepted with approval of the CEN graduate program director.

MSCE Degree Tracks

There are four different tracks available to students seeking a master's degree in Civil and Environmental Engineering:

- Thesis track
- Project track
- Course work track
- 5-Year BS/MS track

Only CEN undergraduate students who are interested in pursuing a master's degree can choose the accelerated 5-Year BS/MS option.

Thesis Track

The thesis option requires the completion of a research thesis usually involving a theoretical, numerical or experimental investigation of a fundamental nature.

1. A minimum of 30 credits must be completed. These must be selected by the student in consultation with the graduate advisor.
2. A grade of C or better is required for all graduate courses to be counted towards the degree.
3. As many as 6 credits of 400 level courses may be counted towards the degree. For these courses, a grade of B or better and the approval of the graduate program director are required.

4. 6 credits of MS Graduate Thesis (CEN 590) must be completed. In addition to the written thesis, the approval of the Thesis Committee (see Appendix A for the approval form) on a satisfactory oral presentation and defense of the thesis is required.
5. No more than 6 credits of individual study, including independent study and/or directed study, and excluding graduate thesis, may apply as credit toward the master's degree.
6. The thesis must be accepted for library collections. The library has moved to an electronic only system for archiving theses, and the submission of bound copies to library are no longer required. A minimum of 2 copies, however, should be bound and submitted to the department and the Graduate Advisor. Other copies may be requested by thesis committee members or other interested parties involved in the thesis research.

Project Track

The project option requires the successful completion of a project, usually involving a theoretical, numerical or experimental investigation of an applied nature, often in conjunction with a company's or government agency's interests.

1. A minimum of 30 credits must be completed. These must be selected by the student in consultation with the graduate advisor.
2. A grade of C or better is required for all graduate courses to be counted towards the degree.
3. As many as 6 credits of 400 level courses may be counted towards the degree. For these courses, a grade of B or better and the approval of the graduate program director are required.
4. 3 credits of MS Graduate Project (CEN 592) must be completed for the Project track. In addition to the written report, the approval of the Project Committee (see Appendix A for the approval form) on a satisfactory oral presentation and defense of the project is required.
5. No more than 6 credits of individual study, including independent study and/or directed study, and excluding graduate project, may apply as credit toward the master's degree.

Course work Track

The course work option requires the successful completion of a comprehensive written or oral exam, involving questions from a set of a minimum of four core courses completed by the student. The set of core courses will be determined by the student's advisor in consultation with the student and must be approved by the Graduate Program Director.

1. A minimum of 30 credits must be completed. These must be selected by the student in consultation with the graduate advisor.

2. A grade of C or better is required for all graduate courses to be counted towards the degree.
3. As many as 6 credits of 400 level courses may be counted towards the degree. For these courses, a grade of B or better and the approval of the graduate program director are required.
4. A comprehensive written or oral exam must be passed after the completion of a set of core courses. A student who fails to pass the exam may retake it for the second time upon consultation with the graduate advisor and approval of the graduate program director.
5. No more than 6 credits of individual study, including independent study and/or directed study, may apply as credit toward the master's degree.

5-Year BS/MS option

CEN undergraduate students at UMass Dartmouth can choose to apply to the accelerated 5-Year BS/MS option. Upon admission, these students are required to follow one of the three tracks discussed above. However, students in the 5-Year BS/MS program are allowed to have 6 credits of upper level (400 or higher) tech-elective (not core-elective) courses count towards both the BS and MS degrees.

Milestones to MSCE Degree

Selection of the Graduate Advisor

Once accepted into a graduate program, the first step is to choose a graduate advisor based on your personal interests. Selection of graduate advisor is important since he or she will guide you through the necessary steps toward completion of degree requirements. You must file a Selection of a Graduate Advisor form (see Appendix A for selection form) with the CEN Graduate Program Director before the end of your first semester. Failure to do so may result in forfeiture of any teaching assistantship (TA) or research assistantship (RA) and inability to register for courses.

Selection of the Thesis/Project Committee

Students in the Thesis and Project tracks must also select 3 faculty members to serve as their thesis or project committee (see Appendix A for the Committee Selection form). The Committee reviews the student's progress towards the degree and approves the thesis or project. The Committee will need to include at least 2 faculty members from within the CEN Department. The student's Graduate Advisor, who is chairperson of this committee, must be a full-time, joint, or affiliate member of the CEN faculty at UMass Dartmouth. The student is responsible for arranging for faculty to serve on his/her committee. When appropriate, a senior industrial person may serve on the Committee with approval of the CEN Graduate Program Director and the Dean of the College of Engineering.

Project/Thesis Agreement

This is a preliminary agreement between the student and the Graduate Advisor regarding the general topic to be investigated in the project or thesis. It must be filed as soon as the student has decided which track he or she will pursue and what the topic might be. This agreement must be filed no later than the end of the first year of study (see Appendix A for Agreement form).

Thesis Proposal

Prior to taking CEN 590 a proposal for thesis research must be prepared by the student in consultation with the Graduate Advisor. The proposal must be approved by the student's Thesis Committee and filed with the CEN Graduate Program Director as a prerequisite to enrolling in thesis.

The format for the thesis proposal is:

- Cover Page - Title; student name, date, signature of graduate student; names, signatures, date of student's Thesis Committee.
- Background - One paragraph (1/3 page) to orient the reader to the area of research
- Problem Statement - One or two sentences that concisely state the problem that will be addressed by the research.
- Technical Discussion - About one page that presents some of the more important aspects of the proposed research. This should include a summary of the state-of-the-art in the particular research area.
- Approach - One paragraph (1/3 page) that describes the methods that will be applied in conducting the research.
- Bibliography – Full citations of cited literature.

Project/Thesis Oral Presentation

Each degree candidate in the thesis or project track will make an oral presentation to the student's committee and invited guests. Students are required to give the oral presentation on the thesis or project topic and are expected to show mastery of the material presented. The details of the thesis or project (including title, date, room, etc.) must be announced at least 2 weeks in advance of all oral presentations. The student's Committee will determine if the presentation and knowledge of the student are satisfactory or if the presentation must be repeated again.

Project Final Report

The Project Final Report must be submitted to the Graduate Advisor for the student to receive a grade for Graduate Project (CEN 592). While there are no specific format requirements for the final report, the report must be reviewed and approved by the committee and the Graduate Advisor. Advisors are free to impose requirements on the final report.

Thesis Format/Approval

The thesis must be completed in accordance with the rules of the UMass Dartmouth Office of Graduate Studies and the College of Engineering. Following the oral presentation, several signatures are required for final approval of the thesis. These include but are not limited to the student's Thesis Committee, the CEN Graduate Program Director.

Appendix A

SELECTION OF GRADUATE ADVISOR

TO: The CEN Graduate Program Director

The faculty member named below has agreed to serve as MSCE Graduate Advisor for:

Student: _____
 Last First M.I.

Email Address: _____ Student ID: _____

Professor: _____
 Last First M.I.

Student Signature: _____ Date: _____

Advisor Signature: _____ Date: _____

Approval: _____
 CEN Graduate Program Director

SELECTION OF GRADUATE COMMITTEE

TO: The CEN Graduate Program Director

The following faculty have agreed to serve on the MSCE Graduate Committee of:

Student: _____
Last First M.I.

Email Address: _____ Student ID: _____

Professor: _____
Last First M.I.

Signature: _____ Date: _____

Professor: _____
Last First M.I.

Signature: _____ Date: _____

Student Signature: _____ Date: _____

Advisor Signature: _____ Date: _____

Note: In some circumstances a senior engineer or scientist from outside UMass Dartmouth may serve on a Graduate Committee. Approval of the CEN Graduate Program Director is required if such a person is being considered. Attach a letter indicating the company, title and areas of expertise of the proposed committee member.

Approval: _____ Date: _____
CEN Graduate Program Director

THESIS AGREEMENT

TO: The CEN Graduate Program Director

The faculty member named below has agreed to act as Graduate Advisor and to direct the MSCE thesis of:

Student: _____
Last First M.I.

Email Address: _____ Student ID: _____

Advisor: _____
Last First M.I.

The general topic or field of research will be _____

This agreement may be terminated by either party by written notification of both parties to the CEN Graduate Program Director. Completion of this form does not fulfill the Thesis Proposal requirement.

Student Signature: _____ Date: _____

Advisor Signature: _____ Date: _____

PROJECT AGREEMENT

TO: The CEN Graduate Program Director

The faculty member named below has agreed to act as Graduate Advisor and to direct the M.S. project of:

Student: _____

Last
First
M.I.

Email Address: _____ Student ID: _____

Professor: _____
Last First M.I.

The general topic or field of research will be _____

This agreement may be terminated by either party by written notification of both parties to the CEN Graduate Program Director. Completion of this form does not fulfill the Project Proposal requirement.

Student Signature: _____ Date: _____

Advisor Signature: _____ Date: _____

MSCE ORAL PRESENTATION

TO: Dean, College of Engineering

FROM: CEN Graduate Program Director

DATE: _____

_____ (Name of student) has successfully completed the oral presentation requirement for the MSCE on this date.

Advisor: _____

Committee Member: _____

Committee Member: _____

PETITION FOR WAIVER OF A REQUIREMENT

TO: CEN Graduate Program Director

FROM: (Student Name)_____ Date:_____

Email Address:_____ Student ID: _____

I believe that I have already accomplished the objectives of the following degree requirement:

and that I should therefore have this requirement waived. I understand that a waiver does not reduce the total number of credits required as a graduate student for completion of the M.S. degree.

In the space below give information that justifies your petition (use additional sheets if necessary). Give course numbers, names, where taken and for what degree. Attach a transcript (copy) and circle the applicable courses:

Student Signature:_____ Date:_____

Approval:

Course Coordinator: _____ Date:_____

CEN Graduate Program Director: _____ Date:_____

All rules are subject to change at any time in accordance with existing and hereafter adopted University policies.

It is the policy of University of Massachusetts Dartmouth not to discriminate against any applicant for admission or employment, or against any employee, or any educational program, on the basis of race, religion, national origin, age, veteran status, handicap, sex, or sexual orientation. The following person has been designated to handle inquiries regarding the nondiscrimination policies:

*Associate Vice Chancellor of
Diversity, Equity & Inclusion
Foster Administration Building
University of Massachusetts Dartmouth
285 Old Westport Road
North Dartmouth, MA 02747-2300*

Telephone (508) 999-9293

For information regarding graduate admission contact:

*Office of Graduate Studies
University of Massachusetts Dartmouth
285 Old Westport Road
North Dartmouth, MA 02747-2300*

Telephone (508) 999-8604

Appendix C

Graduate Courses

Civil and Environmental Engineering

Graduate Courses

CEN 502 - Advanced Hydrology

CEN 504 - Statistical Methods in Civil & Environmental Engineering

CEN 505 - Finite Element Analysis

CEN 512 - Advanced Structural Analysis

CEN 514 - Hazardous Waste Managmnt

CEN 516 - Advanced Analysis and Design of Reinforced Concrete

CEN 517 - Prestressed Concrete Analysis and Design

CEN 519 - Advanced Traffic Engineering

CEN 521 - Matrix Methods of Structural Analysis

CEN 524 - Physical Chemical Processes

CEN 525 - Structural Mechanics

CEN 530 - Topics in Civil & Environmental Engineering

CEN 532 - Pavement Design

CEN 533 - Sp Top:Geotechnical Eng

CEN 538 - Structural Dynamics

CEN 540 - Structural Materials

CEN 552 - Advanced Soil Mechanics

CEN 554 - Surface Water Hydrology

CEN 556 - Waves and Tides

CEN 558 - Open Channel Flow Hydraulics

CEN 562 - Water Resources Planning and Management

CEN 564 - Environmental Water Chemistry

CEN 570 - Reaction Processes in Environmental Engineering

CEN 572 - Advanced Processes in Environmental Engineering

CEN 573 - Water Treatment

CEN 574 - Hazardous Waste Management

CEN 580 - GeoEnvironmental Engineering

CEN 582 - Pavement Design

CEN 584 - Pavement Materials

CEN 586 - Pavement Management

CEN 588 - Intelligent Transportation Systems

CEN 590 - Master's Thesis

CEN 592 - Master's Project

CEN 595 - Independent Study

CEN 596 - Directed Study

CEN 600 - Practice of Structural Engineering

Appendix D

MS Program Graduates and Current Students

CIVIL ENGINEERING MS GRADUATES/STUDENTS

2005-2006	Date of Degree Certification
Eric A. Tobolski	7/24/06
Colin J. Dahlen	7/24/06
2006-2007	
Aly Mohammed Fahmy	2/5/07
2007-2008	
Joseph Iccarino	5/08
Konstantinos Katakalos	5/08
Alexander Austerman	12/08
2008 – 2009	
Bryan Engstrom	5/09
2009-2010	
Arka Pandit	1/10
Yifu Yao	3/10
Mohamed Monir Haggag	12/10
2010-2011	
Shane Sousa	5/11
Andrew Rodriguez	5/11
2011-2012	
Nicholas Aguiar	06/12
2012-2013	
Edson Valadares	2/13
Emile Tayeh	3/13
Jason Lema	5/13
Christopher Cabral	10/13
2013-2014	

Mohammadreza Gargari	8/13
Abbas Booshehrian	8/13
Zachery Saleeba	9/13
Ali Moradi Gharehtapeh	9/13
Siavash Vahidi	10/13
Suren B. Parajuly	6/14

2014-2015

Dena Khatami	1/14
Suren B. Parajuly	6/14
Jeffrey Beaudry	9/14
Tony Khoury	3/15
Benjamin Mitsmenn	3/15
Joao Pires	7/15
Babak Ahmadi	10/15
Keivan Ghobadi	12/15

2016-2017

Hamed Amouzegar	3/16
Kareem Bonugli	4/16
Mark Brum	7/17
Wei-Chun Liao	9/16
Milad Zokaei Ashtiani	8/17

2017-2018

Hejar Jebeli Azdam	1/18
Siavash Fakhaetaha Aval	4/18
Nathaniel Tarantino	5/18
Vashkar Palma	6/18
Michele Winchell	9/18

Current graduate students

**Meshkat, Botshekan
Nikiforos Delatolas
Artoghrul Hasansoy
May May Khin
Peter Kotowski**

**Anlang Li
Seyed Ardalan Nejat
Nicholas Proulx
Mohammod Minhajur Rahman
Sayed Arafat Bin Rahman**

Appendix E

An example of comprehensive exam for MSCE's course work track

Comprehensive Exam
MSCE Program (Course Work Track)
December 4, 2018

ENVIRONMENTAL TURBULENCE
Open Book/Notes

Consider a water body with a stable density gradient of -3.5 kg/m^4 .

- (a) [5 points] What is the minimum velocity gradient that you expect could trigger turbulence in this water body?
- (b) [5 points] The dissipation rate of TKE is measured by a vertical microstructure profiler as $\varepsilon = 3.2 \times 10^{-6} \text{ W/Kg}$. Assuming the turbulence is generated by naturally occurring shear instabilities, what size would you expect the largest eddies to be?
- (c) [5 points] For the scenario described in part (b), estimate an appropriate time scale for these eddies.
- (d) [5 points] From the dissipation rate given above, estimate the Buoyancy Flux, B , the Shear Production of TKE, P , and the Eddy Diffusivity, K_e .

CEN 530 (Subsurface Remediation)

NOTE: Show all work explicitly and explain your answers or any assumptions. You may use class notes and slides. Note that a part of the provided information may not be necessary for solving the ensuing problems.

Dissolved-phase 1,4-dioxane, a likely human carcinogen with widespread use as a stabilizer of certain chlorinated solvents and a contaminant that does not readily biodegrade in the subsurface environment, has been recently discovered in a federal facility upgradient from a public supply well that is used as a source of drinking water. Here is a summary of chemical properties of 1,4-dioxane:

<i>Property</i>	<i>Symbol</i>	<i>Value (unit)</i>
<i>Molecular weight</i>	MW	88.11 (g/mol)
<i>Water solubility</i>	C_{sol}	Miscible
<i>Vapor pressure at 25 °C</i>	P_g	38.1 (mm Hg)
<i>Specific gravity</i>	S.G.	1.33
<i>Octanol-water partition coefficient</i>	$\log_{10} K_{ow}$	-0.27
<i>Henry's law constant at 25 °C</i>	K_H	4.8×10^{-6} (atm.m ³ /mol)
<i>Cancer slope factor (oral)</i>	CPS_o	0.1 (kg-d/mg)

Find the estimated (do 3 out of 4):

- Time it will take the 1,4-dioxane plume to reach the capture zone of the municipal well which is located 300 ft downgradient from the leading edge of the newly discovered contamination. Assume the underlying aquifer is homogeneous, the flow field is at steady-state and Darcy velocity can be assumed to be uniform at 0.015 cm/hr, $\rho_b = 1.8 \text{ g/cm}^3$, $\rho_s = 2.65 \text{ g/cm}^3$, and the organic content of the sandy material is 0.2% (hint: begin by estimating a retardation factor for 1,4-dioxane).
- Concentration of 1,4-dioxane at the supply well location 10 years from the present time, given a current 1,4-dioxane concentration of 1,200 $\mu\text{g/L}$ measured at the federal facility site. You may consider a constant 1,4-dioxane concentration at the source point, neglect molecular diffusion effects and use the 1-dimensional analytical solution to the ADE equation.
- Added risk of cancer due to chronic exposure to 1.4 dioxane for the concentration level estimated in part (b) via ONLY the ingestion of contaminated water from the supply well. Follow the EPA risk assessment procedure using residential exposure factors for adult female group. In any further action necessary?
- Thickness of a treatment wall (a horizontal flow permeable reactive barrier or PRB) as a treatment alternative for this site required to reduce 1,4-dioxane concentration to the MCP¹ GW-1 standard level of 0.3 ppb (310 CMR 40.0974(2)). Laboratory column tests show that 1,4-dioxane has a half-life of 4 days in the reactive medium you have selected. The tests also showed that the material has a porosity of 0.45 and hydraulic conductivity of $2 \times 10^{-2} \text{ cm/sec}$. Assume that the PRB will be installed in the road at the downgradient property line and that the concentration of 1,4-dioxane is 1,200 $\mu\text{g/L}$ at the downgradient edge of the property.

¹ MCP: Massachusetts Contingency Plan

CEN 573 & CEN 412

Open book, open notes

1. A dual-media rapid filter contains anthracite with an effective size of 0.9 mm, sphericity of 0.75, porosity of 0.48, and depth of 0.40 m and sand with an effective size of 0.48 mm, sphericity of 0.90, porosity of 0.40, and depth of 0.40 m. The uniformity coefficients are 1.5 for each of the media. Perform all calculations for a temperature of 10°C. Divide each medium into three layers on a weight basis. Calculate the initial headloss through the bed if the loading rate is $200 \text{ m}^3/\text{m}^2/\text{d}$.
2. Design the activated sludge aeration tank, including the oxygen requirement and the details of the oxygen-supply (diffuser) system for a wastewater treatment plant using the data given below:

Average Flow = 5 MGD

Total Suspended Solids after the primary clarifier = 120 mg/L

BOD₅ of the influent after the primary clarifier = 130 mg/L

Biokinetic Constants:

$k_{\max}$	5.5 d^{-1}
K_s	68 mg/L BOD ₅
Y	0.53 mg VSS/mg BOD ₅
k_d	0.06 d^{-1}

Assume:

$X = 1,500 \text{ mg/L}$

$X_u = 8,000 \text{ mg/L}$

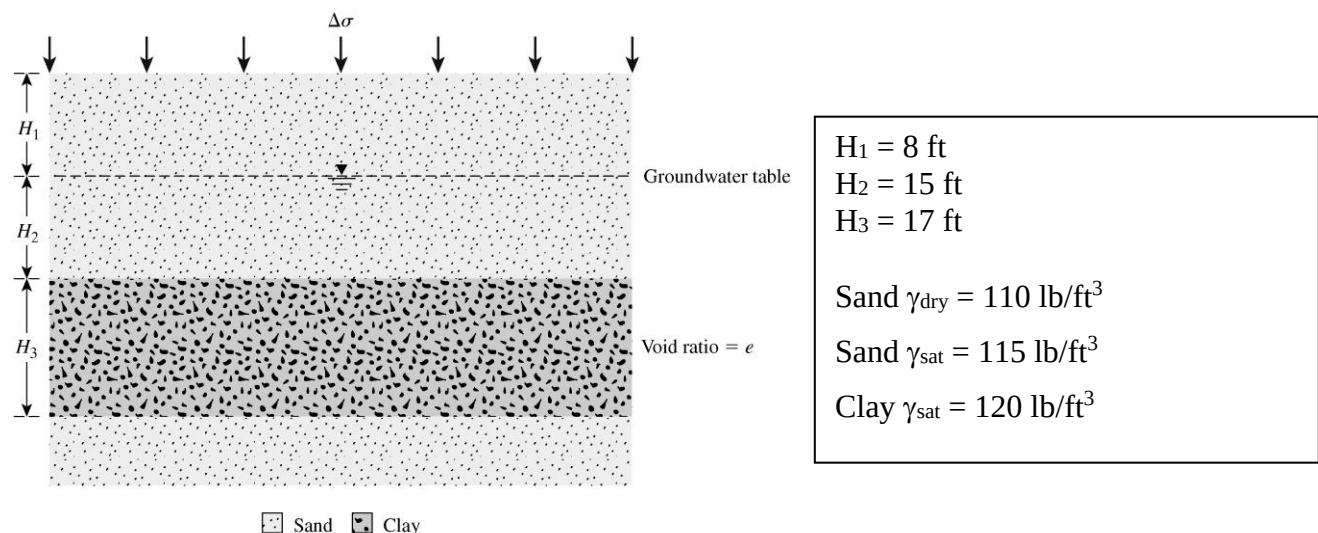
Problem from CEN 533 (open book)

Given: A developer wants to fill a large site for a recreational park. The site conditions are shown on below, along with results from a consolidation test performed on a sample of the **clay**, which is known to be **extremely sensitive**.

The fill will result in an added stress, $\Delta\sigma_1 = 800 \text{ lb/ft}^2$ on the clay layer. The additional increase in stress on the clay layer due to the recreational facilities will be $\Delta\sigma_2 = 300 \text{ lb/ft}^2$. (i.e., the **total** increase in stress on the clay layer after both filling and construction of facilities will be $\Delta\sigma = 1,100 \text{ lb/ft}^2$)

Required:

- (a) Estimate the ultimate magnitude of consolidation settlement (due to both filling and construction of facilities).
- (b) The contractor has suggested using wick drains to accelerate the consolidation of the clay layer. The contractor proposes to install the wick drains, place the fill and then wait **30 days** before constructing the recreational facilities. Estimate the magnitude of **settlement that should occur during that 30 day waiting period**. The details of the proposed wick drains are:
 - Wick drain **width** = **4 in.** and **thickness** = **1/8 in.**
 - Install in a **square** grid pattern, with **spacing** = **4 feet** (center-to-center).



Results from a consolidation test yielded the following additional information regarding the clay deposit:

Initial void ratio, $e_o = 0.9$

Recompression Index, $C_r = C_s = 0.06$

Compression Index, $C_c = 0.36$

σ'_c = preconsolidation pressure = 2600 lb/ft^2

c_v = coefficient of consolidation (vertical drainage) = $0.25 \text{ ft}^2 \text{ per day}$

c_h = coefficient of consolidation (horizontal drainage) = $0.50 \text{ ft}^2 \text{ per day}$

Answers:

(a) ultimate consolidation settlement = inches

(b) settlement at end of “waiting period” (30 days) = inches

Academic Quality Assessment and Development Self-Assessment Report

Master of Science in Computer Science

Computer and Information Science Department

College of Engineering

University of Massachusetts Dartmouth

Spring 2019

Prepared by the AQAD Committee: Paul Bergstein (Chair), Adnan El-Nasan, Maoyuan Sun, Haiping Xu & Xiaoqin Zhang, with contributions from the entire CIS Department

Table of Contents

<i>Introduction to the Dept. of Computer & Information Science</i>	<i>3</i>
<i>Program Enrollments and Graduation Rates</i>	<i>4</i>
<i>I. Goals and Objectives.....</i>	<i>6</i>
<i>II. Curriculum</i>	<i>11</i>
<i>III. Faculty Quality and Productivity</i>	<i>22</i>
<i>IV. Teaching and Learning Environments</i>	<i>26</i>
<i>V. Resources.....</i>	<i>30</i>
<i>VI. Strategic Planning: Future Goals & Specific Objectives</i>	<i>35</i>
<i>Appendix A: Faculty Publications (last 5 years)</i>	<i>37</i>
<i>Appendix B: Faculty Grants (Last 5 Years).....</i>	<i>49</i>
<i>Appendix C: Faculty CVs.....</i>	<i>52</i>
<i>Appendix D: CIS Graduate Student Handbook</i>	<i>53</i>

Introduction to the Dept. of Computer & Information Science

The Department of Computer and Information Science (CIS) currently educates over 250 Bachelor of Science and over 100 Master of Science students. Additionally, department faculty supervise Ph.D. students in the Engineering and Applied Science (EAS) Ph.D. program, Computer Science and Information Systems (CSIS) option. Several department faculty also support the BS and MS programs in Data Science which are offered jointly by the CIS and Mathematics departments.

The CIS Department currently includes ten full-time tenured/tenure track faculty and two full-time lecturers. All faculty who participate in graduate education are actively engaged in teaching, research, and service. During the past five years, the faculty have published 5 book chapters, more than 50 peer reviewed journal articles, over 70 conference papers, and have been awarded a number of prestigious grants including those from the National Science Foundation and Office of Naval Research. The Department enjoys collaborative research associations with a number of area businesses and organizations, including Raytheon and the Naval Underseas Warfare Center (NUWC).

The Computer and Information Science Department was established and began offering the Bachelor of Science (BS) degree in Computer Science in 1983. In 1988 the program became accredited by the Computer Science Accreditation Board (CSAB). In 2000 CSAB merged with the Accreditation Board for Engineering and Technology (ABET) and became ABET's Computing Accreditation Commission. The BS in Computer Science program has been continuously accredited since 1988. Since Fall 2007, the department has offered a Software Engineering option within the Bachelor of Computer Science program, consistent with the University's strategic plan to provide "innovative and high-impact research and academic programs."

In Fall 1988, the Computer and Information Science Department began offering the Master of Science in Computer Science degree. Beginning in January 2005, the department started offering a 5-year BS/MS program in Computer Science for qualified undergraduates. Since Fall 2014, the department has also offered an online Computer Science MS program. Additionally, the department offers a 15 credit Computer Science graduate certificate, which provides a route to our MS program for students from a variety of backgrounds.

Program Enrollments and Graduation Rates

Enrollment by Major

	<i>Fall 2011</i>		<i>Fall 2012</i>		<i>Fall 2013</i>		<i>Fall 2014</i>		<i>Fall 2015</i>		<i>Fall 2016</i>		<i>Fall 2017</i>	
	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2
CIS-BS	150	0	166	0	205	0	234	0	263	2	284	3	269	2
CIS-BS CISS	10	0	11	0	8	0	8	0	12	0	17	0	10	0
CIS-MS	54	0	47	0	47	0	78	1	121	1	116	1	91	0
CIS-OGP	0	0	0	0	0	0	3	0	2	0	6	0	17	0
CMP-PBC	0	0	1	0	0	0	0	0	0	0	1	0	4	0
CMP-OGC	*	*	*	*	*	*	*	*	0	0	1	0	4	1
CNS-PBC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SDD-PBC	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Total	214	0	225	0	260	0	324	1	399	3	425	4	395	3

**CMP-OGC started in Spring 2015.*

Enrollment in Minors

	<i>Fall 2011</i>	<i>Fall 2012</i>	<i>Fall 2013</i>	<i>Fall 2014</i>	<i>Fall 2015</i>	<i>Fall 2016</i>	<i>Fall 2017</i>
CIS-MN	2	1	1	3	4	5	5
CISS-MN	0	0	0	0	0	1	0
CISW-MN	1	0	0	0	0	0	0
CGD-MN	0	0	0	0	0	0	0
MOB-MN	0	0	0	0	0	0	0

**Includes Minor 1 and Minor 2.*

First Year Retention Rate

	<i>Within Department</i>	<i>Within College</i>	<i>Within University</i>
Fall 2016 Cohort	66.7%	72.2%	77.8%
Fall 2015 Cohort	63.6%	63.6%	77.3%
Fall 2014 Cohort	68.6%	68.6%	72.5%
Fall 2013 Cohort	76.7%	78.3%	85.0%
Fall 2012 Cohort	72.1%	74.4%	76.7%
Fall 2011 Cohort	71.1%	71.1%	71.1%
Fall 2010 Cohort	70.6%	70.6%	76.5%

Six Year Graduation Rate

	<i>Within Department</i>	<i>Within College</i>	<i>Within University</i>
Fall 2011 Cohort	39.5%	39.5%	44.7%
Fall 2010 Cohort	32.4%	32.4%	41.2%
Fall 2009 Cohort	25.6%	25.6%	46.5%
Fall 2008 Cohort	28.6%	28.6%	46.4%
Fall 2007 Cohort	22.5%	22.5%	35.0%
Fall 2006 Cohort	35.1%	35.1%	56.8%
Fall 2005 Cohort	13.5%	13.5%	37.8%

Department of Computer and Information Science

CIS-BS	Computer Science BS
CIS-BS CISM	Computer Science BS to MS
CIS-BS CISS	Software Engineering
CIS-MS	Computer Science MS
CIS-OGP	Computer Science Online Graduate Program
CMP-OGC	Computer Science Online Graduate Certificate
CNS-PBC	Post-Baccalaureate Certificate: Computer Networks and Distributed Systems
CMP-PBC	Post-Baccalaureate Certificate: Computer Science
SDD-PBC	Post-Baccalaureate Certificate: Software Development and Design
CGD-MN	Computer Game Design minor
CIS-MN	Computer Science minor
CISS-MN	Software Engineering minor
CISW-MN	System Software minor
MOB-MN	Mobile Applications Development minor

I. Goals and Objectives

Programs shall ensure that their goals and objectives are linked to the campus mission and strategic priorities, to their strategy for improving their position within the discipline.

The Program should evaluate its purpose and planning in light of the campus mission and strategic priorities, and should assess its standing among similar programs nationally. The review should answer the following questions:

- *What is the Program's mission and is it clearly aligned with the campus mission and direction?*

University Goals and Objectives

The campus mission and strategic priorities at UMass Dartmouth are expressed in the University vision and mission statements:

University Vision

UMass Dartmouth will be a globally recognized premier research university committed to inclusion, access, advancement of knowledge, student success, and community engagement.

University Mission

UMass Dartmouth distinguishes itself as a vibrant, public research university dedicated to engaged learning and innovative research resulting in personal and lifelong student success. The University serves as an intellectual catalyst for economic, social, and cultural transformation on a global, national, and regional scale.

The UMass Dartmouth mission and vision statements are published on the university's website at <http://www.umassd.edu/about/missionandvision/>.

The *UMassDTransform2020* strategic plan further articulates the mission, vision, values, and goals of UMass Dartmouth as it evolves in a rapidly-changing higher education landscape. There are five goals laid out in the strategic plan:

Goal 1: Innovative and High-Impact Research and Academic Programs

Goal 2: Integrated Student-Centered Experiences

Goal 3: An Active and Engaged University Community Focused on Excellence in Research, Scholarship, and Innovation

Goal 4: Highly Productive Collaborations, Partnerships, and Community Engagement

Goal 5: Infrastructure and Processes in Support of Excellence

The UMass Dartmouth strategic plan is published on the university's website at <https://www.umassd.edu/strategicplan/>.

Mission of the College

The College of Engineering is comprised of six departments: Bioengineering, Civil and Environmental Engineering, Computer and Information Science, Electrical and Computer Engineering, Mechanical Engineering, and Physics. The college offers eight undergraduate degree programs, five concentrations, eleven graduate programs, and six accelerated BS-MS programs that serve more than 1,400 students. The goals of the college are to prepare graduates to meet 21st-century technological challenges and improve the well-being of society; create new knowledge in engineering, technology, and computer science; and engage and develop students to become leaders in their fields through service and scholarship.

The College of Engineering has the following published mission:

The College of Engineering strives to serve the needs of the region and the nation by creating and disseminating knowledge through research and teaching and preparing students to excel in their chosen profession and to be contributing citizens in a diverse, changing world.

This mission statement is published on the College of Engineering website at

<http://www.umassd.edu/engineering/about/missionandgoals/>.

Program's Mission and Goals of the Master of Science in Computer Science (MS in CS) Program

The mission of the Master of Science in Computer Science (MS in CS) program follows those of the College of Engineering, which were developed to align with UMass Dartmouth's Transform2020 strategic plan. The program's mission includes the following:

- PM 1:** To offer graduate programs in Computer Science of intellectual rigor.
- PM 2:** To maintain Computer Science research programs appropriate to the University.
- PM 3:** To meet regional and state needs through education, and industrial and community outreach.
- PM 4:** To build a satisfying and career enhancing environment at UMass Dartmouth.
- PM 5:** To help build an interdisciplinary intellectual environment at UMass Dartmouth.

PM 6: To maintain curricula to meet the computer fluency needs of all UMass Dartmouth students.

Along with the program's mission, the MS in CS Program at the University of Massachusetts Dartmouth has the following strategic goals.

- Graduates who succeed as leaders at project and enterprise levels.
- Graduates who are able to pursue Ph.D. studies.
- Graduates who contribute to the development of computer industry.
- Graduates who using computer science knowledge contribute to the advancement of other industries.

The program's mission and goals of the MS in CS program are published on the Department of Computer and Information Science website at

<https://www.umassd.edu/engineering/cis/about/mission/>

<https://www.umassd.edu/engineering/cis/graduate/program-objectives/>.

The program's mission and goals are well aligned with the University's mission of "... *engaged learning and innovative research resulting in personal and lifelong student success.*" More specifically, the alignment of program's mission with the campus mission and goals is discussed below.

- PM 1 aligns with the University's UMassD Transform 2020 **Goal 1: Innovative and High-Impact Research and Academic Programs**. An intellectually rigorous graduate program in Computer Science is necessary for our graduates to contribute innovative ideas and high-impact research to the technology sector of our economy.
- PM 2 & PM 5 align with the University's UMassD Transform 2020 **Goal 3: An active and engaged university community focused on excellence in research, scholarship, and innovation**. The department maintains high-quality Computer Science research programs including software engineering, artificial intelligence and data science, and is actively engaged with university community through research collaborations. The department encourages faculty and graduate students to develop interdisciplinary collaborations at UMass Dartmouth.
- PM 3 aligns with the University's UMassD Transform 2020 **Goal 4: Highly productive collaborations, partnerships, and community engagement**. Many students who graduate from our programs work in local and regional companies. They often maintain their connections to the department, serving on our Industrial Advisory Board and/or hiring our graduates.
- PM 4 aligns with the University's UMassD Transform 2020 **Goal 2: Integrated student-centered experiences**. Through internship programs, research assistant

opportunities and career advising, the department aims to build a satisfying and career enhancing environment for graduate students with integrated student-centered experiences.

- PM 6 aligns with the University's UMassD Transform 2020 **Goal 5: Infrastructure and processes in support of excellence.** To support excellence of the MS in CS program, the Graduate Curriculum Committee (GCC) and the CIS Lab Committee continuously improve curricula and infrastructure, respectively, to meet the computer fluency needs of UMass Dartmouth students.

- ***How does the Program's mission relate to curriculum; enrollments; faculty teaching, research/professional/creative activity, and outreach? Is it aligned with the campus strategic priorities?***

The MS in CS program determines curricular content primarily through the action of the Graduate Curriculum Committee (GCC) with the goal of offering intellectually rigorous graduate program in Computer Science (related to PM 1). To increase enrollment, the program is maintained to meet regional and state needs through education, and industrial and community outreach (related to PM 3). PM 1, PM 2 and PM 5 are related to faculty involvement in teaching, research, professional activities, and other related outreach activities. These activities ensure a rigor graduate program and high-quality research programs. The Program's mission is aligned with the campus strategic priorities by disseminating and creating knowledge through teaching and research, and preparing students to be successful in their personal and career lives.

For more details, please refer to sections II and III for discussion of how the Program's mission relates to curriculum and faculty, respectively.

- ***The Program should discuss its strategy for promoting diversity.***

The CIS Department provides a welcoming environment for all faculty and students regardless of ethnicity, religion, gender, or sexual orientation. The Department is highly diverse in terms of both students and faculty. We have both students and faculty from several countries and a few different continents. Currently one third of all faculty and half of tenured faculty are female. At least one CIS faculty member has established a Safe Zone in the Department after undergoing training offered by the University Center for Women, Gender, and Sexuality. Unfortunately, we do not currently have any Hispanic or African-American faculty members. We will continue our attempts to hire faculty from groups that are underrepresented in the Department, but historically there have been very few, if any, such applicants for faculty positions.

- ***How does the program contribute to campus-wide curricular needs through general education and service instruction?***

The MS in CS program is too specialized to significantly contribute to general education. However our MS program helps to support graduate education in Computer Engineering and, increasingly, Data Science.

- ***What is the Program's current standing within the discipline, especially with respect to research and graduate education? What goals does the Program have in terms of its national standing?***

The MS in CS program belongs to the College of Engineering at the University of Massachusetts Dartmouth, which is ranked #132 in Best Engineering Schools (tie). The goal of this program is to be recognized globally, nationally, and regionally for impactful research, scholarship, and innovation that reflect the expertise of its faculty and staff, the program strengths, and the needs of the region and the Commonwealth. To accomplish this goal, the department will develop innovative and high-impact research and academic programs including a PhD program in Computer Science. CIS Faculty will be actively engaged in research activities and interdisciplinary collaborations with researchers from other domains, and enable CS major students to progress toward achievement of their educational, personal, and career goals.

II. Curriculum

General Information

The Computer Science Master's program gives graduates a broad and deep knowledge of computer science by offering a strong core program with a wide selection of elective courses. The program maintains a balance between theory, systems, and applications, with emphasis on software development.

Our students gain the ability to use their knowledge to work on realistic scale projects in the graduate courses. Their experience includes work as a member of a team as well as situations where an individual is responsible for the whole project from problem specification to the completion of the solution. Students learn to conduct independent research and present their results in oral and written forms. They graduate with the knowledge and skills required to develop and design high-quality computer systems and application software. They have the ability to follow the rapid changes in the field of Computer Science. As highly qualified professionals, our students are ready to compete for responsible positions in the computer industry, research institutions, government, or to pursue their education in PhD programs. Most of our Computer Science Master's degree students are on campus, but the program is also offered online.

Computer Science Master Degree Requirements

A personalized graduate program is tailored by the student with an advisor during the first semester and approved by the student's Graduate Committee. All students complete three required computer science courses and a master's project and/or thesis course. Combined thesis and project credits cannot exceed six. The remaining credits are selected from an array of 500 and 600 level courses to create a program tailored to the student's own interests in Computer Science.

The three core courses are chosen from:

- CIS 522 - Algorithms and Complexity 3 credits
- CIS 560 - Theoretical Computer Science 3 credits
- CIS 570 - Advanced Computer Systems 3 credits
- CIS 580 - Paradigmatic Software Development 3 credits

Students must complete at least 3 and at most 6 credits of thesis or project, chosen from:

- CIS 600 - Master's Project 3 credits (Project Track)
- CIS 690 – Master's Thesis 3-6 credits (Thesis Track)

The remaining credits are chosen from CIS 500 or 600-level courses. Approved courses from another department may be substituted. Students on Project Track select six

additional CIS 500- or 600-level courses for 18 credits. Students on Thesis Track select five additional CIS 500- or 600-level courses for 15 credits.

Additional requirements:

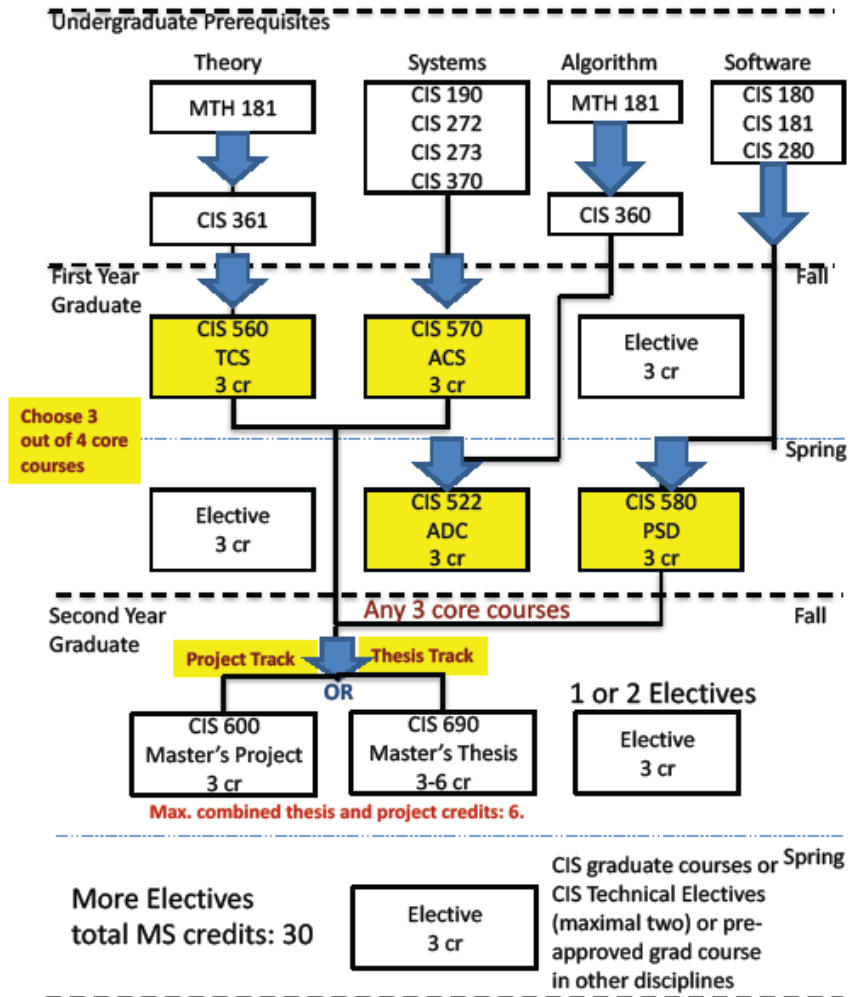
- As many as two undergraduate CIS technical electives may serve as graduate electives, only with previous approval of the Graduate Curriculum Committee. Students who complete a Graduate Internship (EGR 500) may only count one undergraduate course towards their graduate degree.
- No more than 6 credits of coursework taken as a non-degree special student may subsequently be credited toward the graduate degree.
- Students must meet the university graduate requirement of at least a 3.0 grade point average; only courses graded C or better may count toward the degree.
- Students choosing the Master's Thesis option must give a public presentation of their work.
- Students must pass the course CIS 599 graduate seminars for two semesters. In order to pass the course, at least 80% attendance rate is required. In addition, a one-page report, which describes at least two seminars attended, must be submitted by the end of each academic semester.

The dependency graph for MS in CS graduate curriculum is illustrated as follows, which is published on the Department of Computer and Information Science website at:

<https://www.umassd.edu/media/umassdartmouth/college-of-engineering/cis-dept/resources/MS-Dependency-graph.pdf>

Dependency Graph for Master of Science in Computer Science Graduate Curriculum

Updated Sept. 2017



Accelerated BS/MS Program

This fast-track program enables well-qualified BS degree students in Computer Science to complete both the BS and the MS in nine fewer total credits. Students will take three graduate courses as their CIS BS-degree technical electives. Students electing the BS/MS option are required to complete a Master's thesis.

Eligibility

Current undergraduate Computer Science students (including transfer students) who are in progress towards completing their first bachelor's degree are eligible to apply if they

- have completed 60 credits towards the BS degree
- have not taken and are not currently enrolled in any senior-level (400-level) or graduate (500-level) course
- have completed courses CIS 180, 181, 190, 272, 273 (or 264), 280 (or equivalents for transfer students)
- have a GPA of at least 3.000 in all CIS courses taken at the time of application
- have completed MTH 181, 182 and 111, 112 (or equivalents for transfer students) with a GPA of at least 2.800

Those interested may consult the Computer Science Graduate Program Director (GPD) about their eligibility. Students apply for admission to the BS/MS option through the Office of Graduate Studies, submitting the regular graduate application but without GRE or TOEFL scores, or recommendation letters. Application decisions are reviewed by the CIS Graduate Curriculum Committee (GCC).

The department will follow a schedule:

- Graduate Curriculum Committee identifies qualified students: February
- Graduate Curriculum Committee sends invitation letters: March
- Students/Advisors Develop Program of Study: March/April
- Application filing deadline: May 1

Progression to MS Study

The student will earn the BS degree at the point of meeting all BS degree requirements, counting the completed three graduate courses as senior electives. At this time, the approved BS/MS student's status changes to graduate level. However, BS/MS students may change to graduate status earlier once they have completed at least 111 credits toward the BS, have completed all junior (300-level) CIS and MTH courses, and have a GPA in all CIS courses at or above 3.000. Students electing the BS/MS option will pay undergraduate rates until changed to graduate status; in graduate status they may be considered for graduate assistantships.

Maintaining MS Status

The department has determined a specific policy to monitor BS/MS students' performance and progression towards their BS and then MS degrees. Any student accepted to the BS/MS option but later dismissed from the MS level will be transferred back to the BS level program.

<https://www.umassd.edu/engineering/bs-ms-programs/computer-information-science/>

Graduate Certificate Programs

Upon completion of this certificate program, participants will have gained:

- Knowledge of advanced computer systems and software development.
- Advanced knowledge of selected areas of modern computing including but not limited to intelligent information systems, parallel and distributed computing systems, computer networks, and software engineering.
- Understanding of new advances in the discipline of computing such as neural and evolutionary computing, image processing and data science.
- A route into the MS programs in Computer Science at UMass Dartmouth.

Requirements

Students are required to:

1. Take two (2) course from the list below:
 - CIS 522 – Algorithms and Complexity
 - CIS 560 - Theoretical Computer Science
 - CIS 570 - Advanced Computer Systems
 - CIS 580 Paradigmatic Software Development
2. Take any three (3) CIS 500/600 level courses.

<https://www.umassd.edu/engineering/cis/graduate/certificateprograms/>

Online Master of Science in Computer Science Program

The UMass Dartmouth online Master of Science in Computer Science (MSCS) program is 100% online and provides a broad and deep knowledge of computer science with an emphasis on software development. Students with a BS in a field other than Computer Science or Computer Engineering may be required to complete four (4) fully online courses in computer science fundamentals that may be finished within one year. The GRE requirement is waived for students successfully completing the UMass Dartmouth Computer Science online certificate.

UMass Dartmouth online Master of Science in Computer Science students follow the same requirements for Computer Science Master of Science degree, and must complete 30 credits to graduate. Candidates must complete a Master's Project or Thesis individually working one-on-one with a faculty member.

The online graduate program allows students to customize their education and receive the help and guidance to finish as planned:

- UMassD online Master's in Computer Science ranked in the Top 20 nationally by *Computer Science Online*
- Value and affordability of a UMass education
- One-on-one personal advising from enrollment through graduation
- Free online and in-person tutoring and writing center

Online courses are taught by UMass Dartmouth faculty and seasoned practitioners to provide high-quality instruction and personal attention. Students have the flexibility to accommodate work and home responsibilities within the structure of defined assignment due dates.

<https://www.umassd.edu/engineering/cis/graduate/msincomputerscienceonline/>

MSCS Online Preparatory Program

For students with BS degrees in fields other than computer science or computer engineering, the department offers a preparatory program consisting of 4 online courses in computer science fundamentals. Offered through UMassD's University Extension, the preparatory program is fully online and may be completed within one year.

The program provides online students the computer science fundamental courses to meet the following minimum requirements to prepare them to study computer science at the graduate level:

- 2 semesters of programming
- 1 semester of data structures and algorithms
- 1 semester of computer systems (architecture and operating systems)

Online Fundamental Courses Offered in the Fall Semester

- CIS 115 Computer Programming with C
Algorithm development, syntax and semantics of a high level programming language, debugging and verification of programs, concepts of structured programming, arrays, subroutines, and elementary system concepts (compilation, time-sharing). Topics covered in the course include C Compilers and Standards, Variables and Assignments, Branches (if, if-else, switch statements), input/output (read from user, print to user, read from/write to file, loops (for, while, do-while), recursion, arrays and pointers.

- CIS 183 Object-Oriented Programming with Java
Basic concepts in programming and software development using the Java programming language. The course introduces concepts of object oriented paradigm and low-level program design process. The course introduces variables, decision structures, loops, storage structures, exceptions, inheritance, and polymorphism.

Online Fundamental Courses Offered in the Spring Semester

- CIS 322 Data Structures and Fundamental Algorithms
Introduction to data structures and fundamental algorithms. This course covers the design and implementation of dynamic data structures including linked list, queue, stack, heap, trees and graphs. This course also provides comprehensive coverage of fundamental groups of algorithms, including divide-and-conquer, dynamic programming, and greedy algorithms.
- CIS 323 Fundamentals of Computer Systems
Introduction to major components of computer systems. The course introduces fundamental concepts of computing systems, such as circuit design, Boolean equations, binary arithmetic and data representation, the operation of memory, as well as design of a processor. This course also covers the use of VHDL in designing circuits. The course has a design, implementation, and analytical components.

However, even after meeting these requirements, students without a BS in computer science will face the challenge of making up, on their own, certain undergraduate material when taking specific graduate courses.

<https://www.umassd.edu/engineering/cis/mscsonlinepreparatoryprogram/>

Programs shall ensure that curriculum is relevant, rigorous, current and coherent. The need to provide a high quality education for students should be the primary consideration when evaluating the relevancy, currency, and coherence of curricula. Evaluation of the curriculum should reflect an awareness of changing knowledge, trends in the discipline, and the professional context for curriculum. The review should answer the following questions:

- ***How does the Program determine curricular content? How does the curriculum relate to current existing standards, if any, of the discipline?***

The MS in CS program determines curricular content primarily through the action of the Graduate Curriculum Committee (GCC) and the Computer Science Industrial Advisory Committee (CSIAC). The GCC is composed of faculty members with a PhD degree, and chaired by the Graduate Program Director (GPD). The members have

areas of interest that represent the full spectrum of engineering and science, and areas of expertise that include software engineering, artificial intelligence, machine learning, data science and bioinformatics.

CIS MS curriculum is designed with a balanced structure supported by fundamental computer science knowledge, branched with various modern advancements and then converged in the final project to demonstrate and practice learning outcomes. The Master of Computer Science requires three core courses, chosen from four alternatives of theory, algorithm, system and software domains. The primary focus of the GCC with regard to curriculum is to ensure that the curriculum has offerings in the areas of interest to our diverse student population and serve the research needs of the campus. The curriculum has been structured in such a way that students are able to complete a degree in a reasonable amount of time while taking courses of most benefit to them; and that the program can offer a coherent program of study of academic excellence.

Beyond the GCC, the CIS department has an industrial advisory board CSIAC that composed of representatives from industry, government and academia. This board makes recommendations on curriculum content and provides feedback on how well students are prepared.

- ***What internal or external measures of review are employed to ensure that the curriculum is relevant and up-to-date?***

Internal or external measures of review including student evaluation, Faculty Evaluation Committee (FEC) reviews, CSIAC inputs and alumni survey, are employed to ensure that the curriculum is relevant and up-to-date.

Internal Measures

The internal review process is performed by FEC at the end of each academic year, based on student survey and instructional material submitted by all faculty members.

Student evaluation is conducted regularly at the end of each semester, where the students fill out a course related evaluation form and provide comments on curriculum and course material. The survey serves as a tool to measure the course realization by the FEC and the Chairperson.

Faculty members are required to submit Faculty Annual Reports (FARs) with instructional material including course description, syllabus, sample lectures, sample homework, and exam questions by May 20 of each academic year. The FEC and the Chairperson use the student evaluations of faculty and courses, along with the submitted course materials to address issues related to teaching, course content and student concerns for individual courses. The FEC and the Chairperson offer guidance to faculty on “what and how” to improve in specific areas where teaching

effectiveness fall short of expectations, and course materials are not maintained relevant and up-to-date all the time.

External Measures

The GCC also reviews the curriculum to ensure that it is relevant and up-to-date based on external measures include alumni survey, employer survey and the inputs from CSIAC.

The College of Engineering conducts an alumni survey of all engineering graduates. This has been done for all undergraduate programs and graduate programs. The alumni survey for our MS Program is to measure how well our graduates feel they meet each of the Computer Science Program Outcomes upon graduation and three years after graduation.

In Spring 2004, the computer science Program Assessment Committee (PAC) created a new Employer Survey to measure how well the graduates of our BS in Computer Science Program. A “graduate” version of the Employer Survey will be designed to determine to what extent the graduates of our MS in CS program meet each of the graduate computer science program outcomes upon employment and three years after being employed. In addition to this, the employer survey will also obtain data on how well graduates from other MS programs in the region compare to our graduates.

Mission of the Computer Science Industrial Advisory Committee (CSIAC)

The CIS Department created the Computer Science Industrial Advisory Committee (CSIAC) in Spring 2000. This Committee is composed of computer industry professionals and managers. A list of members is published on the Department of Computer and Information Science website at:

<https://www.umassd.edu/engineering/cis/industry/>

The main objective of the committee is to advise the department on current and future issues of undergraduate and graduate programs in computer science. The committee meets annually at the end of each academic year with the faculty and staff of the department. The Mission of the CSIAC is:

- To bring the Computer and Information Science Department the points of view and needs of the computer and other related industries, other educational institutions, the government, and the professions.
- To help maintain a close relationship between the Department and the computer and other related industries, other educational institutions, the government and the professions.

- To afford the instructing staff and the students expert comments on and appraisal of current and proposed programs.
- To offer assistance to further the Department goals.
- To submit recommendations to the Department for consideration.

The CISAC is an integral part of assessment program. An important function of the CSIAC is to generate a list of characteristics new CS graduates should have and to provide feedback from computer-related industry to computer science graduate education. All new initiatives in MS Program including any changes to the program's contents as well as any significant procedural changes are presented to CISAC for their input prior to their implementation. The CSIAC, like in the case of the undergraduate program, will be presented with results of the surveys and will be periodically consulted on issues related to the graduate program outcomes.

- ***Are the curricular offerings structured in a logical, sequential and coherent manner? Is there an appropriate balance between breadth and depth?***

The MS in Computer Science curriculum is structured as follows. In the first year, students take three core courses chosen from the areas of theory, algorithms, system and software engineering (refer to the dependency graph for MS in CS graduate curriculum on page 13). The three core courses provide depth in the fundamental knowledge of computer science, where advanced topics can be built upon such foundation. Six technical elective courses are chosen from a wide variety of modern advanced topics, which expose students to the breadth of the discipline of computer science. Finally, each student must synergize the learned knowledge in different courses to develop a detailed, significant project in computer science under the close supervision of a faculty member (project advisor). This milestone project also presents an opportunity for students to explore a topic in further depth with the help from the project advisors having expertise in the students' chosen project topics.

- ***If consistent with the Program mission, does the curriculum adequately prepare students for further study or employment?***

The MS in Computer Science curriculum adequately prepare students for further study or employment for the following reasons. First, it prepares students with advanced knowledge of computer theory, computer systems, and software. Second, this curriculum also trains students to apply the advanced knowledge learned in class to solving problems and developing software systems. In all graduate courses, there is a strong emphasis on presentation of most up-to-date computer-based technologies. Student assignments and projects are evaluated not only based on the correctness of the answers but also the suitability of the knowledge and technologies used in the

assignments. Finally, the curriculum also prepares student to be effective self-learners and potentially be able to acquire knowledge of new trends and technologies in their fields in a timely manner. This is achieved by requiring student to read research papers provided in most graduate courses and study extensively on recent research topics. Both Master's project and Master's thesis require students to learn independently where a project/thesis advisor plays a mentor's role.

- ***In what way does the Program contribute to the education of students in terms of general knowledge, critical thinking capacity and other essential cognitive skills?***

The MS in Computer Science program contributes to the education of students in the following ways. Many of our graduate courses have assignments with a writing component, while some other courses also require students to present a chosen topic during lecture time. Such assignments and presentation help students to develop general cognitive skills to a greater extend in order to communicate effectively. Furthermore, each student is required to complete a Master's Project or a Master's Thesis. The project/thesis topic is selected by the student in consultation with his/her project/thesis advisor. Student is responsible for conducting the research required for project/thesis completion, where faculty plays only an advisory role in this process. Through this process, students can enhance and exercise essential cognitive skills including critical thinking, and communication skills both orally and in writing.

III. Faculty Quality and Productivity

Programs shall ensure that faculty possess the expertise to assure effective curriculum development, instructional design and delivery, and evaluation of outcomes. Faculty should exhibit awareness of trends in the discipline and the professional field as appropriate. Collectively, faculty should be involved in teaching, research/professional/creative activity, and public service/academic outreach as appropriate to the mission and regional context of the campus. The review should answer the following questions:

- ***Do faculty possess the appropriate background, experience and credentials?***

The CIS department currently has 10 tenure-track faculty and 2 full time lecturers (FTLs), as well as 3 part time lecturers (PTLs). A summary table to accentuate degrees, years of experience, and level of professional activities is provided as follows.

Faculty Name	Highest Degree	Rank	FT or PT	T, TT or NTT	Year of Experience	Level of Professional Activity
Ramprasad Balasubramanian	Ph.D. in Computer Science	P	FT	T	18	H
Jan Bergandy	Ph.D. in Computer Science	A	PT	NTT	35	M
Paul Bergstein	Ph.D. in Computer Science	ASC	FT	T	20	M
Adnan El-Nasan	Ph.D. in Computer Science	L	FT	NTT	2	M
Hua Fang	Ph.D. in Computer Science	ASC	FT	TT	1.5	M
Paul Gracia	M.S. in Information System Science	A	PT	NTT	3	L
Firas Khatib	Ph.D. in Bioinformatics	AST	FT	TT	4	L
David Koop	Ph.D. in Computing	AST	FT	TT	3	L
Ryan Robidoux	M.S. in Computer Science	A	PT	NTT	2	L
Clinton Rogers	M.S. in Computer Science	L	FT	NTT	6	L
Ming Shao	Ph.D. in Computer Science	AST	FT	TT	2	L
Maoyuan Sun	Ph.D. in Computer Science	AST	FT	TT	2	L
Iren Valova	Ph.D. in Computer Science	P	FT	T	18	H
Haiping Xu	Ph.D. in Computer Science	ASC	FT	T	15	H
Xiaoqin Zhang	Ph.D. in Computer Science	ASC	FT	T	16	H

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor A = Adjunct

2. Code: TT = Tenure Track T = Tenured NTT = Non Tenure Track
3. Level of Professional Activity: H = high, M = medium or L = low.

All faculty teaching onsite graduate courses hold a doctoral degree in Computer Science or closely related areas. Dr. Jan Bergandy and Paul Gracia, as PTLs, are teaching online courses only. Ryan Robidoux (PTL) and Clinton Rogers (FTL) are teaching undergraduate courses only. For detailed information on the faculty, please refer to appendices A, B, and C for lists of faculty publications, grants, and CVs, respectively.

- ***Are faculty current in relation to the knowledge base and content of the discipline and curricular offerings?***

Faculty are current in the knowledge base and content of their discipline. This is most evident by the productivity of the faculty, including over 120 peer-reviewed papers published by CIS faculty in the past 5 years.

The CIS faculty members keep abreast of trends in their respective disciplines and professional fields by being active in their research areas and by attending and contributing to professional and research conferences. These include international research conferences in various branches of computer and information science. They are also involved in many major professional societies such as ACM (Association of Computing Machinery), and IEEE (Institute of Electrical and Electronics Engineers. These three avenues, namely, active research, conferences and professional societies ensure that faculty are current in relation to the knowledge base.

- ***Are the program expectations for faculty involvement in teaching, research/professional/creative activity, and public service/academic outreach activities appropriate; and how are these expectations met? Are these expectations consistent with program policies regarding teaching assignments, merit allocations, and other aspects of faculty roles and rewards?***

The program expectations for faculty involvement in teaching, research, professional activities, and other related activities are appropriate and consistent with program policies regarding teaching assignments. New faculty receive startup packages including significant startup funds, two-year course reduction, summer support etc. upon hiring. On a case by case basis, faculty with externally funded research may also buy out a course to secure more time to carry out their research programs.

A summary table with data for AY 2017-18 about enrollment, teaching units, and student credit hours (SCHs) is illustrated as follows.

AY 2017-18 Summary of Faculty Teaching Load, Enrollment, and SCHs

Faculty Name	FT or PT	Courses Taught (Semester, Units, Enrollment)	SCH
Jan Bergandy	<u>PT</u>	CIS 602 Online (F17, 3, 14)	42
Paul Bergstein	FT	CIS 440 (F17, 3, 40); CIS 452 (F17, 3, 51); CIS 340 (S18, 3, 15); CIS 580 (S18, 3, 34)	420
Adnan El-Nasan*	FT	CIS 370 (F17, 4, 83); CIS 570 (F17, 3, 39); CIS 475 (S18, 3, 36); CIS 477 (S18, 3, 46)	695
Hua Fang*	FT	CIS 490 (F17, 3, 50); CIS 264 (S18, 3, 18)	204
Paul Gracia	<u>PT</u>	CIS 602 Online (F17, 3, 27); CIS 577 Online (S18, 3, 32); CIS 602 Online (S18, 3, 7)	198
Firas Khatib	FT	CIS 555 (F17, 3, 16); EGR 111 (F17, 3, 67) CIS 455 (S18, 3, 28); CIS 602 (S18, 3, 36)	441
David Koop	FT	CIS 602 (F17, 3, 25); DSC 201 (F17, 3, 7) CIS 602 (S18, 3, 32)	192
Clinton Rogers	FT	CIS 180-01 (F17, 4, 60); CIS 180-02 (F17, 4, 50); CIS 272 (F17, 4, 74); CIS 181-01 (S18, 4, 53); CIS 181-02 (S18, 4, 45); CIS 273 (S18, 4, 61)	1,372
Ming Shao*	FT	CIS 465 (F17, 3, 24); CIS 280 (S18, 4, 74)	368
Maoyuan Sun*	FT	CIS 602 (F17, 3, 21); CIS 180 (S18, 4, 44)	239
Iren Valova	FT	CIS 190 (F17, 4, 75); CIS 498 (F17, 4, 53); CIS 362 (S18, 3, 66); CIS 499 (S18, 3, 52)	866
Haiping Xu	FT	CIS 461 (F17, 3, 46); CIS 560 (F17, 3, 43); CIS 361 (S18, 3, 62); CIS 481 (S18, 3, 52)	609
Xiaoqin Zhang	FT	CIS 360 (F17, 3, 102); CIS 561 (F17, 3, 29); CIS 522 (S18, 3, 34); CIS 522 Online (S18, 3, 15)	540

*: New faculty with 2-year teaching load reduction.

Department faculty with demonstrable graduate activities have a teaching assignment of two courses per semester. Graduate activities include advising Master's projects, Master's theses, and PhD dissertations. Primary annual evaluations are departmental peer review by tenured faculty and the department Chair. The form of the review and process are specified by contractual agreement.

- ***In what ways does the Program foster professional development and growth of faculty?***

The program fosters professional development and growth of faculty by encouraging faculty to pursue research ideas and to develop advanced research programs. Refer to Appendix B for a list of faculty grants in the past 5 years.

New faculty are given a reduced teaching load (on the average a reduced load is one course per semester) so that they will have sufficient time for grant writing, publications, and other research tasks. They are also provided with significant startup

funds including graduate student support to assist in getting their research programs off the ground. These activities not only foster faculty growth but are also instrumental in the further development of the graduate program. Moreover, by advising Master's project/thesis and PhD dissertations, faculty members are encouraged to engage graduate students in their research projects.

All tenured or tenure-track faculty in the program, who do not receive startup travel grants, are supported by the Dean's Office for \$850 per year for travel expenses. The Provost's Office also provides the maximum amount of \$500 limited to one application per faculty per year through the Faculty/Librarian Travel Grant Program. These funds are mainly used to fund faculty members to travel to conferences for paper presentations.

- ***In what ways does the Program faculty lend its professional expertise — as expressed through teaching and research, scholarly and creative activity — to off-campus constituencies?***

Faculty members may serve on major organizing committees including conference chairs and program committee chairs in computer science related international conferences. For example, Dr. Haiping Xu served as a leading Program Chair of the 27th International Conference on Software Engineering and Knowledge Engineering (SEKE 2015), the IEEE International Conference on Mobile Cloud Computing, Services, and Engineering (IEEE Mobile Cloud 2017), and the IEEE International Conference on Smart City Innovations (IEEE SCI 2017). He also served as a General Chair of SEKE 2016, IEEE Mobile Cloud 2018 and IEEE SCI 2018.

Regional industries have also supported Computer and Information Science undergraduate and graduate students to solve industrial problems in the areas such as database systems, software engineering, and computer networks.

IV. Teaching and Learning Environments

Overview

The success of our students is one of the most important goals of the department. This means that by the time a student graduates they should be able to:

- Research and solve advanced problems in computing using skills acquired in computing theory, computer systems and software.
- Analyze and design systems to solve problems using advanced methodologies and technologies.
- Effectively communicate and participate in successful software/system development teams.
- Contribute to the computing field and use computing skills to advance other industries.

Programs shall provide learning environments that promote student success. Students are expected to learn both content and skills appropriate to the discipline. The program should indicate clear expectations for student learning outcomes. The teaching/learning environment should be accessible to all students, should include a variety of instructional methodologies, and should provide timely feedback to students. The review should answer the following questions:

- ***What is the program looking for in its students? What kind of students is the program well suited to serve? How does the program define “quality” in terms of admission to the program (when relevant)***

Applicants are screened based on their undergraduate transcripts, GRE scores, reference letters, and for foreign applicants, TOEFL scores. Graduate Curriculum Committee (GCC) members and the Graduate Program Director (GPD) check each transcript to ensure the applicants have an adequate background in software, systems, and theoretical foundations of computer science. Each application is reviewed by a minimum of two Graduate Committee members and the Graduate Program director before they are passed to the Department Chairperson who makes the final determination on acceptance.

Applicants with deficiencies in more than one of these areas are rejected. Otherwise qualifying applicants with a minor deficiency in one area may be admitted conditionally. The deficiency is determined in terms of required undergraduate Computer Science courses in our BS program. Students are required to complete the indicated undergraduate remedial courses with a grade of B or better before being allowed to take graduate courses in the area of their deficiency.

During the decision making process for admission the candidates are also reviewed for assistantships. This information is later used by the GCC at the time of making assistantship recommendations to the CIS Chairperson.

- ***To what extent does the program have articulated learning outcomes (content and skills) for students? (Outcomes should be articulated at both the undergraduate and graduate level and by sub-fields, when relevant.) By what means are these outcomes measured? Are they achieved by most students? For programs with graduate research or teaching assistantships: To what extent does the program have articulated learning outcomes for the TA/RA experience? By what means are these outcomes and the quality of the experience assessed?***

The Program outcomes for MS in CS program are defined as follows:

- Graduates are able to individually solve advanced problems in computing.
- Graduates are able to effectively participate as members/leaders of software/system development teams.
- Graduates are able to analyze and design system components and processes to meet specific requirements.
- Graduates are able to communicate effectively both orally & in writing on advanced topics in computing.
- Graduates can apply advanced methodologies and technologies when solving problems and developing software/systems.
- Graduates are effective self-learners and continue to acquire knowledge of new trends and technologies in their field.
- Graduates who have advanced knowledge of computer theory, computer systems, and software.
- Graduates are able to conduct research on assigned topic.

Each graduate course also has articulated learning outcomes which are included in the course syllabus. Faculty assess outcomes in each course through exams, homework assignments, projects, and other student work. Additionally, as part of their course evaluations, students are asked to rate each of the following on a 5 point Likert scale (“strongly agree” to “strongly disagree”):

- Course objectives were stated.
- Learning activities were related to course objectives.
- The course covered the stated objectives.

Students who receive TA/RA assistantships are typically required to complete a Master’s Thesis with research leading to submission of a formal thesis. This course provides a thesis experience, which offers a student the opportunity to work on a

comprehensive research topic in the area of computer science in a scientific manner. The thesis topic is agreed in consultation with a supervisor, and a written thesis must be completed in accordance with the rules of the Graduate School and the College of Engineering.

- ***How are program expectations communicated to students? Are students kept informed of their progress in meeting intended program outcomes?***

The process starts with a seminar held by the Graduate Program Director (GPD) where the expectations and goals of the program are communicated. The syllabi of the different courses have learning outcomes that stem from different program outcomes. The attainment of these course learning outcomes can be mapped back to reflect on the overall achievement of each relevant program outcome.

Students are kept informed of their progress in meeting intended program outcomes when student learning outcomes are assessed in each course through exams, homework assignments, projects, and other student work.

- ***How is assessment of student learning outcomes used in reviewing and modifying program curriculum, advising, and other program elements, and in evaluating faculty?***

Faculty routinely make course improvements based on assessment of student learning outcomes. Issues that cannot be resolved through improvements at the course level are discussed at department meetings, and referred to the Graduate Curriculum Committee for recommendations of curricular improvements. In addition, a faculty's teaching performance is evaluated by Faculty Evaluation Committee (FEC) based on student evaluations, student learning outcomes, and course materials submitted by the faculty member at the end of each academic year.

- ***In what ways does the program evaluate student success following graduation and the program's contribution to that success?***

Student success following graduation and the program's contribution to that success is evaluated through several surveys, such as alumni survey, conducted by the College of Engineering or the department. In addition, to keep track of student success following graduation, alumni are connected with faculty members in various ways including LinkedIn and faculty home pages. An example of alumni info is posted on the following page:

<http://www.cis.umassd.edu/~hxu/csel/people>

- ***What is the role of the core faculty in teaching lower division, upper division and graduate courses? What is the rationale for these assignments***

Based on the currently-approved Agreement between the University of Massachusetts Board of Trustees and the UMass Faculty Federation, Local 1895, the standard teaching load for full-time faculty is 18 teaching units (TUs) per academic year. A TU, like a contact hour, is equivalent to one hour of lecture, recitation or laboratory. Also, as outlined in the Faculty Federation contract, faculty members who advise graduate students obtain the equivalent of up to 4 TUs per semester.

Untenured faculty members are restricted to two courses per academic year for their first year or two (according to the stipulations in the original contract and start-up package), and to no more than four courses per academic year while they are untenured.

The allocation of faculty to teach graduate courses is done by the Department chair. The chairperson assigns the core faculty a mix of graduate and undergraduate courses at both lower and upper division, which is based on the program needs as well as faculty member background and interest. New faculty are required to teach a reasonable number of courses with reasonable numbers of students to demonstrate the effectiveness of their teaching capability. New faculty are also encouraged to introduce new graduate courses related to their fields of research, which benefits the current graduate program.

V. Resources

Overview

The CIS department consists of 10 tenure track faculty, 2 full time lecturers and 2 support staffs. The department has 3 teaching labs that are equipped with modern PCs with both Linux and Windows operating systems.

The MS program in the CIS department utilizes support and services from many non-academic institutional units such as the library, the Office of Faculty Development (OFD), the Computing and Information Technology Services (CITS) and the Center for Innovation and Entrepreneurship (CIE). Many of our students work with CITS and participate in innovation and design marathons held by CIE.

Programs shall ensure that the resources available are used to meet Program goals and objectives, and as appropriate, engage in use of innovation to enhance resources; should engage in both intra- and inter-campus collaboration; and should demonstrate a commitment to effective and efficient use of resources. The review should answer the following questions:

- ***What process does the Program use to allocate resources?***

The department Chairperson is responsible for the allocation of department funding for the Program which comes from the General Operating Fund (GOF), the Major Fees and the Research Indirect.

Funds from the GOF are spent on teaching and research assistants (TAs and RAs). TAs, with faculty supervision, are often assigned to courses with laboratories. RAs are assigned to new faculty on departmental funds to get their research programs going as part of their start up packages. RA assignments need to be approved by the Graduate Program Director and the Chairperson.

The funds from the Major Fees account are mainly spent on grader hiring, laboratory equipment and software purchasing. An on-going three-year lab plan is to be developed and will be used as a guide in spending these funds. In any academic year, if not all the funds are spent, the department may have the option to develop a detailed plan to use the remaining for the following academic year.

Research indirect funds are allocated by the department Chairperson and Principal Investigators (PIs) to fund activities to further develop departmental research. A reasonable portion (10%) of the indirect goes to the department, and a larger portion (15%) of the indirect comes back to PIs, who may use the funds to further their research programs by hiring RAs or purchasing needed research equipment not part of direct grant funding.

The Dean's office provides each tenured or tenure-track faculty member (not receiving startup travel funds) \$850 per year on average for travel expense. Faculty can also apply to the Office of the Provost for maximum grant amount of \$500 per year for professional development.

• ***In what ways does the Program maximize the use of its human resources?***

The department grew in the last 5 years to over 250 undergraduate students and over 100 graduate students including about 20 online students and 8 Ph.D. students. The number of full-time faculty grew from 9 to 12, of which 10 are tenured or tenure-track faculty. The department is seeking 2 more tenure-track faculty starting Fall 2019. A summary of faculty workload in AY 2018-2019 is illustrated in the following table.

Summary of Faculty Workload in AY 2018-2019

Faculty Name	FT or PT ²	Program Activity Distribution ³			% of Time Devoted to the Program ⁵
		Teaching	Research or Scholarship	Other ⁴	
Ramprasad Balasubramanian	FT	5	15	80	25
Jan Bergandy	PT	100	0	0	25
Paul Bergstein	FT	40	40	20	100
Adnan El-Nasan ¹	FT	80	0	20	100
Hua Fang ¹	FT	20	60	20	100
Paul Gracia	PT	100	0	0	25
Firas Khatib	FT	40	40	20	100
David Koop	FT	40	40	20	100
Clinton Rogers	FT	80	0	20	100
Ming Shao ¹	FT	40	40	20	100
Maoyuan Sun ¹	FT	40	40	20	100
Iren Valova	FT	40	40	20	100
Haiping Xu	FT	20	40	40	100
Xiaoqin Zhang	FT	20	40	40	100

1. New faculty with 2-year teaching load reduction.

2. FT = Full Time Faculty or PT = Part Time Faculty, at the institution

3. Program activity distribution should be in percent of effort in the program and should total 100%.

4. Indicate service, sabbatical leave, administrative responsibility etc., under "Other."

5. Out of the total time employed at the institution.

Faculty are assigned courses based on the department needs as well as their areas of expertise. TAs are assigned mainly to assist faculty in undergraduate labs. The majority of the tenured or tenure-track faculty are active in cutting edge research in fields such as software engineering, machine learning, artificial Intelligence, data

visualization and health informatics. With external research grant, a faculty may have the option to buy out a course in order to focus more on research.

The Chairperson distributes student academic advisees across all full-time faculty on equal and cohort bases where students remain with the same faculty member throughout their stay at the university. The graduate advising is also distributed among the different faculty members who teach in the graduate program.

The department has full time office administrator who maintains the everyday support for the chair and the rest of the faculty members. This administrator helps staff the department front desk, responds to faculty requests and maintains the calendar of events among other tasks. The department also has a full-time technician who supports the operation of the labs and acts as a liaison when IT services are needed by the members of the department. A lab assistant and a number of work-study students help both our technician and office administrator.

- ***In what ways does the Program maximize the use of material resources such as space, equipment, operating funds, etc.?***

As with most universities, research and laboratory space are scarce and valuable resources that must be managed in the presence of many competing needs.

Currently the CIS department maintains 3 computer labs to support courses taught by the Department.

Computer labs

Dion 303: Windows lab

12 Dell Optiplex 9020 and 13 Dell Optiplex 7020 computers: 16 GB Ram, 250GB Solid State Hard drive, AMD Radeon Video card, Intel i7 processor, Gigabit Ethernet. Operating System: Windows 7. Overhead Projector, document camera and audio system connected to instructor station maintained and upgraded by CITS. HP 3015 laser printer

Dion 311: Windows lab

29 Dell Optiplex 960 computers: 4 GB Ram, 300GB Hard drive, Intel i5 processor, Gigabit Ethernet. Operating System: Windows 7. 1 IMac 27: 16 GB Ram, Intel I7, Retina Display, 1TB Hard drive Dual Boot OSX 10.11/Windows 7. Overhead Projector, document camera and audio system connected to instructor station maintained and upgraded by CITS. Xerox 3050 laser printer

Dion 305: LINUX lab

25 Dell Optiplex 9020 computers: 16 GB Ram, 500GB Hard drive, Intel i7 processor, Gigabit Ethernet. Operating System Centos 6.5. Overhead Projector, document camera

and audio system connected to instructor station maintained and upgraded by CITS.
HP 4020 laser printer

Servers

Linux Fileserver/NIS/NFS. Operating system: Centos 6.5. Dell PE2900: 3 TB RAID Storage, 40GB Ram, 2xIntel Xeon processors, Gigabit Ethernet. This server supports the operations of the LINUX lab and the operation of the web server.

Windows Storage, Rational Rose License Server. Operating System: Windows Server 2008. Dell Powervault NF600 3 TB RAID Storage, 8GB Ram, Gigabit Ethernet. This server is used for storage of software and images for the Windows lab as well as administrative functions. It also serves as the license server for IBM Rational Rose software.

Database Server (MYSQL)/Subversion Server. Operating System: Centos 6.5. Dell Power Edge t410: 16 GB Ram, 1TB RAID storage, Intel Xeon Processors, Gigabit Ethernet. Used In support of Database classes and for student projects.

Department Web Server(Apache). Dell Optiplex 960: 4 GB Ram, 1TB Storage, Intel I5 Processor, Gigabit Ethernet. Operating System Centos 5.10. Used for faculty, staff and students web pages.

Backup: Ready NAS 9TB Array

The department, through the CIS Lab Committee, constantly assesses space utilization and makes recommendations to the department. The following table shows the 5-year plan. Faculty can also request software or equipment needed for courses.

Five-year plan for CIS laboratories update

Lab/Infrastructure	2016	2017	2018	2019	2020
Dion 303 Lab	Complete Hardware upgrade Dion 303	Upgrade software /OS	Upgrade software	Upgrade software	Update hardware/replace machines
Dion 305 Lab	Update software	Update software/OS	Upgrade software	Update hardware/replace machines	Upgrade software
Dion 311 Lab	Update software	Update Software/OS	Update Hardware/replace machines	Upgrade software	update hardware
Server Infrastructure	Update software	Update Server/storage hardware	Update software	Upgrade software	Upgrade software

A recent plan to innovate TAs' room in Dion 309 into a multi-purpose room to facilitate research demo/presentation is an example of maximizing the use of space. The department has been able to share, effectively, undergraduate laboratory space with the graduate program. Additional spaces such as Textile Rooms 101BCDE are used as research labs for faculty members' research groups.

- ***What strategies does the Program employ to develop alternate sources of revenue (private giving, grants and contracts, etc.), and to share costs with other public and private entities?***

Due to our involvement in Professional and Continuing Education, the Department has access to some shared revenue for our online graduate program. The department is also involved in the Navitas program to enhance our graduate program with additional revenue. This revenue can be used to further support curriculum development and as professional development funds for faculty.

VI. Strategic Planning: Future Goals & Specific Objectives

Curriculum Improvement

In the past two years, the CIS department has approved two new graduate courses, both of which are related to the Data Science program:

- CIS 530: Advanced Data Mining (Effective Data: Fall 2018)
- CIS 539: User Interface Design and Technique (Effective Data: Fall 2018)

In the future, proposals for highly-demanded courses in graduate education such as courses in the areas of cyber security and software engineering will have the higher priority to be approved. In addition, we also need to consider the balance between on-site and online courses, a topic which has a number of ramifications including faculty workload, frequency of course offerings, and student credit hours (SCH).

Development of PhD Program in Computer Science

The CIS Department currently participates in the Engineering and Applied Science (EAS) PhD program. The EAS program consists of four (4) options, namely Applied Mechanics and Materials (AMM), Computational Science and Engineering (CSE), Computer Science and Information Systems (CSIS), and Industrial and Systems Engineering (ISE). PhD students supervised by CIS faculty members typically choose the CSIS option. Since the EAS program is not a Computer Science specific PhD program, it would require our CIS PhD students to take courses that are not necessarily useful to their PhD research. For example, students are required to take EAS 501: Advanced Mathematical Methods and EAS 502: Computational Methods, which are engineering mathematical courses, but they do not have major impacts on our PhD students' research, particularly in areas such as software engineering and artificial intelligence. In addition, the PhD students in Computer Science are also unnecessarily required to take 2 graduate electives in CEN/MNE/MTH/MTX/PHY 500-600-level as a minor. Thus there is a pressing need to offer a PhD program in Computer Science, which is more suitable for CS major PhD students in most of the research areas. Our greatest initial challenge for this program will be scheduling sufficient courses for graduate students and having enough full-time faculty to teach a full complement of graduate and undergraduate courses that will meet our students' needs. The plan of developing a PhD program is consistent with the University's strategic plan to provide "innovative and high-impact research and academic programs."

Faculty

The department currently consists of twelve full-time faculty members (10 tenured or tenure-track and 2 full-time lecturers). The department has two newly approved tenure-track positions at the assistant professor level starting September 2019. Despite the new faculty positions, however, the department will still be too reliant on part-time lecturers and full-time lecturers to provide a full range of courses at all levels, particularly with the addition of Online Graduate program. Currently, the Online Graduate program offers nine (9) online graduate courses every three (3) semesters, along with the MSCS Online Preparatory program offering four (4) online courses in computer science fundamentals each academic year. It is critical that more tenure-track faculty members and full-time lecturers be hired in future years to meet the need of both graduate and undergraduate education at the CIS department.

Appendix A: Faculty Publications (last 5 years)

*: student co-author; #: visiting scholars

Book Chapters

1. Honggang Wang, MD. Shaad Mahmud*, H. Fang, C. Wang, *Wireless Health*, Springer Publisher, ISBN 978-3-319-47946-0.
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3. Soheil Sibdari and Xiaoqin Zhang, Bidding Strategies of Automated Agents in Supply Chain Management, *Bidding: Types, Strategies and the Impact of Irrationality*, Edited by Ming Lim, Nova Science Publishers. 2013. ISBN: 978-1-62808-057-5.
4. Haiping Xu (Ed.), *Practical Applications of Agent-Based Technology*, InTech, March 2012, ISBN: 978-953-51-0276-2.
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9. Jian Zhao, Maoyuan Sun, Francine Chen, Patrick Chiu. BiDots: Visual Exploration of Weighted Biclusters. *IEEE Transactions on Visualization and Computer Graphics*, vol.24, no.1, pp.195-204, January 2018.
10. Zhengming Ding, Ming Shao, and Yun Fu. Incomplete Multisource Transfer Learning. *IEEE Transactions on Neural Networks and Learning Systems* 29, no. 2 (2018): 310-323.
11. Keasar C, McGuffin L, Wallner B, Chopra G, Adhikari B, Bhattacharya D, Blake L, Bortot L, Cao R, Dhanasekaran B.K., Dimas I, Faccioli R, Faraggi E, Ganzynkowicz R, Ghosh Sa., Ghosh So., Gieldon A, Golon L, He Y, Heo L, Hou J, Khan M*, Khatib F, Khoury G, Kieslich C, Kim D, Krupa P, Lee GR, Li H, Li J, Lipska A, Liwo A, Maghrabi A, Mirdita M, Mirzaei S, Mozolewska M, Onel M, Ovchinnikov S, Shah U, Sidi T, Sieradzan A, Ślusarz M, Slusarz R, Smadbeck J, Tamamis P, Wirecki T, Yin Y, Zhang Y, Bacardit J, Baranowski M, Chapman N, Cooper S, Defelicibus A, Flatten J, Koepnick B, Popović Z, Zaborowski B, Baker D, Cheng J, Czaplewski C, Delbem ACB, Floudas CA, Kloczkowski A, Ołdziej S, Levitt M, Scheraga H, Seok C, Johannes Söding, Vishveshwara S, Xu D, Crivelli SN, Players F. An analysis and evaluation of the WeFold collaborative for protein structure prediction and its pipelines in CASP11 and CASP12. *Scientific Reports*, 8(1):9939, 2018.
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Appendix B: Faculty Grants (Last 5 Years)

1. Intelligent Distributed Sensing towards Multi-Vehicle Autonomy with Undersea Applications, Office of Naval Research, Award Nos. N00014-17-1-2709, Award amount: \$224,870, duration three years: September 2017 – August 2020. PI: Ramprasad Balasubramanian, Co-PI: Dr. Lonnie Parker, Naval Undersea Warfare Center, Newport, RI, USA.
2. Research experiences for undergraduates (REU) in Exploring 60G HZ based Wireless Body Area Networks for mHealth Applications, National Science Foundation (CNS-1842177), PI: Hua Fang, 09/01/18-08/31/19, \$16,000.
3. SCH: Student Travel Support for IEEE/ACM Conference on Connected Health (CHASE), PI: Hua Fang, National Science Foundation (SCH-1833549), \$12,000, 06/01/18-05/31/19.
4. Exploring 60G HZ based Wireless Body Area Networks for mHealth Applications, National Science Foundation (CNS-1744272), PI: Hua Fang, \$100,002, 07/01/17-08/31/19.
5. Dataflow Notebooks: Improving Reproducibility in Notebook Environments. D. Koop (PI), S. Field (co-PI); UMass Dartmouth, Data Science Interface Grant, US\$8,000 (2017–2018).
6. Girls Power in Making: Understanding of Trajectories of Identification with STEM Disciplines Among Diverse Adolescent Girls in Making, Coding, and Robotics Infused Science Classes \$32,449, Multidisciplinary Seed Funding Program, University of Massachusetts Dartmouth, co-PI:Maoyuan Sun, PI: Dr. Shakhnoza Kayumova, other co-PIs: Dr. Qinguo Fan and Dr. Walter Stroup.
7. Popularity of Cultural Products in Online Social Media, PI: Haiping Xu, Creative Economy Initiatives Fund, UMass Dartmouth, Collaborative Research with University of Massachusetts Boston, \$36,000 (UMD Portion: 12,000), July 2017 - June 2018.
8. Supporting Data Analytics with Machine Learning Enhanced Visual Linking \$7,000, Summer Research Fellowship Program, University of Massachusetts Dartmouth, PI: Maoyuan Sun, Summer 2017.
9. Deep Learning: Representation and Analytics \$5,000, University of Massachusetts Dartmouth, State Street Data Science Curriculum Enhancement Grant Seed Funding Program for Data-driven Innovation in Engineering, PIs: Ming Shao and Maoyuan Sun.

10. Autonomy and Navigation for Advanced UUVs, Massachusetts Seaport Economic Council, (approved) Award amount: \$612, 250, duration one year: September 1, 2016 – September 30th, 2018, PI: Ramprasad Balasubramanian, Co-PIs: Taskin Padir (Northeastern University), Karen Harper (Charles River Analytics), Mark Smithers (Boston Engineering), Justin Manley (Just Innovations). UMassD share: \$402,250.
11. CI-EN: Enhancing and Supporting a Community-Based Data Analysis, Visualization, and Provenance Platform. PI: David Koop (PI); US\$73,736, (2016–2017), New York University (NSF Subaward).
12. Leveraging evolution to develop therapeutics against enteropathogenic E.coli. Bucci V, Silby M, and Khatib F., UMassD Multidisciplinary Seed Funding Program. Accepted: December 2015; \$28,909.
13. Crowdsourcing of Science & Engineering Problems. UMassD Multidisciplinary Seed Funding Program. Fiondella L. and Khatib F. Accepted: December 2014; \$19,999.
14. Distributed Architecture to Address Communication Challenges in Achieving Multi-UUV Autonomy, Office of Naval Research, Award Nos. N00014-14-1-0478 and N00014-15-1-2073, Award amount: \$300,000, duration four years: June 2014 – May 2018. PI: Ramprasad Balasubramanian, Co-PI: Dr. Lonnie Parker, Naval Undersea Warfare Center, Newport, RI, USA.
15. Expansion of Remote Sensing Using Radio Frequency Identification (RFID) Technology for Seasonal Load Restriction Timing. Cooperative Agreement No RITA-RS-13-01. US Department of Transportation (DOT). Award Amount: \$783,508, Feb 2014 – Feb 2016. (Note: \$391,751 funds from DOT and \$391,757 in-kind partner matching funds). Role as a Co-PI: Ramprasad Balasubramanian, effort: 33%.
16. Situationally Aware Task Consensus Among a Team of Heterogeneous AUVs, Agency - Office of Naval Research, Award Number: N00014-11-1-0600, Award Amount: \$150,000, April 2011 – September 2013, PI: Ramprasad Balasubramanian, Co-PI: Chris Duarte, Naval Undersea Warfare Center, Newport, RI, USA.
17. iHANDs: Intelligent Health Advising and Decision-support System Prototype, UMass Dartmouth Research Foundation, \$10,000. 2012 - 2013. PI: Xiaoqin Shelley Zhang, co-PI: Kristen Sethares (Nursing College).
18. Vessel Detection System, Agency: Mass Highway, New Bedford Harbor Development Commission and the IBI Group Boston. PI: Ramprasad

Balasubramanian, Co-PI: John Davis, ATMC, Award Amount: \$110,000, April 2009 - July 2011.

19. Data Collection via CRS&SI Technology to Determine when to Impose SLR, USDOT Research and Innovative Technology Administration, RITA -RS10-01, Award Amount: \$771,049, June 1, 2011 - August 31, 2013. Rose as a Co-PI: Ramprasad Balasubramanian. Contribution to project 25%.

Appendix C: Faculty CVs

See the attachment *CIS Faculty CVs.pdf*

Appendix D: CIS Graduate Student Handbook

Revised Sept. 28, 2016

The purpose of this handbook is to provide supplemental and program-specific information for CIS graduate students in several areas. More general information and regulations about CIS Master program can be found on [UMass graduate catalog](#) and [CIS department website](#).

Contact Information

To obtain information and get help, you may contact CIS office. Please give at least **one-week** leading time to process any paperwork. For Immigration related issue, contact Christina "Tina" Bruen (Phone: 508-910-6633) at international Student & Scholar Center.

Financial Support Policy

The School will allocate a limited number of graduate assistantships each year. The following guidelines will be used to determine the recipients of this support.

- i) All financial support will be based on merit. Criteria used to determine merit will be the applicant's GRE scores, letters of recommendation and Statement of Purpose.
- ii) The decision as to who will receive department financial support (i.e., from the general College fund) will be determined by the department's service needs (e.g., teaching assistants). All graduate students on College support will be assigned appropriate teaching-related duties. International students must pass the SPEAK test with a minimum score of 55 to be eligible for College teaching assistantships.
- iii) Assignments in teaching and research for incoming students will be predicated on the student's indicated area of specialization.
- iv) The decision as to whom will receive support from research grants and contracts will reside with the principal investigator from whose funds the student will be paid.
- v) Students making satisfactory progress, subject to the availability of funds, are eligible to receive a maximum of four semesters of College support as MS candidates and six semesters of College support as PhD candidates. Students pursuing the non-thesis MS degree are not eligible for College support. Students on academic probation or new provisionally admitted students are not eligible for College support.
- vi) In general, no financial support from the university sources is provided to part-time students unless their services in either teaching or research represent a critical need for the university/program or students no longer need a full-time load of course work during their last semester/year.
- vii) Students on academic probation, i.e., students who have GPAs below 3.0 or have completed 6 credits for Thesis Research or 12 credits of Dissertation Research without submitting and successfully defending a research proposal are not eligible for financial support as TAs.

- viii) Graduate students in “program continuation” status are not eligible for TAs, Teaching Fellowships, Graduate Fellowships, or tuition and CSF waivers

Course Load Guidelines

A course load of 9 credits per semester is considered minimum for full-time status in the Graduate School at UMass Dartmouth. An international student must register full time and stay registered full time for the whole semester. Dropping a course even at the end of the semester that causes the student to fall below full time is unauthorized reduce course load and a student is considered out of status. There are only three exceptions to the full time registration, first semester due to adjustment issues, the end of the study because the student needs less than full time to complete the degree program, or medical reasons with documentation. In such exceptional situations, the student must file a reduce course load form and get approval **first** in order to maintain his/her full-time student status.

Academic Probation and Dismissal of Graduate Students

A student who has been admitted to a graduate program of study in the CIS department, either on a regular or on a provisional basis, must maintain a 3.00 or higher grade point average in all work taken for graduate credit as well as an overall 3.00 GPA in all studies at UMass Dartmouth.

A student will be placed on **academic warning** if his/her cumulative GPA is less than 3.00 after having attempted nine (9) or more credits in courses that are eligible to count toward the degree or certificate.

A student will be placed on **academic probation** if his/her cumulative GPA is less than 2.67 after having attempted nine (9) or more credits in courses that are eligible to count toward the degree or certificate.

A student will be **subject to dismissal** from the graduate program if:

- His/her cumulative GPA is less than 2.00 after having attempted nine (9) or more credits in courses that are eligible to count toward the degree or certificate.;
- His/her GPA is less than 3.00 after completion of one-half of the required number of credits in courses that are eligible to count toward the degree or certificate;
- He/she earns three (3) course grades below B minus (B-) in courses that are eligible to count toward the degree or certificate.
- Where a thesis/dissertation /project is required, a thesis/dissertation/project which is graded F shall be grounds for dismissal.
- The student fails to meet any other conditions imposed as a part of the probation.

A student may appeal any action concerning academic probation and dismissal by petitioning the graduate committee within the department. However, if a student has a record of Academic dishonesty, his/her appeal request will **NOT** be supported by CIS department.

Academic Ethical Standards

All CIS graduate students are expected to maintain high academic ethical standard. Please check [university catalog](#) and [student handbook](#) for detailed description on this matter. Check the academic ethical standards and the consequences of violation specified in each course's syllabus, and follow the standards to avoid getting into trouble. CIS department does maintain a record of all offenses of academic ethical standards. The penalty of a second-time academic dishonest conduct by the same student is a **grade of F** in the course in which the 2nd offense took place.

For any student who has a record of academic dishonesty, his/her request for re-admission will NOT be supported by CIS department.

Satisfactory Academic Progress

Satisfactory progress is indicated by students who

1. Maintain a grade point average above 3.0 on a 4.0 scale as computed from their program of study;
2. Have received no more than two grades below "B"; and
3. Are registered for normal course loads or project/thesis/dissertation continuation.

Unsatisfactory academic progress results from failure to meet the above requirements and/or failure to complete program requirements at the appropriate point in the program. Such requirements are: (1) filing a project or thesis proposal; (2) scheduling the project or thesis presentation; (3) producing final copies of the thesis or dissertation. Students who do not maintain satisfactory progress in their degree program risk having their appointments reduced or being dismissed from the program.

Please note that course credits have a longevity of **6 years** from the time a course is completed. Only graduate courses in which the student receives a grade of C or better, or 400-level courses in which the student receives a grade of B or better, may be applied towards fulfilling degree requirements. All grades are averaged into the student's record. Required courses in which a student received a grade of C minus or less must be repeated in order for the student to graduate.

Course Selections, Registration and Continuation

Course from other department: CIS graduate students are **not** allowed to take courses from other department unless:

- It is requested by MS project adviser, or
- CIS department does not provide technical elective courses that you have not taken before.

400-level technical electives

No more than two 400 level technical elective courses are allowed to be counted toward MS degree only when:

- Such courses (or courses with similar coverage) have not been taken by this student previously.
- The 500-level course on the same topics has not been taken yet.
- EGR 500 - Graduate Internship takes place of one 400 level technical elective.
- The grade earned in that course must be B (not B minus) or better in order to be used towards a graduate degree

Process to earn MS credits for 400-level technical electives

- Get approval before taking the course by emailing the following information to the *graduate program adviser*: student name, ID, the course number and title, a statement of the fulfillment of the above conditions with attachment of your undergraduate and graduate transcripts.
- Save the approval email as a record and register for this course. Notice that at this times the credits for this course is not counted towards MS program in COIN.
- After earning a B or better grade, request the implementation of the credits by sending the approval email to the *graduate program director* with your name, ID, course number, title, the semester this course was taken and the grade for this course shown in your current transcript (attached). The *graduate program director* will require the implementation of the credits in your MS program.

Internship course (EGR 500)

- EGR 500 is a 3-credit course with pass/fail grade, it is counted into program credits but not counted in the GPA. It replaces one 400 level technical elective.
- The minimum requirement for an internship job to qualify earn EGR 500 credits are:
 - Demand skills at least on the level of junior or senior CS students.
 - Should be on-site to gain industry experience.
 - Should be paid at reasonable rate.
- In order to **register for EGR 500 course**, a student needs to:
 - Obtain a support letter describing work responsibility to prove the merit of the internship from the industry sponsor.
 - Prepare a proposal that describes the project objective and outcome.
 - Fill EGR 500 Internship Registration Form.
 - Find one faculty sponsor and get approval.
 - Submit the form and the proposal to CIS department office.

- In order to **complete EGR500 course**, the student needs to submit a report to the faculty sponsor no later than 1 month after the course period ends, and make a presentation to graduate committee.
- Note: If you need Curricular Practical Training (CPT) work permission for an internship job, you are required to register EGR500 course. CPT information is available from International Student & Scholar Center website.

On-line course

Students in **on-site** MS program may take **one** UMass Dartmouth CIS graduate-level (500 and above) **on-line** course (maximum of three credits) out of the entire MS program duration, with additional provisions:

- In particular semester a student cannot select to take an on-line version of a course when the same course is offered on-site.
- Student of the on-site program taking an on-line course must take all exams for this course on-site in the classroom and at the time set by the instructor.
- International students enrolled in the on-site program **cannot** take an on-line course in their last semester of credit course work if they only have one course remaining.

Course Combination Policy

Students in MS in CS on-site program **must** complete a minimum of 21 credits using CIS graduate courses (including MS Project) offered on campus. With a prior approval of the CIS *Graduate Program Adviser* and/or student's academic advisor, the remaining credits (maximum of 9 credits) can be completed by the following:

- Transfer of a graduate course(s) from another accredited institution of higher learning (maximum of 6 credits, grade B- or better)
- Computer science undergraduate technical elective course(s) not taken as part of student's undergraduate degree (maximum of 6 credits, grade B or better)
- Graduate course(s) taken in another department at UMD
- EGR 500 Graduate Internship (maximum of 3 credits)
- Computer science graduate on-line course offered by the CIS Department (maximum of 3 credits)

Registration for courses Graduate students (except the 1st semester for new students) need to register courses for the next semester within the current registration period, the bill will arrive when the next semester begins. Any one who fails to do so may receive letter of disenrollment and needs to pay a certain amount of fee for readmission. MS

project needs to be registered during the regular registration period too; project continuation can wait until the semester begins.

MS project continuation To get the first continuation of MS project, the student needs the approval of the faculty adviser and to submit a support letter to state the reason for continuation request. The second continuation is not allowed except in some extremely difficult situations such as accident or serious family matters (need documents of proof). In such exceptions, approvals from all levels are required.

- **Additional Degree Requirement** All full-time students must pass the course CIS 599 graduate seminars for two semesters. In order to pass the course, at least 80% attendance rate is required. In addition, a one-page report, which describes at least two seminars attended, must be submitted by the end of each academic semester.

Thesis/Project Presentation Schedule

- Thesis/Project presentations are **not** scheduled between July 1 and Aug. 20 and Dec. 22 and Jan. 20.
- Thesis defense should be scheduled for 1 hour including 50 minutes presentation time and 10 minutes for questions and answering (Q&A). Master's project presentation should be scheduled for 25-30 minutes.
- Thesis and project presentations should be scheduled in the CIS 599 seminar time frame when possible.
- **Thesis** presentation needs to be publicly announced via UMD Announce (and possibly other targeted lists) a **minimum of two weeks** in advance of the defense date. An email notice of title, abstract, faculty supervisor and committee member names should be sent to the CIS office (s.sears@umassd.edu with copied to the faculty supervisor) with a **minimum of three (3) weeks** for development and posting of the announcement prior to a thesis presentations.
- **Project** presentation does **NOT** need go to UMD Announcement. The project adviser will coordinate with other faculty members and the CIS 599 coordinator to schedule the presentation. The readers are not required to attend the presentation.

Continuous Registration Requirements

To maintain status as an MS degree candidate, it is necessary to be enrolled continuously (exclusive of summers) or receive an approved Leave of Absence (see below). If you continue to work on a thesis or project after completing formal course requirements, you must remain in "Continuation" enrollment status for every semester until the thesis/project/dissertation is completed, including the semester in which final approvals are given. You must register for Thesis/Project Continuation at the Registrar's office and pay a nominal fee in lieu of tuition and regular fees for each semester you are in that status. If you must interrupt progress towards your degree, you need to seek a formal Leave of Absence.

Interruption or Termination of Studies

A request for a leave of absence (LOA) for one semester or one year may be made in cases when serious illness or injury or other major event prevents the student from participating in his/her program of study for an extended period of time. A Leave of Absence from graduate studies can be requested by submitting a completed form (available from the Office of Graduate Studies) to the CIS Graduate Program Director. The form should include the reason for the request and the anticipated date for returning. A Leave of Absence involves no fees and does not require a re-admission procedure provided that the student returns by the anticipated date or makes other arrangements. A Leave of Absence differs from Graduate Program Continuation in that the latter involves fees and implies that the student is still participating in the program. Students who fail to return from LOA after one year are dismissed from the program and must reapply to continue in their program of study.

Withdrawal from the University permanently removes the student from the program and is therefore a serious procedure. Any student considering withdrawal should consult with their advisor. If the student subsequently decides to withdraw from the University, s/he should do so formally through the normal University procedure. Withdrawing students who hold University appointments should also submit a letter of resignation to the CIS Graduate Program Director. Students who do not register for any courses or continuing studies, or do not request a Leave of Absence, will be automatically withdrawn from the University.

Students who have withdrawn from the University and wish to return must apply for re-admission. Application for re-admission is made by written request to the Office of Graduate Studies. Re-admission is granted subject to the approval of the CIS Graduate Committee, the CIS Department Chairperson, and the Dean of the College of Engineering.

Academic Quality Assessment and Development
Self-Assessment Report

Computer Engineering MS
Electrical Engineering MS
Electrical Engineering PhD

Department of Electrical and Computer Engineering
College of Engineering

University of Massachusetts Dartmouth
North Dartmouth, MA



Spring 2019

KEY TO ABBREVIATIONS

AY	Academic Year
BS	Bachelor of Science
CIS	Computer and Information Sciences
COE.....	College of Engineering
CPE	Computer Engineering
ECE	Electrical and Computer Engineering
EGR.....	Engineering, Unspecified
EE.....	Electrical Engineering
ELE	Electrical Engineering
FT	Full Time
FY.....	Fiscal Year
GPA.....	Grade Point Average
GPO	Graduate Program Objective
IAB	Industrial Advisory Board
MS	Master of Science
PhD	Doctor of Philosophy
PT.....	Part Time
TOEFL.....	Test of English as a Foreign Language
UMass.....	University of Massachusetts
UMassD	University of Massachusetts Dartmouth

TABLE OF CONTENTS

KEY TO ABBREVIATIONS.....	i
Executive Summary	1
I. Introduction	3
I.A. Introduction to the Department of Electrical and Computer Engineering and its Programs...	3
I.B. Progress since last AQAD review	4
I.C. Summary of Programs and Review Status	4
I.D. Program Enrollments and Graduation Rates	6
II. Core Criteria and Related Questions	8
II.A. Alignment of Departmental Activities with Campus Mission and Strategic Priorities	8
II.A.1. Mission and Strategic Plan of the University	8
II.A.2. Mission of the College	10
II.A.3. Mission of the Department of Electrical and Computer Engineering and its Graduate Programs	10
II.B. Evidence of Rigorous, Relevant, Current, and Coherent Curriculum	12
II.B.1. Curriculum Determination and Relevance to Discipline	12
II.B.2. Internal and External Review Measures for Ensuring Relevance of Curriculum	13
II.B.3. Structure of Curriculum	14
II.B.4. Curriculum Alignment with Current Industry Needs	24
II.B.5. Curriculum Contributions to General Knowledge, Critical Thinking and Cognitive Skills	26
II.C. Faculty Quality and Productivity	26
II.C.1. Research and Publications	32
II.C.2. Grants and Contracts	40
II.C.3. Service to the Profession and University	42
II.C.4. Professional Development Opportunities	49
II.C.5. Service to the Community	53
II.D. Facilitation of Student Success	53
II.D.1. Program Learning Outcomes	53
II.D.2. Student Assessment in Relation to Program Evaluation	54
II.D.3. Evaluation of Post-Graduate Success	55
II.E. Resource Allocation	58
II.E.1. Allocation of Human Resources	58
II.E.2. Allocation of Material Resources	67
III. Report and Recommendations from External Review Team	70
IV. Response to External Review Team	71
V. Conclusions	72
VI. Strategic Planning: Future Goals & Specific Objectives	73
APPENDIX A	74

EXECUTIVE SUMMARY

The Department of Electrical and Computer Engineering (ECE) within the College of Engineering at the University of Massachusetts Dartmouth has completed the Academic Quality Assessment and Development (AQAD) self-assessment review for its graduate programs.

This AQAD review shows that the department has successful ABET-accredited undergraduate programs in Electrical Engineering and Computer Engineering and rigorous Master of Science programs in Computer Engineering and in Electrical Engineering which are designed to assist professionals within the electrical and computer engineering industry to obtain the advanced skills and knowledge needed in today's technical workforce. In addition, this review will demonstrate that the ECE Department has succeeded in establishing a research-based doctoral program that has produced 52 PhD degree recipients to date.

The areas of expertise of the faculty span a broad range of ECE topics and represent the strategic research thrusts of the Department. Currently, the department has 15 faculty members. By 2022, five faculty members are expected to retire and a replenishment of the ECE faculty is expected to have occurred by then.

In fall 1997, the ECE Department had 23 full-time tenure-track or tenured faculty, 203 undergraduate students (head count), 75 graduate students (head count), two full-time professional technicians, and two full-time office assistants. Although the student enrollment numbers in fall 2018 are comparable to those in fall 1997, the department now has 15 full-time tenure-track or tenured faculty (a loss of 8 faculty), 1.5 professional technicians (a loss of half), and one full-time administrative assistant (a loss of one). The enrollment and faculty data since 1997 are shown in Figure 1 below. Besides this decline in faculty, the annual research expenditures on external grants have steadily increased in recent years, exceeding the \$1M mark for the first time in FY 2015.

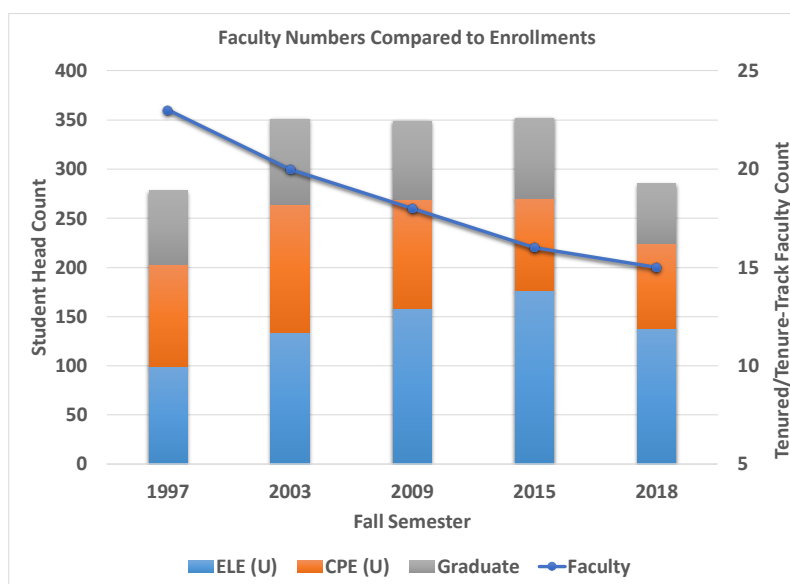


Figure 1. Faculty Numbers Compared to Enrollments since Fall 1997

Over the last two decades, all faculty searches have been targeted to hire research-active faculty, which can be evidenced by the research funding obtained from DARPA (with one Young Faculty Award winner), ONR (with one Young Investigator Award winner), NSF (with three NSF CAREER winners, one active), and other federal agencies. The retirements and departures have been of faculty whose primary responsibility was teaching rather than research.

The principal research thrusts in the ECE Department are as follows:

Technology Domains

- Acoustics, Communications, and Signal Processing
- Electromagnetics and Photonics
- Computing Infrastructure Security and Reliability
- Internet of Things (IoT) & Embedded Systems

Application Domains

- Marine & Underwater
- Healthcare & Quality of Life
- Smart Infrastructure
- Defense & Aerospace

Faculty members routinely contribute to the knowledge of the profession via peer-reviewed journal publications, published textbooks and monographs, and presentations at regional, national, and international conferences.

Alumni of our undergraduate and graduate programs work in academia, government/military research laboratories, and industry.

AQAD Self-Assessment Report

I. INTRODUCTION

UMass Dartmouth traces its roots to 1895, when the state legislature chartered two textile schools: New Bedford Textile School and the Bradford Durfee Textile School in Fall River.

By the middle of the 20th century, the colleges were growing rapidly, spurred by such forces as the GI Bill and the clear economic and social advantages of a well-educated citizenry. They had become multipurpose institutions, preparing engineers, health care workers, teachers, and business leaders – and had forged new identities: New Bedford Institute of Technology and Bradford Durfee College of Technology.

In 1960, the state legislature created Southeastern Massachusetts Technological Institute (SMTI) by merging the New Bedford Institute of Technology and the Bradford Durfee College of Technology. The 710-acre campus in North Dartmouth, part way between New Bedford and Fall River, was established in 1964. The dramatic campus design was the work of architect Paul Rudolph, then dean of Yale's school of Art and Architecture.

There was a clear public demand for a comprehensive university, and in 1969 SMTI became Southeastern Massachusetts University (SMU). The university continued to grow through the 1970s, when its first residence halls were finished and through the '80s, as research and studio facilities came into being.

In 1988, the Dion Science and Engineering Building was opened.

In 1991, a new University of Massachusetts structure combined the Amherst, Boston, and Worcester campuses with Southeastern Massachusetts University and the University of Lowell (now UMass Lowell). Thus, Southeastern Massachusetts University became the University of Massachusetts Dartmouth.

In 1994, UMass Dartmouth received approval to offer its first PhD degree, in Electrical Engineering, and began to offer several joint doctoral programs with other UMass campuses.

I.A. INTRODUCTION TO THE DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING AND ITS PROGRAMS

Electrical and Computer Engineering (ECE) is one of the traditional engineering disciplines and is attractive to engineering students because of the wide range of career paths available to graduates. There are many ECE departments throughout the country, including four within the UMASS system. Most of our undergraduate students are from the local region (within a 50-mile radius of the campus), and they typically find engineering jobs within this same region. The undergraduate programs enjoy a good reputation within the south coast region of Massachusetts and beyond. For students, especially in-state students, the programs offer an excellent value for the money.

The Department of Electrical and Computer Engineering is recognized both nationally and internationally for its work in RF Photonics, remote sensing, acoustics, marine applications, computing infrastructure security and reliability, signal processing, and embedded systems. The department offers undergraduate and graduate programs and is very strong in research and scholarly activities. Department faculty have numerous externally-funded research projects in various areas funded by several federal agencies including NSF, NIH, AFOSR, ONR, DHS. These projects fund undergraduate and graduate students and involve collaborations within and outside of UMass Dartmouth, including other universities and industry.

The Master of Science in Electrical Engineering degree at the University of Massachusetts Dartmouth is over 40 years old, with the first thesis successfully defended in 1976. The Master of Science in Computer Engineering degree is over 15 years old, with the first thesis successfully defended in 2003.

In 1994, UMass Dartmouth received approval to offer its first Doctor of Philosophy (PhD) degree in Electrical Engineering. The first successful doctoral dissertation defense at UMass Dartmouth was in Electrical Engineering in 1997.

I.B. PROGRESS SINCE LAST AQAD REVIEW

Despite reductions in the number of faculty and support staff in the ECE Department since 2002 (last AQAD review), the department's accomplishments include:

- Introduction of an accelerated BS/MS program that has attracted many of the top students;
- Attained more balance between the number of CPE and ELE faculty;
- Streamlined the PhD Qualifier requirements;
- Updated the requirements of both MS programs (CPE and ELE) with the Thesis- and Non-Thesis- tracks requiring the same number of credits (30);
- Surpassed the \$1M mark on research expenditures from external grants;
- Introduced new research thrusts as faculty have changed (added photonics, cyber-security, reliability, underwater communications).

I.C. SUMMARY OF PROGRAMS AND REVIEW STATUS

Spring 2019 marks the second AQAD evaluation of the graduate programs in the Department of Electrical and Computer Engineering. The first AQAD review of the ECE graduate programs occurred in Spring 2002. As was the case in 2002, ABET accreditation still substitutes for AQAD evaluation of the undergraduate programs. Separate AQAD evaluations of the graduate programs and graduate certificates are required.

The University of Massachusetts Dartmouth has been accredited by the New England Association of Schools and Colleges (NEASC) and Commission on Institutions of Higher Education (CIHE) since 1963 and this accreditation encompasses the entire institution. As of August 1, 2018, the CIHE-NEASC became an independent corporation called the New England Commission of Higher Education (NECHE). NECHE establishes and maintains high standards of educational excellence through self-evaluation and peer review. Institutions that demonstrate they meet these standards are accredited. NECHE is recognized by the U.S. Department of Education.

The last NEASC accreditation for the UMass Dartmouth campus was in Fall 2013. The University was found to excel in all aspects across the campus.

The Department of Electrical and Computer Engineering (ECE) at the University of Massachusetts Dartmouth offers the following academic programs:

Bachelor of Science in Electrical Engineering and Bachelor of Science in Computer Engineering

Each of these degrees is a department-specific program and is reviewed separately under the ABET Review Process. The ABET review process satisfies the AQAD review requirement and will not be described in detail in this report. The last ABET review was in 2016, and the department received excellent reviews and the awarding of the maximum accreditation term of six years.

The most recent ABET self-study reports are included with this AQAD review. During late summer 2017, UMass Dartmouth was formally notified of the accreditation action via ABET's Final Statement which is included in Appendix A.

Master of Science in Electrical Engineering and Master of Science in Computer Engineering

Each of these degrees is a department-specific program and will be discussed in this document for review under the AQAD process.

Doctor of Philosophy (PhD) in Electrical Engineering

This degree is a department-specific program and will be discussed in this document for review under the AQAD process.

Accelerated BS/MS Program

Although this is not a degree, the Accelerated BS/MS program offers the top-performing BS students incentives to pursue graduate study at UMass Dartmouth. This program will be discussed in this document for review under the AQAD process.

Graduate Certificates

The department offers six post-baccalaureate certificate programs, as listed below:

- Communications Certificate
- Computer Engineering Systems Certificate
- Digital Signal Processing Certificate
- Acoustics Certificate
- Electrical Engineering Systems Certificate

- Computing Infrastructure Security Certificate

In addition, a graduate Certificate in Computer Systems offered jointly by the Departments of Computer and Information Science and Electrical and Computer Engineering is also available.

These certificate programs are not described in detail in this AQAD report because of the nature of such disciplinary certificates. In general, ECE faculty offer a set of courses that can be used as electives to meet the requirements of these certificates. The certificates also meet a subset of the MS degree requirements. The ECE faculty work with the collaborating faculty in the Department of Computer and Information Science to ensure the coverage of courses for the Certificate in Computer Systems. The Graduate Program Director is responsible for the review of applications, advising candidates and verifying completion requirements.

I.D. PROGRAM ENROLLMENTS AND GRADUATION RATES

Figure I.D.-1 below shows the total number of students (undergraduate and graduate) enrolled in the ECE Department since 2011 using fall semester data. Table I.D.-1 shows the student enrollments in the ECE Department by degree program and year since 2011.

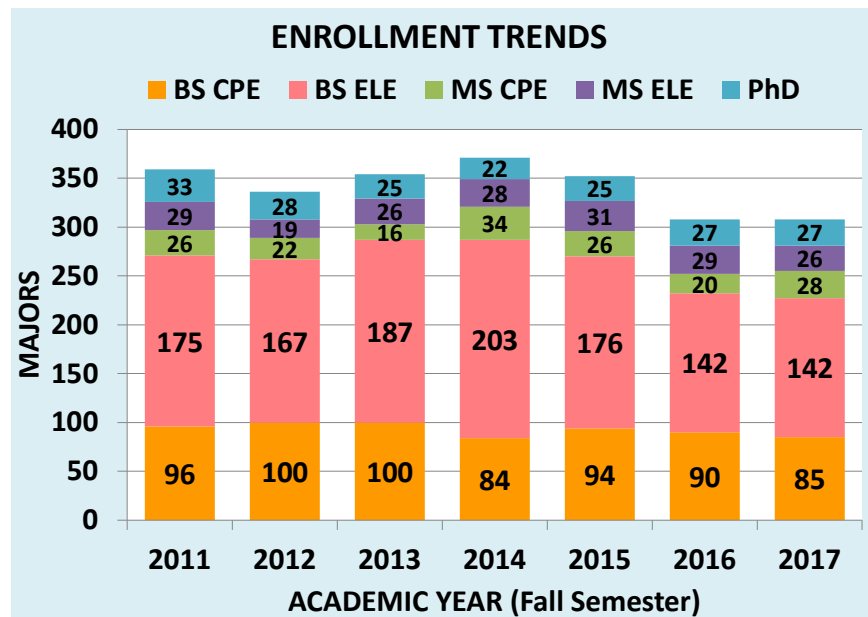


Figure I.D.-1. Enrollment in the ECE Department from 2011-2017

Table I.D.-1. Student Enrollments in the ECE Department by Degree Program and Year

Degree Program	2011	2012	2013	2014	2015	2016	2017
BS CPE	96	100	100	84	94	90	85
BS ELE	175	167	187	203	176	142	142
MS CPE	26	22	16	34	26	20	28
MS ELE	29	19	26	28	31	29	26
PhD (ELE Option)	21	15	15	14	11	9	10
PhD (CPE (Option)	12	13	10	8	14	18	17
ECE Certificates	1	1	1	1	1		

Table I.D.-2 shows the number of graduates per degree program since 2011. Figure I.D.-2 shows that data graphically (except for the Certificates and combining both PhD options).

Table I.D.-2. Number of Graduates in the ECE Department by Degree Program and Year

Degree Program	2011	2012	2013	2014	2015	2016	2017
BS CPE	18	16	17	24	16	16	24
BS ELE	30	30	28	30	42	48	35
MS CPE	12	10	6	4	6	19	13
MS ELE	5	10	9	5	9	6	9
PhD (ELE Option)	1	1	1	2	2	2	1
PhD (CPE (Option)		2	3	2		1	3
ECE Certificates				1		3	

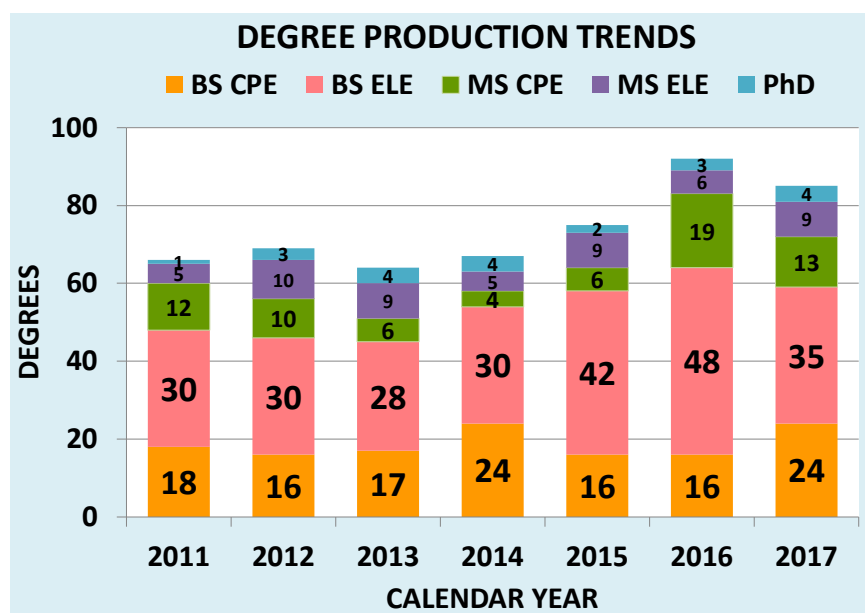


Figure I.D.-2. Degrees Produced from 2011-2017

II. CORE CRITERIA AND RELATED QUESTIONS

II.A. ALIGNMENT OF DEPARTMENTAL ACTIVITIES WITH CAMPUS MISSION AND STRATEGIC PRIORITIES

Consistent with AQAD Criterion 1, the goals and objectives of the graduate programs in the ECE Department are linked to the campus mission and strategic priorities.

II.A.1. Mission and Strategic Plan of the University

The University of Massachusetts (UMass) System has the following published mission:

The University's mission is to provide an affordable and accessible education of high quality and to conduct programs of research and public service that advance knowledge and improve the lives of the people of the Commonwealth, the nation and the world.

The University of Massachusetts Dartmouth has the following published mission:

UMass Dartmouth distinguishes itself as a vibrant, public research university dedicated to engaged learning and innovative research resulting in personal and lifelong student success. The University serves as an intellectual catalyst for economic, social, and cultural transformation on a global, national, and regional scale.

This mission statement is published on the university's website at <http://www.umassd.edu/about/missionandvision/>.

While the UMass Dartmouth's mission has effectively remained the same over time, the University today bears little resemblance to its predecessor school (Southeastern Massachusetts University). To address these changes, the University developed "UMass Dartmouth 2020: A Strategic Plan for the Next Decade."

UMassDTransform2020 articulates the mission, vision, values, and goals of UMass Dartmouth as it evolves in a rapidly-changing higher education landscape.

Based on the work of a 42-member committee made up of faculty, students, staff, and community members, with additional feedback from stakeholders throughout the community, *UMassDTransform2020* positions the university for transformation, growth, and prosperity – with a focus on:

- the transformative educational experience of students as the highest priority
- innovative and enriched learning, dynamic and impactful research
- a commitment to K-12 engagement, public service, and community partnerships
- growth in the areas of entrepreneurship, the environment, health, justice, and arts and culture

The five goals of the strategic plan provide the framework through which we build a university culture that continually and agilely adapts to the complex challenges and ever-changing landscape of public higher education.

Goal 1: Innovative and High-Impact Research and Academic Programs

UMass Dartmouth will vigorously contribute to the advancement of knowledge through the development of innovative and high-impact research and academic programs that are integrative, interdisciplinary, and promote critical thinking, problem-solving, and creativity.

Goal 2: Integrated Student-Centered Experiences

The success of undergraduate and graduate students through a transformative educational experience will be UMass Dartmouth's highest priority. To enable students to progress toward achievement of their educational, personal, and career goals, investments will be made in key areas that support student success.

Goal 3: An Active and Engaged University Community Focused on Excellence in Research, Scholarship, and Innovation

UMass Dartmouth will be recognized globally, nationally, and regionally for impactful research, scholarship, and innovation that reflect the expertise of its faculty and staff, the strengths of its programs, and the needs of the region and the Commonwealth. To accomplish this goal, the University will be actively engaged in a well-defined pathway to obtain Carnegie Doctoral Research University (DRU) status.

Goal 4: Highly Productive Collaborations, Partnerships, and Community Engagement

From its inception, UMass Dartmouth has played a catalytic role in the region in economic, social, and cultural development. True to its history and rich legacy, the University will continue to support and expand collaborations that enable a mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity to address critical societal issues and contribute to the public good in areas such as sustainable economic development, education, environment, fishing industry, health care, manufacturing, and transportation.

Goal 5: Infrastructure and Processes in Support of Excellence

A robust physical, technological, and administrative infrastructure that ensures a productive, safe, and positive environment for faculty, students, and staff is essential to the achievement of the strategic goals of *UMassDTransform2020*.

UMass Dartmouth is committed to benchmarking progress in these areas and has created a report card to track and evaluate indicators vital to success. An update with strategies and measures from 2016 is available at

<https://www.umassd.edu/media/umassdartmouth/about/strategicplan/StrategicPlanUpdate2016.pdf>.

II.A.2. Mission of the College

The College of Engineering has the following published mission:

The College of Engineering strives to serve the needs of the region and the nation by creating and disseminating knowledge through research and teaching and preparing students to excel in their chosen profession and to be contributing citizens in a diverse, changing world.

This mission statement is published on the College of Engineering website at <http://www.umassd.edu/engineering/about/missionandgoals/>.

The College of Engineering is comprised of six departments: Bioengineering, Civil and Environmental Engineering, Computer and Information Science, Electrical and Computer Engineering, Mechanical Engineering, and Physics. The college offers eight undergraduate degree programs, five concentrations, eleven graduate programs, and six accelerated BS-MS programs that serve more than 1,400 students. The goals of the college are to prepare graduates to meet 21st-century technological challenges and improve the well-being of society; create new knowledge in engineering, technology, and computer science; and engage and develop students to become leaders in their fields through service and scholarship.

II.A.3. Mission of the Department of Electrical and Computer Engineering and its Graduate Programs

The Department of Electrical and Computer Engineering has the following published mission:

The Department of Electrical and Computer Engineering at the University of Massachusetts Dartmouth provides students with a universally recognized undergraduate and graduate education in electrical and computer engineering, develops new ideas and technologies deployed around the world, and prepares its graduates to be vital contributors to the economic growth of the Commonwealth of Massachusetts, the nation, and beyond.

This mission statement is published on the Electrical and Computer Engineering department's website at <https://www.umassd.edu/engineering/ece/about/>.

The department's mission is consistent with the college's and the university's missions, all of which emphasize technology, innovation, regional economic growth, and individual development. Graduates of our programs will develop new ideas and technologies, will participate in research, and will contribute to the economy of the region where they work.

II.A.3.a. Graduate Program Objectives (GPOs)

The graduate programs in Electrical and Computer Engineering at the University of Massachusetts Dartmouth have the following objectives:

1. To provide students in-depth understanding and expertise in specific areas of specialization in electrical engineering and computer engineering.

2. To train students to do scientific research in specific areas of interest.
3. To train students how to communicate their research findings as technical papers, conference and seminar presentations.
4. To provide students the opportunity to show mastery in a specific research project or research area of interest by writing and defending a thesis/project report or by passing a comprehensive exam.
5. To graduate students who can be successful technical contributors to industry and productive faculty members in electrical and computer engineering departments.

These program objectives are published on the Electrical and Computer Engineering department's website at <https://www.umassd.edu/engineering/ece/graduate/programeducationalobjectives/>.

II.A.3.b. Program Strategic Alignment to University Mission

The alignment of the graduate Electrical and Computer Engineering programs with the College, University and System missions is discussed below.

GPO 1: To provide students in-depth understanding and expertise in specific areas of specialization in electrical engineering and computer engineering.

GPO 1 aligns with the University's UMassD Transform 2020 **Goal 1: Innovative and High-Impact Research and Academic Programs**. In-depth understanding and expertise in an area of electrical engineering or computer engineering is necessary for our graduates to contribute innovative ideas to the technology sector of our economy.

GPO 2: To train students to do scientific research in specific areas of interest.

This GPO aligns with the University's UMassD Transform 2020 **Goal 1: Innovative and High-Impact Research and Academic Programs**. In-depth understanding and expertise in an area of electrical engineering or computer engineering is necessary for our graduates to contribute innovative ideas to research projects.

GPO 3: To train students how to communicate their research findings as technical papers, conference and seminar presentations.

This GPO aligns with the University's UMassD Transform 2020 **Goal 3: An Active and Engaged University Community Focused on Excellence in Research, Scholarship, and Innovation**. In order to be recognized for their quality research, students must present their findings to the research community and must be able to clearly articulate their ideas both in writing and in talks.

GPO 4: To provide students the opportunity to show mastery in a specific research project or research area of interest by writing and defending a thesis/project report or by passing a comprehensive exam.

This GPO aligns with the University's UMassD Transform 2020 **Goal 5: Infrastructure and**

Processes in Support of Excellence. It is part of the departmental processes to ensure quality in the students who graduate from our programs.

GPO 5: To graduate students who can be successful technical contributors to industry and productive faculty members in electrical and computer engineering departments.

This GPO is in support of the University's UMassD Transform 2020 **Goal 4: Highly Productive Collaborations, Partnerships, and Community Engagement.** Many students who graduate from our programs work in local and regional companies. They often maintain their connections to the department, serving on our Industrial Advisory Board and/or hiring our graduates.

II.B. EVIDENCE OF RIGOROUS, RELEVANT, CURRENT, AND COHERENT CURRICULUM

Consistent with AQAD Criterion 2, the ECE Department ensures that curricula are relevant, rigorous, current and coherent.

II.B.1. Curriculum Determination and Relevance to Discipline

The MS in ELE, MS in CPE and PhD in EE programs determine curricular content primarily through the action of the Graduate Committee and the Industrial Advisory Board, an external advisory committee. The Graduate Committee is composed of nine members of the department who are self-selected and thus serve by choice. Members of the Graduate Committee include two Assistant Professors, two Associate Professors, and five Professors. Their areas of interest represent the full spectrum of the department both in terms of seniority and areas of expertise that include acoustics, computer architecture, digital signal processing, distributed systems, electromagnetics, embedded systems, image processing, Internet of things (IoT), microprocessors, networking, ocean engineering, optics, reliability engineering and remote sensing. The primary focus of the Graduate Committee with regard to curricula is to ensure that the programs have offerings in the areas of interest to our diverse student population and local industry; that they are structured in such a way that students are able to complete a degree in a reasonable amount of time while taking courses of most benefit to them; and that the program can offer a coherent and academically sound program of study. In this capacity, the Graduate Committee has recommended restructuring core course requirements in a variety of ways to meet the needs of our student population.

Individual faculty members may develop and propose new (graduate) courses in their areas of research expertise. The Graduate Committee reviews all requests for new graduate courses, or changes to existing graduate courses, and periodically reviews graduate curricula. The primary focus of the Graduate Committee regarding the graduate curricula is to safeguard the academic rigor of the graduate programs and to ensure that they comply with college and university regulations, e.g., no more than two grades below B- and maintain a grade point average of at least 3.0 out of a 4.0 grading scale in all courses.

All ECE Department committees are strictly recommending bodies. The full ECE faculty must approve all recommendations from committees before any action can be taken. Recommendations made by the Graduate Committee must be approved by a majority vote of the entire full-time tenure-track and tenured faculty in the department before any curricular changes go into effect.

The department also has an Industrial Advisory Board composed of representatives from industry, government and academia, and this board makes recommendations on curriculum content and provides feedback on how well our students are prepared.

II.B.2. Internal and External Review Measures for Ensuring Relevance of Curriculum

Our MS in Electrical Engineering (ELE) program is in its forty sixth year of operation. The MS in Computer Engineering (CPE) program, which began as the CPE Option under the MS ELE program, is now in its seventeenth year as an approved program. The PhD program in Electrical Engineering is in its twenty third year of operation.

While Electrical Engineering and Computer Engineering are rapidly changing fields, one would not expect a need for huge changes in curricular needs over short time frames (e.g., 3 years). During the time frames of these programs, however, we have made many changes to our curricula to address the needs of our students and local industries. We establish the needs for these changes primarily through the following review methods.

Within the department, the Graduate Committee receives requests from faculty to add new graduate courses or remove old courses or make changes to existing courses based on the present faculty research interests and sound pedagogy. Secondly, the Graduate Program Director routinely meets with graduate students and inquires about how well their needs are being met. Because of these internal review strategies, we identify strengths and weaknesses within our programs. These observations eventually result in changes to the programs as deemed necessary.

Industry studies, student interests and changes in faculty emphasis resulted in the formation of a separate MS CPE program and investigation into the viability of a separate PhD in Computer Engineering. These evolutionary changes allow us to offer flexible degrees, better meeting the needs and interests of our students, particularly in the research areas where we have strategic thrusts.

We obtain external review of our curricula through consultation with local industry and at least annual meetings with the department's Industrial Advisory Board (IAB). The IAB is made up of local government and industry representatives and alumni. For example, based on perceived needs, articulated by the IAB and local industry, the department has instituted seven post-baccalaureate Certificates (PBCs). The goal of the certificates is to encourage practicing engineers to take graduate courses that can eventually lead to an MS degree. Formal recognition with a PBC allows students to take a few courses in a focused area relevant to their employment and to have something to show for the effort while ensuring they are well on their way to satisfying the pertinent MS degree requirements. The need for our graduates to be prepared for the employment opportunities in the region has led, for example, to a strong marine acoustics, signal processing and embedded systems focus within the department. This attracts current employees of large employers such as the Naval Underwater Warfare Center (NUWC), General Dynamics and Raytheon, and gives our graduates an advantage when seeking employment at these and other sites.

Finally, and perhaps most importantly, our curricula stay up to date because they support the growing research interests of our faculty and industry. As research activity is by its nature state of the art, course offerings developed in support of research typically represent cutting-edge topics in the field.

Our MS in ELE, MS in CPE, and PhD in EE programs are maturing and continue to grow their research activity. This has resulted in the development of a variety of new courses (e.g., Computational Electromagnetics, Optoelectronics, Ocean Engineering, Passive Remote Sensing, Wireless Communications, Sensor Networks, Acoustic Transduction and Electroacoustic Transducers, Embedded Systems Design, Advanced Digital Design, Network Security, Fault Tolerant Computing, Reliability Engineering, Multimedia Communications) supporting these diverse areas of research activity. These research areas played a pivotal role in the development and evolution of our PhD program. Our growing research base in computer engineering supports the MS in CPE and is driving the Computer Engineering Option within the PhD in Electrical Engineering program.

II.B.3. Structure of Curriculum

Curricula for the MS in ELE, MS in CPE and PhD in EE degrees vary widely from one university to another. At some universities there are no required courses, and the onus for providing a sound education is placed entirely on the quality of graduate academic advising. Other programs require extensive numbers of core courses and courses for particular areas of specialization. Our programs have always been proposed along moderate lines.

MS Programs

Both the MS in ELE and the MS in CPE programs require four core courses, two depth courses, one breadth course, and one (Thesis Track) or two (Non-Thesis Track) free electives. Beyond these requirements, we have a requirement that a certain number of graduate credits be earned (at least 24 of the required 30 credits must be at the graduate level). These requirements are well within the norms for MS in ELE and MS in CPE programs throughout the nation.

There are two tracks for the Master of Science degree that a student may choose from: Thesis Track and Non-Thesis Track.

In addition to the common requirements described above, a student pursuing the Thesis Track must successfully complete six credits of master's thesis (ECE 600) and submit a thesis acceptable to the student's committee. In addition to the written thesis, successful oral defense of the thesis work is required prior to completion of the program.

Every MS Thesis-Track degree candidate must pass ECE 599 Graduate Seminar. This 0-credit course requires students to attend a minimum of six seminars or presentations given within the department or technical presentations offered by professional organizations such as IEEE. Students who are employed full-time may request a waiver for ECE 599 by seeking the support from their graduate advisor for the waiver justification, who then requests for the waiver to the ECE Graduate Program Director.

In addition to the common requirements described above, a student pursuing the Non-Thesis Track must successfully complete three credits of master's project (ECE 501) or Engineering Internship (EGR 500). A written report of the project work is required to satisfy this program track. Students with at least 2 years post-BS work experience as an engineer may choose to submit a report documenting project work and/or research experience. If approved, the student will be able to satisfy the credit requirement by taking

another graduate ECE course.

PhD Program

The PhD in EE degree program has two options, depending on the student's previous educational background. The Electrical Engineering Option is designed for students with backgrounds in Electrical Engineering while the Computer Engineering Option assumes the student has a Computer Engineering background. The PhD program has no specific course requirements but does require typically 18 credits after the MS degree or 48 credits of course work after the BS degree excluding dissertation credits. Dissertation credits are nominally 18. The program requires students to complete and pass the PhD qualifying requirements at the beginning of the program, followed by a written comprehensive exam and oral comprehensive exam at the completion of course work and the start of dissertation research. An oral defense of their dissertation and the production and acceptance of the dissertation are the culmination of the program.

Every PhD degree candidate must pass ECE 599 Graduate Seminar. This 0-credit course requires students to attend a minimum of six seminars or presentations given within the department or technical presentations offered by professional organizations such as IEEE. Students who are employed full-time may request a waiver for ECE 599 by seeking the support from their graduate advisor for the waiver justification, who then requests for the waiver to the ECE Graduate Program Director.

II.B.3.a. Graduate Programs

The following subsections contain details of the degree requirements for the following graduate programs:

- Master of Science in Electrical Engineering,
- Master of Science in Computer Engineering, and
- Doctor of Philosophy in Electrical Engineering.

The Master of Science degree programs in Electrical Engineering or Computer Engineering at the University of Massachusetts Dartmouth provide sufficient structure to ensure that each graduate of either program has a firm foundation to go on to further graduate studies or to succeed at the advanced level in industry. However, there is enough program flexibility to allow students to pursue studies of their own interest. The MS in Computer Engineering and the MS in Electrical Engineering, although separate degrees, share some common requirements:

1. At least 24 of the required 30 credits must be at the graduate level (500 series or higher); a grade of C or better is required for all graduate courses to be counted towards the degree. As many as six credits of 400 series courses will be allowed to compensate for variations in the student's background; a grade of B or better is required for them to be counted towards the degree. Undergraduate courses in excess of the six-credit limit are allowed, but will not count for credit toward the degree.
2. Each candidate for the Master of Science Degree must obtain a minimum of 30 graduate credits with the following constraints:
 - maintain a grade point average of at least 3.0 out of a 4.0 grading scale in all courses,

- obtain no more than two course grades below B-minus,
 - have no more than three credits of ECE 595 Independent Study, and
 - the credits must be in accordance with a program of study filed by the student and approved by the student's graduate advisor.
3. There are two tracks to the Master of Science degree that a student may choose from:

Thesis Track

In addition to the common requirements listed above, a student pursuing the Thesis Track must successfully complete at least six credits of Master's Thesis (ECE 600) and submit a thesis satisfactory to the student's committee. In addition to the written thesis, successful oral defense of the thesis work is required prior to completion of the program.

Every MS Thesis-Track degree candidate must pass ECE 599 Graduate Seminar. This 0-credit course requires students to attend a minimum of six seminars or presentations given within the department or technical presentations offered by professional organizations such as IEEE. Students who are employed full-time may request a waiver for ECE 599 by seeking the support from their graduate advisor for the waiver justification, who then requests for the waiver to the ECE Graduate Program Director.

Non-Thesis Track

In addition to the common requirements listed above, a student pursuing the Non-Thesis Track must successfully complete three credits of Master's Project (ECE 501) or Engineering Internship (EGR 500). A written report of the project work is required to satisfy this program track. Students with at least 2 years post-BS work experience as an engineer may choose to submit a report documenting work project and/or research experience. If approved, the student will be able to satisfy the credit requirement by taking another graduate ECE course.

Table II.B.3.a.-1 shows the credit requirements for the non-thesis and thesis tracks. The depth, breadth, and free elective requirements are fulfilled by technical electives which are Electrical and Computer Engineering graduate courses. Students may choose their technical electives in their area of concentration and across other areas to establish a broad knowledge base. Graduate courses in Computer Science, Mathematics, Physics, and other engineering disciplines may be taken as technical electives only if they are pre-approved by the Graduate Committee. The credits for Master's Project (ECE 501) cannot be counted toward the requirement for the thesis track. It can be replaced with a three-credit technical elective for the non-thesis track. The objective of the core requirement is to guarantee broad and strong analytical skills for the MS students.

Table II.B.3.a.-1 MS Credit Requirements for the Non-Thesis and Thesis Tracks

Non-Thesis Track	Credits	Thesis Track	Credits
Core Requirement	12	Core Requirement	12
Depth Requirement	6	Depth Requirement	6
Breadth Requirement	3	Breadth Requirement	3
Free Elective Requirement	6	Free Elective Requirement	3
Advanced Project (ECE 501)	3	Thesis (ECE 600)	6
		Graduate Seminar (ECE 599)	0
Total Credits	30	Total Credits	30

II.B.3.a.1 MS Electrical Engineering Curriculum

The MS ELE program has four components: a required course component, a depth component, a breadth component, and a free elective component.

The following four (4) courses are **required** of all Electrical Engineering MS students:

- ECE 521 Random Signals and Systems I,
- ECE 530 Introduction to Advanced Electronics and Optoelectronics,
- ECE 551 Acoustic and Electromagnetic Waves,
- and one of the following two courses: ECE 571 Digital Communications or ECE 574 Discrete-Time Signal Processing.

To fulfil the Depth Requirement, two (2) courses must be taken, defined by the student's advisor, in one of the following specialization areas: Acoustics and Signal Processing; Devices and Applied Electromagnetics; Wireless Communications and Sensor Networks.

The Breadth Requirement stipulates that students must also take one (1) graduate course, defined by the student's advisor, from a specialization area different from that selected to satisfy the Depth Requirement.

For the Free Elective Requirement, students in the Thesis Track must take one (1) additional ECE graduate course and students in the Non-Thesis Track must take two (2) or three (3) additional ECE graduate courses.

II.B.3.a.2 MS Computer Engineering Curriculum

The MS CPE program has four components: a required course component, a depth component, a breadth component, and a free elective component.

The following four (4) courses are **required** of all Computer Engineering MS students:

- a graduate math course that can be satisfied with one of the following courses: (CIS 560, EAS 501, ECE 521, ECE 523, ECE 530, ECE 544, ECE 551, ECE 571, ECE 574, ECE 575, ECE 584, ECE 620, ECE 640, ECE 646, ECE 671, ECE 672, ECE 674, MNE 539, MTH 501, MTH 505, MTH 521, MTH 573, MTH 574 or another course approved by the student's advisor);
- ECE 560 Computer Systems Performance Evaluation;

- ECE 562 Advanced Computer Architecture; and
- ECE 565 Operating Systems.

To fulfill the Depth Requirement, two (2) courses must be taken, defined by the student's advisor, in one of the following specialization areas: Computer Systems Specification, Analysis, Design, and Performance Assessment; Database Systems; Distributed and Parallel Systems; Microprocessors; Networking or Fault-Tolerant Computing.

The Breadth Requirement stipulates that students must also take one (1) graduate course, defined by the student's advisor, from a specialization area different from that selected to satisfy the Depth Requirement.

For the Free Elective Requirement, students in the Thesis Track must take one (1) additional ECE graduate course and students in the Non-Thesis Track must take two (2) or three (3) additional ECE graduate courses.

II.B.3.a.3 PhD Program in Electrical Engineering

PhD students should complete and pass the PhD qualifying requirements appropriate to their option (Electrical Engineering or Computer Engineering) by the end of their first year of study if they enter the program with an MS degree or at the completion of 30 credits if they enter the program with a BS degree. The qualifying requirement has three components:

- Undergraduate Academic Fundamentals,
- Graduate Academic Fundamentals, and
- Research.

The Undergraduate Academic Fundamentals component can be satisfied by presenting evidence of a BS degree in the option major (e.g., BS in ELE for the electrical engineering option). If the student does not have a BS degree in the major, he/she can petition the department to accept equivalent professional experience in electrical or computer engineering as enough qualifying background or their program of study must document which undergraduate courses will be taken to address deficiencies.

The Graduate Academic Fundamentals component can be satisfied by:

- taking the required graduate courses in the MS major (Electrical Engineering or Computer Engineering) and obtaining a GPA ≥ 3.5 ;
- passing a written exam based on the required courses; or
- passing a written exam based on 3 courses in the student's area of specialization.

The Research component can be satisfied by:

- completing an MS thesis at UMass Dartmouth with the recommendation of both the MS and PhD advisors;
- passing an oral exam based on research completed at another institution; or

- passing ECE 602 Research Skills, a course for which successful completion requires an oral defense of a research project in front of at least three ECE faculty.

PhD candidates must also pass the PhD comprehensive examination. This examination verifies that the student is sufficiently prepared to conduct scholarly research in the selected area of the PhD dissertation. Consequently, the PhD comprehensive examination focuses on advanced graduate studies and a formal PhD research proposal.

The comprehensive examination is scheduled by the student's major advisor at the convenience of the committee members, is administered by the major advisor, and is conducted by the committee members. The comprehensive examination consists of two parts: a written examination followed by an oral examination. The oral examination is scheduled within four weeks of successful completion of the written examination, with two weeks' notice to the UMass Dartmouth community. The form and content of both parts of the examination are set by the student's committee.

Doctoral students receive a P (Pass) in Pre-Dissertation Research (ECE 603) upon successful completion of both the written and oral examination, as determined by the unanimous consent of the committee. Students failing to give satisfactory performance on either part of the examination are allowed a single re-examination of either all or a portion of either examination as determined by the committee.

PhD candidates must successfully complete a PhD dissertation. Successful completion of the PhD dissertation is indicated by the satisfactory oral defense of a written dissertation that represents an original contribution to the scholarly research literature of the field and approval of the written document by all committee members. The dissertation requires 18 credits of Doctoral Dissertation Research (ECE 701).

The department lists approximately 76 electrical and computer engineering graduate courses of which typically ten unique course offerings occur per term. Of the 76 electrical and computer engineering graduate courses, approximately 40 run within a fairly regular rotating schedule. Hence students with all course work as well as students' free elective choices have sufficient groups of courses to choose from during their program of study period.

Table II.B.3.a.3.-1 lists the PhD dissertations successfully defended up through September 2018.

**Table II.B.3.a.3.-1 Dissertations Completed under the PhD in Electrical Engineering
(since 1997)**

YEAR	STUDENT'S NAME	Ph.D.	DISSERTATION TITLE	ADVISOR
2018	Cochran, John C.	Electrical Engineering Option	A General Theory of the Slotted Cylinder Projector (SCP) Transducer	Dr. David A. Brown
2018	Liu, Yang	Electrical Engineering Option	Source Enumeration, Localization and Spectral Estimation Using Co-Prime and Other Sparse Sensor Arrays	Dr. John R. Buck
2018	Mahmud, Md Shaad	Electrical Engineering Option	A Novel Approach to Predict and Prevent Bradycardia of Preterm Infants Using Time-Frequency Analysis	Dr. Honggang Wang & Dr. Yong K. Kim
2018	Rooney, Ian Max Teplitz	Electrical Engineering Option	Variance Reduction Techniques for Power Spectral Density Estimation with Coprime Sensor Arrays	Dr. John R. Buck
2017	Ahmad, Moh'd	Electrical Engineering Option	Spectral Domain Fast Multipole Method for Solving Integral Equations in Electromagnetic Wave Scattering	Dr. Dayalan P. Kasilingam
2017	Huang, Jingfang	Computer Engineering Option	QOE-Aware Scalable Video Transmission Over Resource-Constrained Cognitive Radio Networks	Dr. Honggang Wang
2017	Viall, Benjamin Roy	Computer Engineering Option	Wireless Health Indicator Patch for Patient Education and Diagnostics (WHIPPED): An Integrated System Approach to Patient Self-care	Dr. Paul J. Fortier
2017	Xu, Longtao	Electrical Engineering Option	Photonic Integrated Circuit Technologies for RF Photonic Links	Dr. Yifei Li
2016	Adhikari, Kaushallya	Electrical Engineering Option	Performance Analysis of Product Processing of Colinear Sparse Arrays	Dr. John R. Buck
2016	Rashwan, Abdelnaser	Electrical Engineering Option	Quality-Driven Secure Routing for Wireless Multimedia Sensor Networks Using Secret Sharing	Dr. Honggang Wang
2016	Tuladhar, Saurav Ratna	Electrical Engineering Option	Improved Sample Matrix Inversion Adaptive Beamformers for Uniform Linear Arrays using Array Polynomial	Dr. John R. Buck
2016	Wang, Yujie	Computer Engineering Option	Reliability Modeling of Probabilistic Competing Failures	Dr. Honggang Wang & Dr. Liudong Xing
2016	Zhang, Zhaoyang	Computer Engineering Option	Secure and Energy-Efficient Wireless Body Area Networks	Dr. Honggang Wang
2015	Ehsani Zonouz, Amir	Computer Engineering Option	Application Communication Reliability in Wireless Sensor Networks	Dr. Liudong Xing & Dr. Vinod M. Vokkarane
2015	Hague, David A.	Electrical Engineering Option	The Generalized Sinusoidal Frequency Modulated Waveform for Active Sonar Systems	Dr. John R. Buck
2015	Jin, Shilei	Electrical Engineering Option	Advanced components for RF Photonic Links	Dr. Yifei Li
2015	Randall, Robert Craig	Electrical Engineering Option	Velocity Control of Piezoelectric Transducers with Class D Power Switching Amplifiers	Dr. David A. Brown
2014	Khomchuk, Petro	Electrical Engineering Option	Parameter Estimation and Moving Target Classifications Capabilities	Dr. Igal Bilik & Dr. Dayalan Kasilingam
2014	Wang, Chaonan	Computer Engineering Option	Reliability and Sensitivity Analysis of Complex Systems and Networks	Dr. Liudong Xing
2013	Ma, Ruiping	Computer Engineering Option	Survivability Design and Analysis for Wireless Sensor Networks	Dr. Liudong Xing
2013	Northardt, Ernest T.	Electrical Engineering Option	Application and Extensions of Deterministic	Dr. Igal Bilik & Dr. Dayalan Kasilingam
2013	Sarangapani, Sairajan	Electrical Engineering Option	Investigation of Electromechanical Properties of Stripe-Electroded Tangentially Polarized Bars and Cylinders	Dr. David A. Brown & Dr. Boris S. Aronov
2012	Bachand, Corey L.	Electrical Engineering Option	Electroacoustic Transducer and Transmit System Modeling for Performance Prediction	Dr. Boris S. Aronov, Dr. David A. Brown, and Dr. Igal Bilik
2012	Boddu, Prashanthi	Computer Engineering Option	Reliability Optimization of Complex Series-Parallel Systems with K-out-of-n: G Subsystem Redundancy	Dr. Liudong Xing
2012	Dastgheib-Beheshti, Babak	Electrical Engineering Option	Development of a Full Experimental Framework for the Technical Reference Model of Wireless Sensor Networks	Dr. Howard E. Michel
2012	Jarvis, Susan	Computer Engineering Option	A Novel method for Multi-class Classification Using Support Vector Machines	Dr. Howard E. Michel
2012	Tannous, Ola	Computer Engineering Option	Combinatorial Reliability Evaluation and Optimization for Dynamic Standby Systems	Dr. Liudong Xing
2012	Tsalolikhin, Evgeny	Electrical Engineering Option	Mobile localization Using the Adaptive Channel Modeling in AOA-TOA Domain	Dr. Igal Bilik
2011	Shen, Bichuan	Electrical Engineering Option	Modeling and Learning for Fish Identification and Vehicle and Pattern Detection	Dr. Liudong Xing & Dr. Chi Hau Chen
2009	Shrestha, Akhilesh	Computer Engineering Option	Dependability Modeling and Analysis of Mission Critical Systems	Dr. Liudong Xing
2008	Ho, Pei-Gee (Peter)	Electrical Engineering Option	Multivariate Time Series Model Based Support Vector Machine for Multiclass Remote Sensing Image Classification and Region Segmentation	Dr. Chi Hau Chen

**Table II.B.3.a.3.-1. Dissertations Completed under the PhD in ELE (since 1997)
(continued)**

YEAR	STUDENT'S NAME	Ph.D.	DISSERTATION TITLE	ADVISOR
2007	Chen, Honglei	Electrical Engineering Option	Auto Regressive Aperture Extrapolation for Adaptive Array Processing	Dr. Dayalan Kasilingam
2007	Wang, Zhenhai	Electrical Engineering Option	Factor Analysis for Seismic Profiling and Adaptive Blind Source Separation for Bandlimited Speech	Dr. Chi Hau Chen
2007	Zhang, Jiaming	Electrical Engineering Option	Region of Interest Segmentation and Video Coding in Dynamic Video Backgrounds	Dr. Chi Hau Chen
2006	Oishi, Tetsuro	Electrical Engineering Option	Underwater directional Transducers and Arrays Using Baffled Piezoelectric Cylindrical Shells	Dr. David Brown & Dr. Boris Aronov
2006	Roodbeen, Steven A.	Electrical Engineering Option	Component Sum Interval Analysis: Training Artificial Neurons and Neural Networks	Dr. Chi Hau Chen
2005	Tao, Xiaoli	Electrical Engineering Option	Multi-Class Classification of Remote Sensing Data With Improved Artificial Neural Networks	Dr. Howard E. Michel
2005	Wang, Dajun	Computer Engineering Option	Mining T-Outliers in High Dimensional Time Series Financial Data	Dr. Paul J. Fortier
2005	Wang, Xianju	Electrical Engineering Option	Study of a Novel Theory in ICA Image Restoration and Enhancement, with Special Reference to Ultrasonic NDE Images and SAR Images	Dr. Chi Hau Chen
2005	Yu, Quin	Computer Engineering Option	Denial-of-Service Countermeasure with Immunization and Regulation	Dr. Hong Liu
2004	Djordjevic, Miroslav	Electrical Engineering Option	Numerical Methods for Electromagnetic Modeling of Vehicles Over a Wide Range of Frequencies	Dr. Branislav M. Notaros
2003	Blackmon, Fletcher A.	Electrical Engineering Option	Linear and Non-Linear Opto-Acoustic Underwater Communications	Dr. Lee Estes & Dr. Gilbert Fain
2003	Ilic, Milan M.	Electrical Engineering Option	Higher Order Hexahedral Finite Elements for Electromagnetic Modeling	Dr. Branislav M. Notaros
2002	Hong, Baoming	Electrical Engineering Option	Integrated Automatic Face Recognition Based on Multiresolution Transform and Multiscale Local Feature Representations	Dr. Chi Hau Chen
2002	Wang, Junfeng	Electrical Engineering Option	Techniques for Compensating Unknown Motion Effects in Sar/Isar Imaging	Dr. Dayalan Kasilingam
2001	Qidwai, Uvais Ahmad	Electrical Engineering Option	2-D Blind Deconvolution for Image Restoration with Applications to Ultrasonic NDE	Dr. Chi Hau Chen
2001	Zhang, Xiaohui	Electrical Engineering Option	Independent Component Analysis for Remote Sensing Image Processing and Pattern Recognition	Dr. Chi Hau Chen
2000	Guo, Qishuang	Electrical Engineering Option	Propagation of Acoustic Waves in Bars and Determination Of Dynamic Acoustic Constants	Dr. David A. Brown
2000	Mukhin, Denis	Electrical Engineering Option	A Framework for Association Rule Mining	Dr. Paul J. Fortier
1999	Cheng, Tzu-Hung	Electrical Engineering Option	Wavelet-Based Image/Video Compression	Dr. Chi Hau Chen
1998	McCarrick, Charles D.	Electrical Engineering Option	An Analytical Model for Pyramidal Horn Antennas with Ridges	Dr. Dayalan Kasilingam
1997	Lee, Gwo Guin	Electrical Engineering Option	On Multiresolution Wavelet Analysis Using Gaussian Markov Random Field	Dr. Chi Hau Chen

II.B.3.b. Accelerated BS/MS Program

The accelerated BS/MS program is a bridge between the BS and MS degrees as opposed to being a specific degree program. This fast-track program enables outstanding BS degree students in Electrical Engineering or Computer Engineering to complete both the BS and the MS degrees, at different times, with nine fewer total credits.

Outstanding undergraduate scholars are identified at the conclusion of the fall semester of their junior year. The Graduate Committee selects nominees at the beginning of the spring semester. Students invited to participate in the program must then identify and select a graduate advisor and develop an individual program of study. Those students then file an application through the Office of Graduate Studies, submitting the regular graduate application (but with GRE and TOEFL scores and recommendation letters waived); and they are accepted into the accelerated BS/MS program once their application is complete and reviewed by the Graduate Committee. Students in the accelerated BS/MS program are required to file a program of study for their MS degree by the end of the first semester of their graduate study.

BS/MS students must complete the requirements for the BS Degree as well as the MS degree

requirements under one of the existing options (refer to Section II.B.3 for the general MS degree requirements, Section II.B.3.a.1 for the requirements of MS Electrical Engineering curriculum and Section II.B.3.a.2 for the MS Computer Engineering curriculum). A maximum of nine credits taken to satisfy the MS Degree requirements (at most two 400-level courses passed with a grade of B or better) can be counted towards the BS degree as technical electives. The 400-level courses offered jointly at the 500-level must be taken at the 500-level in order to be double-counted. For BS degree students in Computer Engineering, ECE 457 can be counted as an undergraduate technical elective. For BS degree students in Electrical Engineering, ECE 471 can be counted as an undergraduate technical elective. A grade of C or better is required for all graduate-level courses (500-level or above) to be counted towards both degrees.

To qualify for the accelerated BS/MS program, a student must have an undergraduate GPA above a certain threshold at the time of invitation. For example, the threshold of 3.40 was used in the spring 2018 invitations. This threshold is reviewed and updated by the Graduate Committee regularly based on the program's performance. A potential student must apply before the awarding of the BS degree.

II.B.3.c. Graduate Certificate Programs

A certificate offers the working professional recognition of a coherent program of advanced study at the graduate level. The certificate programs are compatible with the MS degree requirements, enabling certificate recipients to transition to a degree program without loss of credits. Each certificate requires 15 credits of graduate course work. A student may complete multiple certificates, provided an application has been approved for each and the student satisfies the requirements of each. Each certificate meets a subset of the degree requirements for the MS in either Electrical Engineering or Computer Engineering. Currently, the Electrical and Computer Engineering Department offers six post-baccalaureate certificate programs, as listed below:

- Communications Certificate
- Computer Engineering Systems Certificate
- Digital Signal Processing Certificate
- Acoustics Certificate
- Electrical Engineering Systems Certificate
- Computing Infrastructure Security

In addition, a graduate Certificate in Computer Systems offered jointly by the Departments of Computer and Information Science and Electrical and Computer Engineering is also available.

The tables associated with these certificates are included with this report in the Excel file named *Electrical & Computer Engineering Data for AQAD Fall 2011 to Fall 2017*. The enrollment counts that are given in the tables cite the number of students enrolled in the certificate program at the fall semester of each academic year. It is important to note that oftentimes MS students realize their eligibility for a certificate after they have completed most or all of the required courses. In these cases, the certificates are typically awarded within the same year that the student enrolls in the certificate program. Because these students did not initially enroll in the Certificate program, enrollment numbers may not give an accurate indicator of actual demand of students that are specifically seeking a certificate.

Certificate in Communications

This certificate program provides essential background, advanced education and training in communication theory and information systems design. The program encompasses 2 required courses (ECE 521 Random Signals and Systems and ECE 571 Digital Communications) and 3 elective courses in the field. These electives provide distinct expertise, and sufficient depth that allow the student to take on challenging roles in the diverse arena of modern advanced communication system design.

Certificate in Computer Engineering Systems

The purpose of this certificate program is to provide essential background in computer engineering systems through three required courses (ECE 560 Computer Systems Performance Evaluation, ECE 562 Advanced Computer Architecture, and ECE 565 Operating Systems). These courses, combined with two electives representing distinct computer engineering areas, will provide sufficient depth and tangible useful expertise in an area of choice in computer engineering systems.

Certificate in Digital Signal Processing

The certificate in digital signal processing requires two courses: Random Signals and Systems (ECE 521) and Discrete-Time Signal Processing (ECE 574). In addition, students select three additional courses from topics such as Digital Communications, Estimation Theory, Sonar Signal Processing or Advanced Topics in Signal Processing. The offered courses span a wide range of signal processing application areas to meet the needs of engineers working in those areas.

Certificate in Acoustics

The Acoustics Certificate is awarded for completing five courses in the multidisciplinary area of Acoustics, the study of sound and its engineering applications. Students completing the Acoustics certificate are well prepared for a career in many fields that involve acoustics such as sonar, medical ultrasonics, electroacoustics, speech processing, acoustical engineering and more.

Certificate in Electrical Engineering Systems

The purpose of this certificate program is to provide essential background in electrical engineering systems through three required courses (ECE 521 Random Signals and Systems, ECE 581 Mathematics of Systems Analysis, and ECE 561 Computer Systems). These courses, combined with two electives representing distinct electrical engineering areas, will provide enough depth and tangible useful expertise in an area of choice in electrical engineering systems.

Certificate in Computing Infrastructure Security

The purpose of this certificate program is to provide essential background in computing infrastructure security through three required courses (ECE 565 Operating Systems, ECE 548 Cyber Threats and Security Management, and ECE 549 Network Security). These courses, combined with one elective on computer systems or information technology and another elective on security, will provide sufficient depth and

tangible useful expertise in the area of cybersecurity and computing infrastructure protection.

Certificate in Computer Systems (jointly offered with Department of Computer and Information Science)

This certificate program aims to provide sufficient depth and tangible useful expertise in computer systems related design and analysis through five required courses (CIS 552 Database Systems, ECE 560 Computer Systems Performance Evaluation, ECE 561 Computer Systems, ECE 565 Operating Systems and CIS 577 Networks). This certificate program offers a route into UMass Dartmouth's MS program in Computer Engineering or in Computer Science.

II.B.4. Curriculum Alignment with Current Industry Needs

The curricula adequately prepare students for further employment or study. Many students who have graduated from our MS programs (CPE and ELE) have gone on to successful careers in industry and/or have pursued PhD study here or at other institutions. Twelve of our PhD graduates obtained faculty positions in academia, while other PhD graduates have opted for industrial research positions. Reports, such as the Graduate Student Exit Survey, indicate that our students felt well prepared. Our MS and PhD graduate students work in both large and small companies and have been very successful in their careers whether in industry, academia or government.

The ECE Department seeks input from industry in the following ways:

- All changes to the graduate programs are presented to the Electrical and Computer Engineering Industrial Advisory Board (IAB). The Board is used in a consultative capacity only. They can make recommendations, but they cannot make policy.
- Research faculty members are encouraged to make a short presentation before the IAB to describe their research interests.
- Faculty members perform research in areas that are important to both industry and the community.
- Several ECE faculty members interact regularly with industry on a consulting or research basis. Faculty members are allowed one day of professional absence per week during the fall and spring semesters. Often, the consulting/research leads to collaborative efforts and awareness of industry needs.

Electrical and Computer Engineering Industrial Advisory Board (IAB)

Alumni, potential **employers**, and actual employers of our graduates are represented by the members of the ECE Industrial Advisory Board (IAB). The very active Electrical and Computer Engineering IAB is made up of engineers, technical administrators, and executives from a variety of companies, large and small. Meetings of the ECE IAB are held once a year. Current IAB members are listed in Table II.B.4.-1. The list is also available on the ECE department's web site at <https://www.umassd.edu/engineering/ece/industry/>.

Table II.B.4.-1 ECE Department IAB Membership (AY 2018-2019)

NAME	TITLE	AFFILIATION	UMassD ALUM?	EMPLOYER OF ECE GRADS?
Wayne Campos	President & CEO	MIET Healthcare Inc. & Hippo Data Storage Fall River, MA	Yes	Yes
Carlos Casanova	President & Solutions Architect	CarlosCasanova.com Slatersville, RI	Yes	
Stephen Collins	President & Independent Consultant/Analyst	1024 Technology Marketing Westport, MA		
Marshall W. Cross	Chairman	MegaWave Corporation Devens, MA		
Sara A. Ferland	Computer Engineer	Naval Undersea Warfare Center (NUWC) Newport, RI	Yes	Yes
David Hague	Research Scientist	Naval Undersea Warfare Center (NUWC) Newport, RI	Yes	Yes
Stephen Hall	Product Validation Engineer	Onset Computer Corporation Bourne, MA	Yes	Yes
Norm Hildreth	Consultant		Yes	Yes
Eric K. Jamieson	Senior Principal Engineer	Raytheon Company Portsmouth, RI		Yes
Thomas Lambalot	Entrepreneur & Consultant	Nashua, NH	Yes	
David A. Lincoln	Consultant	Middletown, RI		
Fred Magalhaes	Director	General Dynamics Electric Boat Groton, CT	Yes	Yes
W. Vance McCollough	Manager (Retired)	Raytheon Company Portsmouth, RI		Yes
Earl Medeiros	Hardware Quality Assurance Supervisor	Dell EMC Hopkinton, MA	Yes	Yes
Brock Morrisette	Manufacturing Engineering Operations Consultant	Lockheed Martin Marion, MA	Yes	Yes
Tom Northardt	Engineer IV	MIKEL, Inc. Middletown, RI	Yes	Yes
Timothy Palmer	Manager	General Dynamics Mission Systems Taunton, MA		Yes
Ken Rapoza	Senior Electrical Engineer	Lockheed Martin Marion, MA	Yes	Yes

Some examples where the ECE Department has made changes to the curriculum because of industrial input are as follows:

- Most of our graduate courses are delivered either in the early morning, ending by 10:00 AM, or in the late afternoon, starting at 3:30 PM, to accommodate students from industry.
- Working and retired engineers with relevant industrial experience have been hired to teach courses as adjunct faculty.

II.B.5. Curriculum Contributions to General Knowledge, Critical Thinking and Cognitive Skills

While virtually every course in the program contributes to these educational goals, the most critical contribution to these areas is in the student's capstone experience. The process of completing a dissertation, thesis or project relies almost entirely on the student's development of critical thinking; and the process of deeply researching such open-ended activities and exploring numerous solution methods leads inevitably to a great increase in the student's general knowledge and self-confidence as an independent learner. Students with two years of industry experience who elect the Non-Thesis Track must show current project responsibility consistent with the expectations of the above capstone experience.

II.C. FACULTY QUALITY AND PRODUCTIVITY

Consistent with AQAD Criterion 3, the ECE Department ensures faculty quality and productivity. The faculty in the Electrical and Computer Engineering (ECE) Department support 5 distinct programs: BS in Electrical Engineering, BS in Computer Engineering, MS in Electrical Engineering, MS in Computer Engineering, and PhD in Electrical Engineering.

Of the 15 full-time faculty tenured/tenure-track faculty members in the ECE Department, eight (8) faculty have particular expertise in Electrical Engineering (ELE) and seven (7) faculty have particular expertise in Computer Engineering (CPE). Because approximately one-half of both the CPE and ELE undergraduate programs are common, the above distribution of faculty is enough to deliver the programs.

The areas of research and expertise of the faculty span these principal research thrusts: (1) Acoustics, Communications, and Signal Processing; (2) Electromagnetics and Photonics; (3) Computing Infrastructure Security and Reliability; and (4) Internet of Things (IoT) & Embedded Systems. These technology domains directly contribute to these application domains: (1) Marine & Underwater; (2) Healthcare & Quality of Life; (3) Smart Infrastructure; and (4) Defense & Aerospace.

Tables II.C.-1A and II.C.-1B summarize the Department of Electrical and Computer Engineering faculty qualifications. Faculty members maintain competence in their areas of specialization through research, consulting, serving on review panels for funding agencies, membership in professional societies, reviewing journal papers and participation in technical conferences. Except for one, all current full-time faculty members in the department have terminal doctoral degrees.

The eight full-time and one part-time faculty members in the department who primarily support the Electrical Engineering (ELE) programs are listed in Table II.C.-1A. All have a PhD in the field. All the full-time faculty are tenured. Most have at least a few years of industrial/government work experience. This background allows them to bring a depth of real-world problems to the classroom and an insight into

the research needs of industry and government. All but two have over 20 years teaching experience. Most are also active in research.

As with the ELE faculty, the CPE faculty members are competent to teach any of the CPE core classes. The seven full-time and one part-time faculty members in the department who primarily support the Computer Engineering (CPE) programs are listed in Table II.C.-1B. All, but one, have a PhD in the field and are full-time, either tenured or tenure-track. Two have significant industrial/government work experience. All but three have over 10 years teaching experience. Most are also active in research.

More detailed faculty resumes are provided in the file named *ECE Faculty CVs.pdf*.

Table II.C.-1A. Faculty Qualifications: Electrical Engineering

Faculty Name	Highest Degree Earned- Field and Year	Rank ¹	Type of Academic Appointment ² T, TT, NTT	FT or PT	Years of Experience			Professional Registration/ Certification	Level of Activity H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Brown, David A.	PhD/Engineering Acoustics 1991	P	T	FT	10	27	23	None	H	H	M
Buck, John R.	PhD/Electrical Engineering 1996	P	T	FT	0	22	22	None	M	H	L
Costa, Antonio H.*	PhD/Electrical Engineering 1994	P	T	FT	0	33	33	None	L	L	L
Gendron, Paul J.	PhD/Electrical Engineering 1999	AST	TT	FT	20	5	5	None	M	H	L
Kasilingam, Dayalan P.	PhD/Electrical Engineering 1987	P	T	FT	6	25	25	None	L	M	M
Li, Yifei	PhD/Electrical Engineering 2003	ASC	T	FT	0	14	11	None	L	H	L
McCollough, William V.	PhD/Electrical Engineering 1977	A	NTT	PT	34	23	4	None	H	L	L
Payton, Karen L.	PhD/Electrical Engineering 1986	P	T	FT	5	29	29	None	M	M	L
Rancour, David P.	PhD/Electrical Engineering 1987	ASC	T	FT	5	30	30	None	L	M	L

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other

2. Code: TT = Tenure Track T = Tenured NTT = Non-Tenure Track

Table II.C.-1B. Faculty Qualifications: Computer Engineering

Faculty Name	Highest Degree Earned- Field and Year	Rank ¹	Type of Academic Appointment ² T, TT, NTT	FT or PT	Years of Experience			Professional Registration/ Certification	Level of Activity H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Fiondella, Lance N.	PhD/ Computer Science & Engineering 2012	AST	TT	FT	0	5	5	None	L	M	M
Fortier, Paul J.	D.S./Computer Science 1993	P	T	FT	17	24	24	None	L	M	M
Liu, Hong	PhD/Computer Science 1990	P	T	FT	0	31	28	None	L	M	L
Viall, Benjamin*	PhD/Electrical Engineering 2017	I	NTT	PT	0	6	6	None			
Viall, Philip H.	MS/Electrical Engineering 1983	P	T	FT	0	35	35	None	L	L	M
Wang, Honggang	PhD/Computer Engineering 2009	ASC	T	FT	0	9	9	None	L	H	M
Xing, Liudong	PhD/Electrical Engineering 2002	P	T	FT	0	16	16	None	L	H	M
Zhou, Ruolin**	PhD/Engineering 2012	AST	TT	FT	0	6	0	None	L	M	M

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other

2. Code: TT = Tenure Track T = Tenured NTT = Non-Tenure Track

* Was a Part-Time Lecturer (PTL) during AY 2017-2018.

** New hire (fall 2018).

Based on the currently-approved Agreement between the University of Massachusetts Board of Trustees and the UMass Faculty Federation, Local 1895, the standard teaching load for full-time tenure-track or tenured faculty is 18 teaching units (TUs) per academic year. A TU, similar to a contact hour, is equivalent to one hour of lecture, recitation or laboratory. Also, as outlined in the Faculty Federation contract, faculty members who advise graduate students obtain the equivalent of up to 4 TUs per semester. The teaching loads for AY 2017-2018 are summarized in Table II.C.-2 below where the student-credit-hours (SCHs) delivered are included along with the contractual TUs. The department delivered 5,028.5 SCHs for AY 2017-2018. Table II.C.-3 lists the SCHs delivered by the ECE Department for AYs 2013-2014 through 2017-2018.

Table II.C.-3 also shows an AY breakdown in the number of PhD related credit hours taught by ECE faculty. This table reflects the emphasis on growing doctoral programs as evidenced from the change in the doctoral student credit hours from 42 to 141 between AY 2015-2016 and AY 2017-2018.

Table II.C.2. Teaching Activities for AY 2017-2018 (Totals by Instructor)

	AY CREDITS		AY ENROLLMENT		AY TEACHING UNITS		AY STUDENT CREDIT HOURS
	Fall	Spring	Fall	Spring	Fall	Spring	Fall & Spring
FACULTY							
David Brown	21	15	42	13	7	8	165
John Buck	0	3	2	2	2	3	3
Antonio Costa	5	5	67	91	6	6	286
Lance Fiondella	6	13	15	66	3	10	162
Paul Fortier	26	31	81	126	10	16	345
Paul Gendron	9	15	38	24	10	12	147
Dayalan Kasilingam	24	24.5	65	103	10	13.5	417
Yifei Li	12	12	15	45	5	8	180
Hong Liu	21	27	52	23	10	10	231
Karen Payton	6	6.5	144	102	8	11.5	554.5
David Rancour	13.5	14	154	145	13.5	15	707.5
Philip Viall	8	8	116	131	10	12	550
Honggang Wang	48	36	46	30	11	9	168
Liudong Xing	21	24	9	32	4.5	10	117
PART-TIME LECTURERS							
Vance McCollough	3	9	49	90	3	6	378
Benjamin Viall	7	7	107	112	9	9	422.5
TEACHING ASSISTANTS							
Keith Albergaria	2	2	28	13	6	5	41
Leonardo Asseph	0.5	0.5	15	17	1.5	1.5	16
Gwendolyn Davis	0.5	0.5	7	22	1.5	1.5	14.5
Lavanya Mandava	1	2	20	36	2	4	56
Robert Mushrall	0.5	1	21	24	1.5	3	34.5
Sharma Prinkle		0.5		16		1.5	8
Murilo Silva		1		10		2	10
Christopher Souza		2		15		5	15
TOTAL	235	259.5	1,093	1,288	134.5	182.5	5,028.5

Table II.C.-3. Student-Credit Hours since AY 2013-2014

Student-Credit-Hours	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Total SCHs	6,103	6,469	6,102	5,486	5,029
PhD SCHs	72	69	42	123	141

II.C.1. Research and Publications

The level of externally-funded research in the Department of Electrical and Computer Engineering has increased dramatically in recent years. The principal research thrusts in the ECE Department are as follows:

Technology Domains

- Acoustics, Communications, and Signal Processing
 - Applied acoustics (underwater engineering, electroacoustics, marine mammal bioacoustics)
 - Signal processing (DSP, speech processing and intelligibility, detection and estimation theory)
 - Wireless and multimedia communications
 - Dynamic spectrum access and cognitive radio
- Electromagnetics and Photonics
 - Remote sensing
 - Photonic integrated circuits
 - RF photonics
- Computing Infrastructure Security and Reliability
 - Network and system security
 - System reliability engineering
 - Risk analysis
- Internet of Things (IoT) & Embedded Systems
 - Cyber-physical systems
 - Data science & artificial intelligence
 - Embedded system design
 - Sensor networks & devices

Application Domains

- Marine & Underwater
 - Underwater acoustics, communications and sonar
 - Underwater sensor arrays and networks
 - Marine mammal bioacoustics
- Healthcare & Quality of Life
 - Body area networks
 - Speech processing and intelligibility

- Biomedical computing
- Smart Infrastructure
 - Connected vehicles
 - Smart homes & grids
 - Artificial intelligence
- Defense & Aerospace
 - Communications and sensing
 - Embedded systems security
 - Software intensive systems reliability

The ECE Department's research-active faculty have been awarded many grants and contracts to fund their work. Below is a sample list of external funding sources for faculty in the Department of Electrical and Computer Engineering for AY 2016-2017:

- National Science Foundation (NSF)
- Department of Homeland Security (DHS)
- Department of Defense (DOD)
- Office of Naval Research (ONR)
- Naval Air Warfare Center
- U.S. Army Research Office
- NASA Langley Research Center
- U.S. Department of Transportation
- U.S. Forest Service
- Air Force Office of Scientific Research (AFOSR)
- National Institutes of Health (NIH)

Below is a sample list of journals, conferences, and publishers for AY 2016-2017 through which the faculty of the Department of Electrical and Computer Engineering published. ECE Department authors are shown in **blue**. **Red** indicates UMass Dartmouth faculty from other departments. **Purple** indicates graduate students of the ECE Department.

Books & Book Chapters

1. **Honggang Wang**, **M.D. S. Mahmud**, **H. Fang**, and C. Wang, *Wireless Health*, Springer, ISBN: 978-3-319-47946-0, 2016.
2. **Y.K. Kim**, **Honggang Wang**, and **M.D. S. Mahmud**, " *Wearable Body Sensor Network for Healthcare Applications* " in *Smart Textiles and Their Applications*, Chapter 9, Woodhead Publishing, 2016.

Journal Papers

1. **Adhikari, K.** & **Buck, J.R.** (2017). Spatial spectral estimation with product processing of a pair of colinear arrays. *IEEE Transactions on Signal Processing*, 65(9), 2389–2401.
2. **Buck, J.R.**, Wage, K.E. & Nelson, J.K. (2016). Designing Active Learning Environments. *Acoustics Today*, 12(2), 12–20.

3. **Hague, D.A. & Buck, J.R.** (2017). The Generalized Sinusoidal Frequency-Modulated Waveform for Active Sonar. *IEEE Journal of Oceanic Engineering*, 42(1), 109–123.
4. **Liu, Y., Buck, J.R.** & Ikonomidou, V.N. (2017). Generalized min-max bound-based MRI pulse sequence design framework for wide-range T1 relaxometry: A case study on the tissue specific imaging sequence. *PLoS ONE*, 12(2), e0172573. doi: 10.1371/journal.pone.0172573
5. Mueller, R., Gupta, A.K., Zhu, H., Pannala, M., Gillani, U.S., Fu, Y., Caspers, P. & **Buck, J.R.** (2017). Dynamic Substrate for the Physical Encoding of Sensory Information in Bat Biosonar. *Physical Review Letters*, 118 (15), 158102.
6. **Costa, A.H.**, Enriquez-Caldera, R., Tello-Bello, M. & Bermudez-Gomez, C.R. (2016). High resolution time-frequency representation for chirp signals using an adaptive system based on duffing oscillators. *Digital Signal Processing*, 55, 32–43.
7. Yeh, C.T. & **Fiondella, L.** (2016). Optimal Redundancy Allocation to Maximize Multi-state Computer Network Reliability subject to Correlated Failures. *Reliability Engineering and System Safety*, 166, 138–150. doi: 10.1016/j.res.2016.08.026
8. **Jafary, B., Nagaraju, V., & Fiondella, L.** (2016) Impact of Correlated Component Failure on Preventive Maintenance Policies. *IEEE Transactions on Reliability*, 66(2), 575–586. doi: 10.1109/TR.2017.2687426
9. **Gendron, Paul J.** (2016). Shallow water acoustic response and platform motion modeling via a hierarchical Gaussian mixture model. *Journal of the Acoustical Society of America*, 139 (4), 1923–1937.
10. **Gendron, Paul J.** (2017). Evidence in support of Gaussian mixture models for sparse time varying ocean acoustic response functions. *Journal of the Acoustical Society of America*, 141(4), 413-419.
11. Chang, L., Pfeiffer, M., Volet, N., Zervas, M., Peters, J., Manganelli, C.L., Stanton, **Li, Y.**, Kippenberg, T.J. & Bowers, J. (2017). Heterogeneous integration of lithium niobate and silicon nitride waveguides for wafer scale photonic integrated circuits on Silicon. *Optics Letters*, 42(4), 803–806.
12. **Jin, S.**, Xu, L., **Li, Y.** (2016). Highly linear optical phase modulation inside a mixed QW modulator. *IEEE Photonics Technology Letters*, 28(16), 1759–1762.
13. **Jin, S.**, Xu, L., Rosborough, V., Klamkin, J. & **Li, Y.** (2016). RF Frequency Mixer on photonic integrated circuits. *IEEE Photonics Technology Letters*, 28(16), 1771–1773.
14. Xu, L., **Jin, S.** & **Li, Y.** (2016). Nonlinear optical phase modulation inside a MQW optical phase modulator. *IEEE/OSA Journal of Lightwave Technology*, 34(14), 3300–3305.
15. Xu, L., **Jin, S.** & **Li, Y.** (2017). RF photonic link with a mqw phase modulator transmitter and an ACP-OPLL Receiver. *IEEE Photonics Technology Letters*, 29(2), 259–262.
16. Dai, Y., Levitin, G. & **Xing, L.** (2017). Optimal Periodic Inspections and Activation Sequencing Policy in Standby Systems with Condition Based Mode Transfer. *IEEE Transactions on Reliability*, 66(1), 189–201.
17. Levitin, G., **Xing, L.** & Dai, Y. (2017). Optimal Data Partitioning in Cloud Computing System with Random Server Assignment. *Future Generation Computer Systems*, 70, 17–25.

18. Levitin, G., **Xing, L.** & Dai, Y. (2017). Reliability vs. Expected Mission Cost and Uncompleted Work in Heterogeneous Warm Standby Multi-Phase Systems. *IEEE Transactions on Systems, Man, and Cybernetics*, 47(3), 462–473.
19. Levitin, G., **Xing, L.**, and Y. Dai, "Cold-Standby Systems with Imperfect Backup," *IEEE Transactions on Reliability*, vol. 65, no. 4, pp. 1798-1809, Dec. 2016.
20. Levitin, G., **Xing, L.**, Ben-Haim, H. & Dai, Y. (2016). Optimal task partition and state-dependent loading in heterogeneous two-element work sharing system. *Reliability Engineering & System Safety*. 156, 97–108.
21. Levitin, G., **Xing, L.**, Zhai, Q. & Dai, Y. (2016). Optimization of Full vs. Incremental Periodic Backup Policy. *IEEE Transactions on Dependable and Secure Computing*, 13(6), 644–656.
22. **Mahmud, M.S., Wang, H., Esfar-E-Alam, A.M., & Fang, H.** (2017). A Wireless Health Monitoring System Using Mobile Phone Accessories. *IEEE Internet of Things Journal*, 4(6), 2009–2018.
23. **Mandava, L. & Xing, L.** (2017). Reliability Analysis of Cloud-RAID 6 with Imperfect Fault Coverage. *International Journal of Performability Engineering*, 13(3), 289–297.
24. Peng, R., Zhai, Q., **Xing, L.** & Yang, J. (2016). Reliability analysis and optimal structure of series- parallel phased-mission systems subject to fault level coverage. *IIE Transactions*, 48(8), 736–746.
25. Wu, D., Yan, J., **Wang, H.**, Wu, D., Wang, R. (2017). Social Attribute Aware Incentive Mechanism for Device-to- Device Video Distribution. *IEEE Transactions on Multimedia*, 19(8), 1908–1920.
26. Wu, D., Yang, B., **Wang, H.**, Wu, D. & Wang, R. (2016). An Energy-Efficient Data Forwarding Strategy for Heterogeneous WBANs. *IEEE Access*, 4, 7251–7261. 2016.
27. Wu, D., Zhang, P., **Wang, H.**, Wang, C. & Wang, R. (2016). Node Service Ability Aware Packet Forwarding Mechanism in Intermittently Connected Wireless Networks. *IEEE Transactions on Wireless Communications*, 15(12), 8169–8181.
28. Wu, S., Rendall, J., Smith, M., Zhu, S., Xu, J., Yang, Q., **Wang, H.**, & Qin, P. (2017). Survey on Prediction Algorithms in Smart Homes. *IEEE Internet of Things Journal*, 4(3), 636–644.
29. **Anjum, M.D. N. & Wang, H.** (2016). Dynamic scheduling and analysis of real time systems with multiprocessors. *Digital Communications and Networks*, 2(3), 130–138, ISSN 2352-8648.
30. **Zhang, Z., Fang, H., & Wang, H.** (2016). Multiple Imputation based Clustering Validation (MIV) for Big Longitudinal Trial Data with Missing Values in eHealth. *Journal of Medical Systems*, 40(6), 1–9.
31. Zou, S., Xu, Y., **Wang, H.**, Li, Z., Chen, S. & Hu, B. (2017). A Survey on Secure Wireless Body Area Networks. *Security and Communication Networks*, 2017. doi:10.1155/2017/3721234

Conference Papers & Proceedings

1. **Liu, Y.** & **Buck, J.R.** (2016, November). *Super-resolution DOA estimation using a coprime sensor array with the min processor*. 50th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA. (944–948).
2. **Liu, Y.** & **Buck, J.R.** (2016, July). *Spatial spectral estimation using a co-prime sensor array with the min processor*. Sensor Array and Multichannel Signal Processing Workshop, IEEE, Rio de Janeiro, Brazil. (1–5).
3. **Liu, Y.** & **Buck, J.R.** (2017, March). *High-resolution direction-of-arrival estimation in SNR and snapshot challenged scenarios using multi-frequency coprime arrays*. International Conference on Acoustics Speech and Signal Processing, IEEE, New Orleans, LA. (3434–3438).
4. Ryan, C. & **Buck, J.R.** (2017, March). *Applying the unit circle constraint to the diagonally loaded minimum variance distortionless response beamformer*. International Conference on Acoustics Speech and Signal Processing, IEEE, New Orleans, LA. (3366–3370).
5. **Bhattacharya, S., Nagaraju, V.,** Spero, E., Ghoshal, A. & **Fiondella, L.** (2017, January). *Reliability Improvement to Minimize Average Procurement Unit Cost for Rotorcraft Tradespace Exploration*, Proceedings of the 63rd Reliability and Maintainability Symposium, Orlando, FL.
6. **Jafary, B.** & **Fiondella, L.** (2017, January). *Optimal Checkpointing of a Fault Tolerant System subject to Correlated Failure*. Proceedings of the 63rd Reliability and Maintainability Symposium, Orlando, FL.
7. **Jafary, B., Nagaraju, V.,** & **Fiondella, L.** (2017, January). *Impact of Correlated Component Failure on Age Replacement Maintenance Policies*. Proceedings of the 63rd Annual Reliability and Maintainability Symposium, Orlando, FL.
8. **Nagaraju, V.** & **Fiondella, L.** (2017, January). *A Single Change-point Software Reliability Growth Model with Heterogeneous Fault Detection Processes*. Proceedings of the 63rd Reliability and Maintainability Symposium, Orlando, FL.
9. **Nagaraju, V.,** Murthy, A.K., **Fiondella, L.,** Zeephongsekul, P. & Wandji, T. (2016, August). *Expectation Conditional Maximization Algorithms for Failure count Non-homogeneous Poisson Process Software Reliability Models*. Proceedings of the International Conference on Reliability and Quality in Design, Los Angeles, CA. (372–376).
10. **Nagaraju, V., Fiondella, L.,** & Wandji, T. (2017, April). *A Survey on Fault and Attack Tree Modeling and Analysis for Cyber Risk Management*, Proceedings of the International Symposium on Technologies for Homeland Security, IEEE, Waltham, MA.
11. **Nagaraju, V.,** Katipally, K., Muri, R., Wandji, T. & **Fiondella, L.** (2016, August). *An Open Source Software Reliability Tool: A Guide for Users*, In Proc. International Conference on Reliability and Quality in Design. Los Angeles, CA. (132–137).
12. **Nagaraju, V., Fiondella, L.,** & Wandji, T. (2017, March). *An Open Source Tool to Support the Quantitative Assessment of Cybersecurity*. Proceedings of the International Conference on Cyber Warfare and Security Dayton, OH.

13. **Shekar, V. & Fiondella, L.** (2016, June). *Graph Extraction and Demand Profiling Applications for Transportation Network Research*. Proceedings of Humanitarian Technology: Science, Systems and Global Impact, 2016. Boston, MA.
14. **Shekar, V., Fiondella, L.,** Chatterjee, S. & Halappanavar, M. (2017, April). *Quantifying Economic and Environmental Impacts of Transportation Network Disruptions with Dynamic Traffic Simulation*. Proceedings of the International Symposium on Technologies for Homeland Security, IEEE, Waltham, MA.
15. **Shekar, V., Fiondella, L.,** Halappanavar, M. & Chatterjee, S. (2017, April). *Quantitative Assessment of Transportation Network Vulnerability with Dynamic Traffic Simulation Methods*, Proceedings of the International Symposium on Technologies for Homeland Security, IEEE, Waltham, MA.
16. Yeh, C.T. & **Fiondella, L.** (2016, August). *Redundancy Allocation Optimization for a Stochastic Computer Network with Correlated Failure*. Proceedings of the Asia-Pacific International Symposium on Advanced Reliability and Maintenance Modeling, Seoul, Korea.
17. **Fortier, P. & Viall, B.** (2016, October). *Wireless subsurface sensors for remote transportation infrastructure management*. IEEE Sensors, Orlando, FL.
18. **Fortier, P.J., Balasubramanian, R., Miller, H., Viall, B., Igoe, P. & Eftekhari, S.** (2017, March). *Wireless Subsurface Sensors Supporting Remote Roadway Management*. Geotechnical Frontiers 2017: Walls and Slopes, Orlando, FL. doi: 10.1061/9780784480458
19. **Silva, J.L., Gendron, P.J.** (2016, November). *Waveform designs for computationally efficient acoustic response estimation*. 172nd Meeting of the Acoustical Society of America, Honolulu, HI.
20. **Barros, A.B., Anchieta, D., Gendron, P.J.** (2016, November). *Posterior inference of two closely spaced wave vectors for inference regarding the state of an acoustic target*. 172nd Meeting of the Acoustical Society of America, Honolulu, HI.
21. **Kasilingam, D., Fascia, A. & Ahmad, M.** (2016, July). *Fast Algorithm for Implementing Spatial Frequency Analysis of Electromagnetic Scattering*. Antennas and Propagation Symposium, IEEE, Fajardo, PR.
22. Xu, L., **Jin, S. & Li, Y.** (2017, July). *Integrated high dynamic range RF photonic link on a chip*. CLEO-Pacific Rim, Singapore.
23. **Rodriguez, J.,** Xu, L. & **Li, Y.** (2017, April) *Hybrid on-chip microwave signal processor architecture*. SPIE Defense and Security Conference, Anaheim, CA.
24. **Crossman, M., Liu, H., Xing, L.,** & Shea, T. (2017, April). *Security Analysis of Two-Factor Authentication*. Proceedings of the International Symposium on Technologies for Homeland Security, IEEE, Waltham, MA.
25. **Sharma, P., Liu, H., Wang, H.** & Zhang, S. (2017, April). *Securing Wireless Communications of Connected Vehicles with Artificial Intelligence*. International Symposium on Technologies for Homeland Security, IEEE, Waltham, MA.
26. Li, Z., **Wang, H.,** Daneshmand, M. & **Fang, H.** (May, 2017) *Secure and Efficient Key Generation and Agreement Methods for Wireless Body Area Networks*. Conference on Communications, IEEE, Paris, France.

27. Liu, G., Chen, Q., Yang, Q., Zhu, **Wang, H.** & Wang, W. (2017, May). *Opinion Walk: An Efficient Solution to Massive Trust Assessment in Online Social Networks*. International Conference on Computer Communications, IEEE, Atlanta, GA.
28. **Mahmud, M.S., Wang, H.** and **Kim, Y.** (2016, May). *Real time non-contact remote cardiac monitoring*. IEEE International Conference on Communications (ICC), Kuala Lumpur, Malaysia. doi: 10.1109/ICC.2016.7511486
29. **Mahmud, M.S., Wang, H., Alam, E.E. & Fang, H.** (2016, December). *A Real Time and Non-Contact Multiparameter Wearable Device for Health Monitoring*. 2016 Global Communications Conference, IEEE, Washington, DC, (1–6). doi: 10.1109/GLOCOM.2016.7841538
30. **Anjum, M.N. & Wang, H.** (2016, December). *Optimal Resource Allocation for Deeply Overlapped Self-Coexisting WBANs*. Global Communications Conference, IEEE, Washington, DC, (1–7). doi: 10.1109/GLOCOM.2016.7842093
31. **Wang, J., Fang, H.,** Carreiro, S., **Wang, H.** & Boyer, E. (2017, January). *A New Mining Method to Detect Real Time Substance Use Events from Wearable Biosensor Data Stream*. International Conference on Computing, Networking and Communications: Social Computing and Semantic Data Mining, IEEE, Silicon Valley, CA. (465–470). doi: 10.1109/ICCNC.2017.7876173
32. **Wang, J., Fang, H.,** Li, B. & **Wang, H.** (2017, May). *Evaluate Clustering Performance and Computational Efficiency for PSO based Fuzzy Clustering Methods in Processing Big Imbalanced Data*. Conference on Communications, IEEE, Paris, France.
33. Wu, D., **Wang, H. & Wang, R.** (2016, August). *A Social Relation Aware Hybrid Service Discovery Mechanism for Intermittently Connected Wireless Network*. Wireless Algorithms, Systems, and Applications, Bozeman, MT. Lecture Notes in Computer Science, 9798.
34. **Mandava, L., Xing, L.,** & Pan, Z. (2016, July). *Imperfect Coverage Analysis for Cloud-RAID 5*. Proceedings of the International Conference on Quality, Reliability, Risk, Maintenance, and Safety Engineering, JiuZhaiGou, China.
35. Zhao, G. & **Xing, L.** (2017, January). *Layered Reliability Modeling of Smart Home System*. Proceedings of the 63rd Annual Reliability & Maintainability Symposium, Orlando, FL.

Oral & Poster Presentations

1. **Buck, J.R. & Adhikari, K.** (2016, May). *Estimating the spatial spectra of Gaussian processes with co-prime sensor arrays*. 171st Meeting of the Acoustical Society of America, Salt Lake City, UT.
2. **Buck, J.R.** (2016, December). *Examining the temporal structure and information entropy of leopard seal calling bouts*. 172nd Meeting of the Acoustical Society of America, Honolulu, HI.
3. **Liu, Y., Buck, J.R. & Bautista, R.** (2016, May). *Spatial power spectral estimation using coprime sensor array with the min processor*. 171st Meeting of the Acoustical Society of America, Salt Lake City, UT.
4. **Ryan, C. & Buck, J.R.** (2016, December). *Applying the unit circle constraint to the diagonal loaded minimum variance distortionless response beamformer*. 172nd Meeting of the Acoustical Society of America, Honolulu, HI.

5. Mueller, R., Gupta, A., Zhu, H., Pannala, M., Gillani, U.S., Fu, Y., Caspars, P. & **Buck, J.R.** (2016, December). *Information-theoretic assessment of the peripheral dynamics in the biosonar system of horseshoe bats*. 172nd Meeting of the Acoustical Society of America, Honolulu, HI.
6. **Nagaraju, V.**, Katipally, K., **Muri, R.**, Wandji, T. & **Fiondella, L.** (2016, November). *RT-139: Software Reliability Modeling*. 4th Annual Systems Engineering Research Center, Doctoral Students Forum, Washington, D.C.
7. **Gendron, P.J.** (2016). Waveform designs for computationally efficient acoustic response estimation. *The Journal of the Acoustical Society of America*, 140(4):3230–3230, doi: 10.1121/1.4970210
8. **Noyes, D.**, **Liu, H.**, **Fortier, P.** & **Xu, H.** (2017, April). *Security Improvement of USB Technology*. Cyber Security Posters, IEEE International Symposium on Technologies for Homeland Security, Waltham, MA.

Patents & Applications

1. **Fortier, P.** (2017, February). US and International application for wireless subsurface sensor. US 62/115,844.
2. Mitsa, T. & **Fortier, P.** (2016, September). *Adaptive, hybrid reasoning decision support system for personnel hiring and inter-connected business strategic evolution*. Application filed, US 62/402,112.

Invited Talks

1. **Fiondella, L.** (2016, August). *Tradespace Exploration Incorporating Reliability and Availability*. Institute for Defense Analysis, Alexandria, VA.
2. **Fiondella, L.** (2016, July). *Dynamic Transportation Network Vulnerability Algorithms to Minimize the Impact of Mass- Casualty Events: What will it take?* MITRE Homeland Security Systems Engineering and Development Institute, McClean, VA.
3. **Fiondella, L.** (2016, October). *Software Reliability Research—Assessments & Tools*. Office of the Deputy Assistant Secretary of Defense for Developmental Test & Evaluation, Alexandria, VA.
4. **Fiondella, L.** (2016, September). *Software Reliability: Tools and Algorithms*. IEEE Boston Reliability Society, Lexington, MA.
5. **Fiondella, L.** (2017, February). *Software Reliability Engineering: Algorithms and Tools*. Florida State University, Tallahassee, FL.
6. **Fiondella, L.** (2017, February). *The United States Department of Homeland Security (DHS) cyber security mission as a model for Cameroon*. International Exhibition for Enterprises SMEs and Partnerships of Yaounde, Yaounde, Cameroon.
7. **Fiondella, L.** (2017, January). *Software Reliability Research—Assessments & Tools*. Office of the Secretary of Defense, Developmental Test and Evaluation Functional Integrated Product Team Meeting, Washington, DC.
8. **Gendron, P.J.** (2016, July) Lecture Series on Detection and Estimation, Zhejiang University, China

9. **Payton, K.** (2016, May). Applications of Speech Intelligibility Assessment. Acoustical Society of America Spring Meeting.

II.C.2. Grants and Contracts

The department's research-active faculty have been awarded many grants and contracts to fund their research and to support their graduate students. The research expenditures from external grants in the ECE Department for the past five years are shown in Table II.C.2.-1.

Table II.C.2.-1. ECE Department Research Expenditures Since FY 2014

FY 2014	\$ 938,343
FY 2015	\$ 1,093,902
FY 2016	\$ 1,333,000
FY 2017	\$ 1,088,985
FY 2018	\$ 1,051,382

Table II.C.2.-2 below lists the external funding sources for faculty in the Department of Electrical and Computer Engineering for the FY 2016.

Table II.C.2.-2. Research Funding During FY 2016¹

Manager Name	Project Name	Funding Source	Start Date	End Date	Budget/Grant Amount	FY '16 Expenses
Brown, David	Flexensional Transducer Modeling + Training Physics Based Energy Approach	Office of Naval Research	2014-01-01	2016-12-31	450,945	\$76,430.87
Buck, John	Adaptive Beamforming and Random Matrix Theory	Office of Naval Research	2015-03-12	2017-12-31	122,169	\$105,379.94
Buck, John	Co-Prime Sensor Array Signal Processing	Office of Naval Research	2013-01-01	2017-12-31	643,742	\$164,677.86
Fiondella, Lance	Dynamic Transportation Network Vulnerability Assessment Algorithms	Univ. of Southern Calif./DHS	2015-07-01	2016-06-30	30,000	\$28,275.58
Fiondella, Lance	Rotorcraft Tradespace Exploration Incorporating Reliability Engineering II	Natl Inst of Aerospace / NASA Langley Research Ctr	2015-09-01	2016-12-31	32,531	\$22,784.83
Fiondella, Lance	CSR: SMALL: Robust Algorithms for an Open Source Software Reliability Tool	National Science Foundation	2015-10-01	2017-09-30	124,999	\$12,762.27
Fiondella, Lance	Mitigating the Impact of Transportation Network Distruptions on Evacuation	Homeland Security / Univ. of Southern California	2014-07-01	2015-09-30	25,000	\$3,007.09
Fiondella, Lance	Robust Software Reliability Modeling & Tools	U.S. Dept. of Defense/UMA	2015-03-01	2016-02-29	91,082	\$80,356.09
Fiondella, Lance	Rotocraft Tradespace Exploration	NATL INST of AEROSPACE	2015-04-15	2015-10-31	107,390	\$18,321.06
Fortier / Miller/ Bala	Expansion of Remote Sensing Using Radio Frequency Identification (RFID) Technology	U.S Department of Transportation	2015-02-15	2017-02-14	391,751	\$40,590.45
Fortier/ Miller/ Bala	RFID Technology	U.S. Forest Service	2016-05-12	2017-09-30	99,600	\$336.40
Fortier, Paul	RFID Technology	U.S. Forest Service	2016-05-23	2017-09-30	99,600	\$2,102.55
Gendron, Paul	Requirements for Vendor Magnetic Sensors Employed for Underwater Surveillance System	Office of Naval Research	2013-02-28	2016-09-30	200,000	\$89,449.16
Kasilingam, Dayalan	Micro-Doppler-Based Target Classification Using Automotive MIMO Radar	General Motors Corp.	2012-08-23	2014-12-31	60,820	\$0.00
Kasilingam, Dayalan	Micro-Doppler-Based Target Classification Using Automotive MIMO Radar	General Motors Corp.	2012-08-23	2014-12-31	9,000	\$0.00
Li, Yifei	RF Frontend on a Monolithic Integrated Circuit #1	Air Force Office of Scientific Research	2012-04-15	2017-04-14	883,512	\$162,865.09
Li, Yifei	RF Frontend on a Monolithic Integrated Circuit #2 (Clean Room & Consultant)	Air Force Office of Scientific Research	2012-04-15	2017-04-14	116,125	\$39,720.15
Li, Yifei	Monolithic Microwave Photonic Integrated Circuits	Office of Naval Research	2013-01-01	2016-11-30	400,865	\$73,259.26
Li, Yifei	Monolithic Microwave Photonic Integrated Circuits	Office of Naval Research	2013-01-01	2016-07-31	7,500	\$0.00
Liu, Hong	Cybersecurity Curriculum Initiation Funding	S&T / President's Office	2014-09-01		9,000	\$2,351.18
Payton, Karen	DMX: Enabling Technology for Seperation and Enhancement of Mixed Signals	Star Research Services / NH	2014-08-22	2016-08-31	305,592	\$67,482.14
Wang, H. / Kim, Yong	SCH:EXP:Collab. Research: Design of a wearable biosensor system with wireless network...	National Science Foundation	2014-09-01	2017-08-31	360,202	\$125,210.30
Wang, Honggang	CCSS:Collab Research: Developing a physical-channel based lightweight authentication system for WBANs	National Science Foundation	2014-09-01	2017-08-31	155,912	\$34,119.98
Wang / Kasilingam / Li / Xing / Michel	MRI: Acquisition of COMET, A Cognitive Radio Multimedia Communication Research + Education	National Science Foundation	2014-09-01	2017-08-31	274,494	\$149,019.41
Wang, Honggang	NeTS:EAGER: A Cross-Layer End-to-End Performance Modeling Approach for Large-Scale Random...	National Science Foundation	2014-10-01	2017-09-30	109,619	\$32,366.38
Wang, Honggang	SCH: Student Travel Support for IEEE Conf. on Connected Health (CHASE 2016)	National Science Foundation	2016-03-15	2017-02-28	15,000	\$0.00
Xing, Liudong	CRS: Small: Collab Research: Bridging Reliability Analysis and Reality in Sensor Systems	National Science Foundation	2011-08-01	2015-07-31	260,120	\$1,307.86
Xing, Liudong	CRS: Small: Collab Research: Bridging Reliability Analysis + Reality in Sensor Systems (Supplements)	National Science Foundation	2011-08-01	2015-07-31	16,000	\$1,473.37
Xing, Liudong	CRS: Small: Collab Research: Bridging Reliability Analysis and Reality in Sensor Systems (Participants)	National Science Foundation	2011-08-01	2015-07-31	1,496	\$0.00
TOTAL					\$5,404,066	\$1,333,649

¹ July 1, 2015 through June 30, 2016.

II.C.3. Service to the Profession and University

Faculty members are expected to show a service contribution to one or more of the following constituencies: Department, College, University, profession and community. Service levels vary by faculty rank and interest. Generally, to provide time for junior faculty to concentrate on building a good foundation for their teaching, research and scholarship, untenured faculty members carry a lighter service load than senior faculty.

Typical service within UMass Dartmouth includes membership in the Faculty Senate, advising of a student chapter, membership on standing department committees and in the College Academic Council, assistance with UMass Dartmouth open houses and experience UMassD events, and participation in many other UMass Dartmouth committees and sponsored events.

Below is a sample list of service and memberships by ECE Department faculty within UMass Dartmouth for AY 2016-2017².

DEPARTMENT COMMITTEES

Committee Name

ABET Steering
Colloquia
CPE Curriculum

ECE Faculty Evaluation

ECE Laboratory
ELE Curriculum
Eta Kappa Nu (Zeta Xi Chapter)
Graduate

IEEE Student Chapter
Computer Security Education Club (CSEC)
Library Liaison
Webmaster

Members

Fortier, Kasilingam, Payton*, Rancour
Li, Wang*, Xing*
Fiondella, Fortier*, Liu, Rancour, Viall, Wang, Xing
Brown, Buck, Fortier, Helgeland, Kasilingam*, Li, Liu, Payton, Rancour, Viall, Wang, Xing
Rancour*, Robillard, Smart, Viall
Fortier, Helgeland, Kasilingam, Rancour*
Xing*
Brown, Buck, Fiondella, Gendron, Li, Liu*, Payton, Wang, Xing
Viall*
Liu*
Rancour
Costa

COLLEGE COMMITTEES

Committee Name

Academic Council
Curriculum
EGR 111 Coordinator
Honors
Scholarship
Society of Women Engineers

Members

Brown*, Xing
Fortier, Rancour
Payton
Buck
Kasilingam, Xing
Payton*

² As reported by faculty. * denotes Chairperson/co-Chairperson or Faculty Advisor.

UNIVERSITY COMMITTEES

<u>Committee Name</u>	<u>Members</u>
Faculty Senate	Buck*
Research, Scholarship and Innovation	
Budget Review Board	Costa
Faculty Federation Grievance	Kasilingam
Faculty Federation Negotiating Team	Costa*, Kasilingam
Graduate Council	Liu
Out-of-Cycle Pay Raise	Costa, Kasilingam
UMass Cyber Security Task Force	Fiondella, Liu
NCAA Faculty Athletic Programs	Fortier*
PhD in Engineering & Applied Science	Xing
University Curriculum Committee	Fortier
Louis Stokes Alliance for Minority Participation (BCC)	Gendron

Electrical and Computer Engineering faculty members also provide significant service loads outside of UMass Dartmouth. Many faculty members are active participants in professional societies, serving on editorial boards and on technical committees.

Most notably, Howard Michel (who retired in 2016) was elected President of IEEE. He served as President-Elect in 2014, President and CEO in 2015 and served as Past President in 2016. With over 430,000 members, IEEE is the world's largest technical professional association. As President, he worked with industry, academic and governmental leaders around the globe. He fostered support for the electrical and computer engineering professions while continuing IEEE's mission to advancing technology for the benefit of humanity.

In addition, here is a sample list of administrative offices in professional organizations that ECE faculty have held:

- Advisory Board, Industrial Advisory Board for Engineering and Technology, Bristol Community College [Gendron]
- Advisory Board, Connected Vehicles Conference [Liu]
- Board Member, IEEE Board of Directors [Michel]
- Chair, IEEE International Globalization Strategy Committee [Michel]
- Chair, IEEE International New Initiatives Committee [Michel]
- Co-Chair, Dam Maintenance Committee, Waterman Reservoir [Viall]
- Head, Coastal Systems Technology Group [Brown]
- President, Narragansett Chapter of the Acoustical Society of America [Brown]
- President-Elect, IEEE [Michel]
- Technical Advisor, Spawar Systems Center's Underwater Acoustic Communications Program [Gendron]
- Technical Director, Advanced Technology & Manufacturing Center [Brown]
- Treasurer, 2013 IEEE Underwater Acoustic Signal Processing Workshop [Buck]

- Treasurer, 2015 IEEE Underwater Acoustic Signal Processing Workshop [Buck]
- Organizing Committee, 2013 Acoustical Society of America Conference [Buck]
- Vice Chair, IEEE 1633: Recommended Practice on Software Reliability [Fiondella]
- Associate Director, UMass Center for Rehabilitation Engineering [P. Viall]
- Acoustical Society of America 171st Meeting [Gendron]
- IEEE Chase 2016 [Wang]
- Symposium on Signal Processing in Mobile Multimedia Communication Systems, IEEE Global
- Conference on Signal and Information Processing [Wang]
- IEEE Conference on Technologies for Homeland Security [Fiondella]

ECE Faculty have received the following many awards and honors. Here is a sample list of some:

- IEEE Multimedia Communications Technical Committee Outstanding Leadership Award 2015 [Wang]
- Keynote Speaker, 8th ICST/ACM International Conference on Bio-Inspired Information and Communications Technologies [Wang]
- UMass Dartmouth Sponsored Research Recognition Award [Wang]
- Elected Fellow of the Acoustical Society of America, 2013 [Brown, Buck]
- Elected Senior Member of IEEE, 2013 [Buck]
- Distinguished Publication Award by the U.S. Navy's Space and Naval Warfare Systems Center [Gendron]
- 2013 Reviewer Meritorious Service Certificate: "A Top Reviewer", IEEE Transactions on Parallel & Distributed Systems [H. Wang]
- Ralph A. Evans / P.K. McElroy Best Paper Award at the 2015 Annual Reliability and Maintainability Symposium [Fiondella]
- Best Paper Award at the 2015 IEEE International Symposium on Technologies for Homeland Security [Liu]
- IEEE HEALHTCOM 2015 Outstanding Service Award [Wang]
- IEEE CloudCOM 2015 Outstanding Service Award [Wang]
- Keynote Speaker, IEEE Workshop on Big Data Sciences, Technologies and Applications of IEEE INFOCOM 2016 [Wang]
- Thomas L. Fagan, Jr. Best Student Paper Award (First Place) at the 2015 Annual Reliability & Maintainability Symposium (RAMS) [Xing]
- 2015 ChangJiang Scholar award, Ministry of Education, China [Xing]
- Best Paper Award at the 2017 IEEE International Symposium on Technologies for Homeland Security [Fiondella]
- Best Paper Runner-Up Award at the 11th International Conference on Wireless Algorithms, Systems, and Applications (WASA), 2016 [Wang]
- 2017 German-American Frontiers of Engineering Symposium (Invited by National Academy of Engineering (NAE) [Wang]
- 2016 Scholar of the Year Award, UMass Dartmouth [Wang]
- Best Paper Award at the 2015 International Conference on Quality, Reliability, Risk, Maintenance, and Safety Engineering (QR2MSE); Presented at the QR2MSE in July 2016 [Xing]

ECE Faculty have chaired or organized sessions at conferences. Here is a sample list of some:

- Acoustical Society of America 171st Meeting [Gendron]
- IEEE/ACM CHASE 2016 [Wang]
- Symposium on Signal Processing in Mobile Multimedia Communication Systems, IEEE Global Conference on Signal and Information Processing [Wang]
- IEEE Conference on Technologies for Homeland Security [Fiondella]
- IEEE MMTC Board Co-Director [Wang]
- Acoustical Society of America 171st Meeting [Gendron]
- IEEE International Conference on Consumer Electronics (ICCE) – Berlin 2015 [Fiondella]
- Technical Committee on Signal Processing in Acoustics [Gendron]
- IEEE/ACM CHASE 2017 [Wang]
- IEEE ICME 2017: Multimedia Networking and Communications [Wang]

ECE faculty are often retained as consultants in their areas of expertise. Here is a sample list:

- ASW Technologies [Gendron]
- NUWC [Gendron, Michel]
- SPAWAR Systems Center [Gendron]
- Argon ST/ Boeing [Brown]
- Navy Underwater Warfare Center [Michel]
- Office of Naval Research [Brown]
- PURVIS, Inc. [Fortier]
- University of Missouri [Brown]
- Woods Hole Oceanographic Institute [Brown]

ECE faculty often serve on Editorial Boards and/or as editors, or assistant/associate editors of journals. Here is a sample list:

- International Journal of E-Health and Medical Communications [Wang]
- Reliability and Systems Safety, ISRN Sensor Networks and Journal of Computational Engineering [Xing]
- IEEE Access Journal [Wang]
- IEEE Communications Magazine [Wang]
- IEEE Internet of Things Journal [Wang]
- IEEE Transactions on Big Data [Wang]
- IEEE Transactions on Multimedia [Wang]
- International Journal of Performability Engineering [Xing]
- International Journal of Systems Science [Xing]
- Journal of the Acoustical Society of America [Brown]
- KSII Transactions on Internet and Information Systems [Wang]
- Wiley's Security and Communication Networks Journal and Transactions on Emerging Telecommunications Technologies [Wang]
- International Journal of Big Data Intelligence [Wang]
- IET Wireless Sensor Systems Journal [Wang]

- International Journal of Distributed Sensor Networks [Wang]
- Short Communications, International Journal of Performability Engineering [Xing]
- IEEE Journal of Biomedical and Health Informatics [Wang]
- IEEE Transactions on Multimedia, Special Issue on Cloud-Based Video Processing and Content Sharing [Wang]
- IEEE IoT Journal Special Issue on IoT for Smart and Connected Health [Wang]
- IEEE Sensors Journal [Wang]
- IEEE Communication Magazine Special Issue on Emerging Applications, Services and Engineering for Cellular Cognitive Systems [Wang]
- IEEE Transactions on Big Data, Special Issue on Big Data Infrastructure [Wang]
- Special Issue on Technologies and Theories in P2P Converged Ubiquitous Networks, Peer-to-Peer Networking and Applications [Xing]

ECE faculty are active on committees in their technical societies. Here is a sample list:

- ASA Editorial Board of Associated Editors [Brown]
- ASA Membership Committee [Buck]
- ASA Technical Committee on Education in Acoustics [Brown]
- ASA Technical Committee on Engineering Acoustics [Brown]
- ASA Technical Committee on Physical Acoustics [Brown]
- IEEE Geoscience and Remote Sensing Society [Kasilingam]
- IEEE RS Administrative Committee [Fiondella]
- IEEE Standards Association [Fiondella]
- Southern New England Entrepreneurs Forum [Brown]
- ACM International Conference on Bio-Inspired Information and Communications Technologies [Liu]
- ACM International Workshop on Mobility and Middle Ware Management in HetNets [Wang]
- Ad Hoc and Sensor Networking Symposium [Gendron]
- ASA, Committee on Local Chapters of the ASA [Brown]
- ASA, Technical Committee on Signal Processing [Gendron]
- BodyNets 2015 [Wang]
- BSN 2014 Zurich [Wang, Xing]
- BSN 2015 Boston [Wang]
- IARIA SensorComm Conference [Fortier]
- IEEE International Symposium on Technologies for Homeland Security [Liu]
- ICC, International Conference on Computing, Networking and Communications, Wireless Symposium [Gendron]
- ICCME, International Conference on Computing in Mechanical Engineering [Gendron]
- ICCVE, the International Conference on Connected Vehicles and Expo [Gendron]
- ICNC 2015 for Social Computing and Semantic Data Mining Symposium [Wang]
- ICST 8th International Conference on Mobile Multimedia Communications [Wang]
- IEEE Communication Flagship Conference [Wang]
- IEEE Conference on Communications [Wang]

- IEEE Consumer Communications and Networking Conference, Wireless Networking and Mobility Track [Wang]
- IEEE Fusion, 18th International Conference on Information Fusion [Gendron]
- IEEE International Conference on Computer Communications and Networks, Cognitive, Cellular and Mobile Networks [Wang]
- IEEE Globecom [Wang, Xing]
- IEEE ICC [Gendron, Wang]
- IEEE ICDCS 2015 [Wang]
- ICNC 2016 for Social Computing and Semantic Data Mining Symposium [Wang]
- IEEE INFOCOM 2015 [Wang]
- IEEE ISCC 2015 [Wang]
- IEEE HEALTHCOM 2015 [Wang]
- IEEE INFOCOM 2015 [Wang]
- IEEE International Conference on Computer Communications and Networks [Wang]
- IEEE International Conference on Networking, Architecture and Storage [Xing]
- IEEE International Conference on Prognostics and Health Management [Fiondella]
- IEEE International Symposium on Technologies for Homeland Security [Fiondella]
- IEEE ISCC 2015 [Wang]
- IEEE Reliability and Maintainability Symposium [Fiondella]
- IEEE WoWMoM 2015 [Wang]
- IEEE WWIC 13th International Conference on Wired and Wireless Internet Communications [Gendron]
- IEEE Symposium on Computers and Communications [Wang]
- IEEE TENSYP 2015, IoT Architectures [Wang]
- International Conference on Advances in Computing, Communications and Informatics [Xing]
- International Conference on Body Area Networks [Fiondella]
- International Conference on Cloud Computing, GRIDs and Virtualization [Fiondella]
- International Conference on Computing, Networking and Communications [Gendron, Xing]
- International Conference on Internet of Things [Wang]
- International Conference on Machine Learning and Applications [Fiondella]
- International Conference on Quality, Reliability, Risk, Maintainability and Safety [Xing]
- NTMS Workshop on Wireless Sensor Networks: Architectures, Deployments and Trends [Xing]
- International Microwave Symposium [Li]
- International Special Topics Meeting in Microwave Photonics [Li]
- ISSAT International Conference on Reliability and Quality in Design [Fiondella]
- IWCM [Gendron]
- SIRS, International Symposium on Signal Processing and Intelligent Recognition Systems [Gendron]
- UBI-Health Tech 2015 [Wang]
- Wireless Networking Symposium [Gendron]
- 1st International Conference on Reliability Systems Engineering [Xing]

- 2nd International Symposium on Stochastic Models in Reliability Engineering, Live Sciences and Operations Management [Xing]
- 4th International IEEE International Workshop on Smart Communication Protocols and Algorithms [Wang]
- 6th International Conference on Cloud Computing [Wang]
- 7th International Conference on e-Health Networking, Applications and Services [Xing]
- 10th International on Body Area Networks [Wang]
- 17th IEEE International Conference on E-Health Networking, Application & Services [Wang]
- 35th IEEE International Conference on Distributed Computing Systems [Wang]
- 34th Annual IEEE International Conference on Computer Communications [Wang]
- 2015 Prognostics and System Health Management Conference [Xing]

ECE faculty often serve as reviewers for technical journals, conferences or books. Here is a sample list:

- ACM Transaction on Sensor Networks [Wang]
- Journal of Acoustical Society of America [Brown, Buck, Gendron, Payton]
- European Journal of Operational Research [Fiondella, Xing]
- GLOBEOM 2014 Ad Hoc and Sensor Networking Symposium [Xing]
- IEEE Communication Magazine [Wang]
- IEEE Journal of Lightwave Technology [Li]
- IEEE Journal of Ocean Engineering [Brown]
- IEEE Microwave Theory and Technology [Li]
- IEEE Microwave and Wireless Component Letter [Li]
- IEEE Photonic Technology Letter [Li]
- IEEE Photonics Journal [Li]
- IEEE Sensors [Fortier]
- IEEE Transactions on Biomedical Circuits and Systems [Wang]
- IEEE Transactions on Circuit and Systems for Video [Wang]
- IEEE Transactions on Multimedia [Wang]
- IEEE Transactions on Networking [Wang]
- IEEE Transactions on Network and Service Management [Wang]
- IEEE Transactions on Parallel and Distributed Systems [Wang]
- IEEE Transactions on Reliability [Fiondella, Xing]
- IEEE Transactions on Signal Processing [Buck]
- IEEE Transactions on Smart Grid [Wang]
- IEEE Transactions on Systems, Man and Cybernetics: Systems [Fiondella, Xing]
- IEEE Transactions on Vehicular Technology [Wang]
- IEEE Transactions on VLSI [Wang]
- IEEE Transactions on Wireless Communications [Wang]
- International Journal of Management Mathematics [Xing]
- International Journal of General Systems [Xing]
- International Journal of Software Engineering and Knowledge Engineering [Fiondella]
- International Journal of System Science [Fiondella]

- Journal of Marine Mammalogy [Buck]
- Journal of Ocean Engineering [Brown]
- Journal of Oceanic Engineering [Gendron]
- Journal of Risk and Reliability [Fiondella, Xing]
- Journal of Speech Communication [Payton]
- Mathematical Problems in Engineering [Xing]
- NSF Panel [Wang]
- Reliability Engineering and System Safety [Fiondella, Xing]
- Sensors [Fiondella]
- Software Quality Professional [Fiondella]
- Statistical Methodology, Elsevier Press [Gendron]
- Transactions on Intelligent Transportation Systems [Xing]
- 9th International Conference on Body Area Networks [Xing]
- 61st Annual Reliability and Maintainability Symposium [Xing]
- 2014 International Conference on Advances in Computing, Communications and Informatics [Xing]

ECE faculty are often invited to give technical presentations at seminar series or at other universities. Here is a sample list:

- American Society for Quality Reliability Division Chinese Webinar Series [Xing]
- University of Rhode Island Graduate School of Oceanography [Buck]
- Woods Hole Oceanographic Institution, Department of Applied Ocean Physics and Engineering [Buck]
- International Conference on Networks and Information [Xing]
- Minnesota State University – Mankato [Xing]
- University of Alberta, Canada [Xing]
- Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing, China [Xing]
- Zhengzhou University, China [Xing]
- Beihang University, Beijing, China [Xing]

Additional information is provided in the faculty curriculum vita in the file named *ECE Faculty CVs.pdf*.

II.C.4. Professional Development Opportunities

New Faculty Support

To prepare new faculty to be successful at the university, the Office of Faculty Development runs a “New Faculty Institute”. The Institute is a year-long program, designed to introduce new faculty to the university's academic community and to help them launch or sustain a teaching and scholarship agenda. The Institute provides each newly-hired faculty member with a course release for both fall and spring semesters. In addition, new faculty members attend Wednesday afternoon sessions during the year on a range of topics of interest. Session topics have included knowing the student body, effective teaching and assessment, advancing one's research, promotion and tenure, academic counseling, university

programs and student data, governance and opportunities for service. Social events for new faculty and their families are also held. Honggang Wang, Yifei Li, Paul Gendron and Lance Fiondella all attended this program. Ruolin Zhou, our most recent hire, is attending this program.

In addition to the New Faculty Institute initiatives, the ECE Department has implemented a new faculty mentor program. Each newly-hired tenure-track faculty is paired with a recently tenured mentor. The mentor guides the new faculty in establishing best practices in classroom pedagogy, appropriate service activities and development of a viable research program.

Overhead Return from External Funding

UMass Dartmouth returns 15% of the 59% research overhead (OH) to the Principal Investigator (PI). These funds are paid into a personal research overhead account and can be used for any reasonable expense, except for personal salary. Example uses for these OH return funds include:

- Support graduate students when a grant has yet to begin or has ended
- Employing undergraduate students to work in a lab
- Equipment purchases
- Travel expenses to attend a conference or to visit a potential external research funding source

Start-up Packages for New Faculty

In recent years, significant start-up packages have been offered for newly hired junior faculty in the department. The funds consist of research assistantships, faculty summer salary, and travel and equipment funds. Junior faculty members have leveraged these start-up packages well and have successfully obtained external research grants to grow their research programs. Honggang Wang and Yifei Li benefited from start-up packages. They have both been very successful in acquiring grant funding for their research. More recent hires, Paul Gendron, Lance Fiondella, and Ruolin Zhou, received start-up packages to help grow their research programs.

New faculty members are now automatically given generous start-up packages. A typical startup package for new faculty is as follows:

- Summer stipend for three or four months
- Research Assistantship support for four semesters
- Funding for a post doc for one year
- Funding for new equipment and travel expenses
- Reduced teaching load of one course per semester for first two years

Internal Funding Opportunities (UMass Dartmouth)

Multidisciplinary SEED Funding

[\(http://www.umassd.edu/research/researchdevelopment/internalawards/multidisciplinaryseedfundingprogram/\)](http://www.umassd.edu/research/researchdevelopment/internalawards/multidisciplinaryseedfundingprogram/)

The goal of this program is to provide seed funding for projects in areas relevant to institutional research priority, are multidisciplinary and have the potential to attract significant external funding. Proposals that involve collaborations across multiple colleges/schools are particularly encouraged. The seed funding is a one-time award to facilitate faculty collaborations and to help faculty improve their chances

of external funding success. Recently, a collaboration between Liudong Xing of the ECE Department and Jing Wang of the Music Department using the IDEA Studio was funded in 2015.

Summer Research Fellowship

(<http://www.umassd.edu/research/researchdevelopment/internalawards/summerresearchfellowship/>)

The purpose of the Summer Research Fellowship Program (SRFP) is to provide seed money for research and future scholarly effort primarily for tenured and tenure-track faculty. It is expected that these awards will result in external grant funding, scholarly journal publications, books, or display of juried artistic/creative work. Lance Fiondella was awarded an SRFP in 2014 to visit the Army Research Laboratory.

Undergraduate Research Incentive Program

The College of Engineering (COE) offers an opportunity for undergraduate students to participate in research with a faculty member. The program objectives are to stimulate awareness of advanced research and interest in graduate study. The program is open to outstanding, full-time sophomore, junior and senior COE students. Students in the program will work an average of ten hours per week on-campus during the academic year under the guidance of a COE professor on a specific research topic. The program is funded on a matching basis by the faculty sponsor and the College of Engineering.

Seminar Series

The Provost's office offers grants of up to \$1,000 a year for conducting seminar series. The department has successfully conducted a comprehensive seminar series for almost two decades. This seminar series helps to foster the research and scholarly work in the department and offers undergraduates exposure to technical research and scholarly activities.

Travel Grants

The Provost's office offers up to \$500 a year for each faculty member to travel to technical conferences. The COE Dean's office also helps to supplement these travel funds and makes available up to \$850 per faculty member per year for travel. The Office for Faculty Development offers a \$500 (maximum) travel grant for faculty who will be presenting papers or facilitating workshops on college-level teaching and learning. Most faculty in the department have taken advantage of travel fund availability to attend conferences in their areas of specialization on a regular basis.

The UMass Dartmouth Faculty Federation **Scholar of the Year** award recognizes a substantive body of work as well as exemplary scholarly/artistic achievement by an individual in his/her own discipline. The awardee must be of international or national repute. The primary basis for selection is an intellectual and/or artistic contribution to some field of inquiry within the last four years. A \$1,000 prize accompanies the award. Scholar of the Year awardees from the ECE Department: Dr. Chi Hau Chen (retired) in 1996, Dr. Branislav Notaros (now at Colorado State University) in 2005, Dr. Liudong Xing in 2010, and Dr. Honggang Wang in 2016.

External Funding Opportunities (UMass President's Office)

Office of Technology Commercialization and Ventures (OTCV) Technology Development Fund (<http://otcv.umassp.edu/about-otcv/otcv-technology-development-fund/>)

The purpose of the Fund is to assist faculty and the OTCV offices with the commercial development of important technologies discovered on our campuses. The Fund was initially created as part of the university's science and technology activities and as part of OTCV's desire to increase licensing income, startups, and entrepreneurship at UMass.

These funds are to be awarded through a competitive process to researchers who have invented or developed concepts, goods or services that have commercial potential. The grant is intended to move technologies to the proof of concept stage or to allow the investigator to take other critical steps to make the technology attractive for licensing or other forms of commercialization. The Fund is not intended to support basic research, but rather to close the gap between the research discovery and proven technology.

Science & Technology (S&T) Initiatives Fund

(<http://www.umassd.edu/research/researchdevelopment/internalawards/sciencetechnologyinitiativefund/>)

This program has been suspended. The goals of the S&T program were to catalyze research collaborations among UMass campuses and industry; support well-established faculty with a track record of external funding, who were positioned to help grow the university's R&D enterprise; focus funds on areas of strategic importance to campus research and the State's innovation economy and attract significant new investments to the university. The funding level was \$100K - \$150K for a 12-month period.

Resources to Enhance Teaching Effectiveness

The Office of Faculty Development (OFD) supports the professional development of junior, mid-career, and senior faculty to achieve success, productivity, and satisfaction at each stage of their academic careers. In addition to the New Faculty Institute, this center offers seminars and workshops on innovative teaching methods. Speakers from on and off campus present their new ideas in teaching and learning at these seminars. ECE faculty member John Buck, a Faculty Fellow in the OFD, leads two OFD programs for science, technology and engineering faculty. The first program is for faculty new to mentoring graduate research students and the second program is for faculty interested in exploring active and collaborative learning pedagogy in the classroom.

The **Provost's Teaching and Learning with Technology Award** (formerly Best Practices Awards) was established in 2007 to recognize UMass Dartmouth faculty, librarians, and staff members for excellence in teaching and learning with technology. This annual award recognizes a UMass Dartmouth faculty, librarian, or staff member who has demonstrated effective practices that improve student learning outcomes through the integration of technology.

The University of Massachusetts system offers **The Manning Prize for Excellence in Teaching**. The Manning Prize honors outstanding faculty members from each of the five campuses of the University of

Massachusetts. This competitive prize is presented to faculty members who demonstrate excellence in teaching and assessment, along with exemplary dedication to students and the campus community. The Manning Prize carries a \$10,000 award. In 2016, the inaugural award went to John Buck from the UMass Dartmouth campus.

The Leo M. Sullivan **“Teacher of the Year”** Award Committee invites nominations for the 2016 award. Each year at the Annual Banquet, the Faculty Federation presents this award to a UMass Dartmouth teacher. Established in 1971, the “Teacher of the Year” Award recognizes a colleague who has demonstrated a particular dedication to students through exceptionally meritorious teaching and advising. A \$1,000 prize accompanies the award. Teacher of the Year awardees from the ECE Department: Dr. John Buck in 2008 and Dr. Liudong Xing in 2014.

II.C.5. Service to the Community

Faculty within the Electrical and Computer Engineering Department also volunteer their time and engineering expertise outside of the classroom through various consultative positions, community service projects, and outreach to industry. Below is a sample list of entities to which faculty have consulted or donated their time and expertise:

- Purvis Systems, Inc.
- IARIA SensorComm
- IEEE Sensors
- HICSS
- Young Professionals of IEEE Springfield Section
- Kalos Technologies, Inc.
- Lockheed Martin
- Loggerhead Instruments
- Amazon
- NUWC internal review advisory board
- Diman Regional Vocational Technical High School
- Southeastern New England Chapter of the Acoustical Society of America
- O'Neil Engineering
- UMass Dartmouth Center for Innovation and Entrepreneurship (CIE)
- Citizens for the Preservation of Waterman Lake, Inc., Harmony, RI
- SHARE Foundation, Inc.

II.D. FACILITATION OF STUDENT SUCCESS

Consistent with AQAD Criterion 4, the academic programs in the ECE Department ensure teaching/learning environments that facilitate student success.

II.D.1. Program Learning Outcomes

The graduate programs in Electrical and Computer Engineering at the University of Massachusetts Dartmouth have the following objectives:

1. To provide students in-depth understanding and expertise in specific areas of specialization in electrical engineering and computer engineering.
2. To train students to do scientific research in specific areas of interest.
3. To train students how to communicate their research findings as technical papers, conference and seminar presentations.
4. To provide students the opportunity to show mastery in a specific research project or research area of interest by writing and defending a thesis/project report or by passing a comprehensive exam.
5. To graduate students who can be successful technical contributors to industry and productive faculty members in electrical and computer engineering departments.

The degree to which these proficiencies are satisfied is measured by:

- the satisfactory classroom performance in core courses,
- the satisfactory writing and defense of the thesis and/or satisfactory performance on a course project (MS),
- the successful dissertation proposal and dissertation defense (both have written and oral components),
- the publication of journal and conference papers, and
- the comprehensive exam which is combined with the defense of the dissertation proposal.

II.D.2. Student Assessment in Relation to Program Evaluation

Coursework

Currently, student assessment in coursework is primarily based on student performance in assignments such as homework, exams and projects. Performance scores are then converted into course grades in the range from A to F by the instructor. Students must maintain a cumulative GPA of at least 3.000 to graduate from the MS programs and from the PhD program; obtain no more than two course grades below B-minus; and the credits must be in accordance with a program of study filed by the student and approved by the student's graduate advisor.

Two types of changes to curriculum content have been implemented. Some changes are implemented at the course level by the instructor while other changes are implemented at the degree program level by the Graduate Committee. For example, two new courses (ECE 530 Introduction to Advanced Electronics and Optoelectronics and ECE 551 Acoustic and Electromagnetic Waves) were added as required courses for the MS in Electrical Engineering; new courses, including ECE 548 Cyber Threats and Security Management, ECE 520 Wireless Networks and Mobile Security, and ECE 620 Dependable and Secure Computing have been developed for the certificate program in Computing Infrastructure Security.

Currently, individual graduate courses explicitly state course objectives and outcomes when the instructor chooses to do so; ad hoc assessment of the course outcomes and changes to the course content as needed have been done individually by some faculty. However, the changes have not

necessarily been formally documented. Going forward it is intended that a graduate-course evaluation process will be performed on a regular basis, and formal documentation will be recorded. The ECE Department has a well-defined process for doing such evaluations at the undergraduate level to meet the needs of ABET. Some aspects of the assessment process from the undergraduate program will be applied to the graduate program. However, unlike the undergraduate programs that seek to develop program-wide outcomes that apply to all students, the graduate programs, on the other hand, are structured in a way that allows students to be exposed to different courses based on their interests. Therefore, it is sound to assess outcomes at the course level.

The following course-level assessment process is proposed for implementation starting fall 2019:

- Every graduate course will list the general objectives and specific student learning outcomes on the syllabus distributed to the students.
- After the course has been delivered, the instructor will assess to what extent each outcome has been achieved. The assessment could be based on performance scores specifically linked to grades on course assignments such as homework, exams and projects.
- Student surveys, where the students self-assess their achievement of course outcomes, will be administered at the end of the semester.

It is intended to keep this assessment and a continuous improvement process that is systematic and effective but also practical.

Research

In addition to student performance in courses, it is necessary to assess the performance of the MS Thesis Track students and PhD students in their area of research. At the master's level, this assessment is measured for Thesis Track students by their performance in the writing of the thesis and subsequent thesis defense.

At the PhD level, the assessment is done in multiple phases, i.e., during the PhD qualifier, written and oral PhD comprehensive exams based on the dissertation proposal developed by the student, the writing of the dissertation and the final dissertation defense. These assessments are conducted on a pass/fail basis by a faculty committee, which consists of the student's PhD advisor and a minimum of three additional members with the committee's majority being permanent UMassD faculty and at least one coming from outside the University. Journal and/or conference papers are expected to be generated from the student's dissertation research.

II.D.3. Evaluation of Post-Graduate Success

Faculty are typically aware of where their students go to work immediately after each student earns their graduate degree. Below is a sample list of known employers of the graduates of the MS in Electrical Engineering, MS in Computer Engineering, and the PhD in Electrical Engineering programs, broken out into their various sectors.

Academic Sector

- Bunker Hill Community College
- Chongqing University of Technology, Chongqing, China
- Illinois Institute of Technology
- Jinan University, China
- Louisiana Tech University
- National Cheng Kung University, Taiwan
- New York Institute of Technology (NYIT)
- Post University
- Qatar University, Qatar
- Shanghai Jiaotong University, China
- University of Electronic Science and Technology, China
- University of New Hampshire
- University of Massachusetts Dartmouth
- Worcester Polytechnic Institute
- Zarqa University, Jordan

Government/Military Sector

- Naval Underwater Warfare Center (NUWC)
- NASA

Industry Sector

• Accenture	• Google
• Amazon	• KForce
• Analog Devices	• Lockheed
• Arcon Corporation	• Magna International
• BAE Systems	• Microsoft Corporation
• Belcan Engineering	• MIKEL, Inc.
• Bose Corporation	• MIT Lincoln Labs
• BrainCo Tech.	• Netapp
• BTech Acoustics	• Oracle
• CheckPoint Solutions	• Pall Corporation
• Cummins, Inc.	• Qualcomm
• Dell EMC	• Qorvo
• Deloitte	• Raytheon
• DocBox, Inc.	• Recombinant DNA Corp.
• eClinicalWorks	• Rowe Technologies, Inc.
• Fidelity Investments	• SAIC
• General Dynamics	• SeaCorp
• General Motors	• Seagate Technology
• Global Prior Art, Inc.	• Sloan

- State Street
- Tervela
- The Mathworks, Inc.
- Veoneer USA
- WSP/Parsons Brinckerhoff

PhD

Fifty-two (52) students have graduated with a PhD in Electrical Engineering since the program was approved in 1995. Of those, 14 hold academic positions. Graduating students are asked to complete an exit survey as part of their certification process (not all do it). Of the 17 PhD graduates who have completed the survey since 2011, 9 indicated their employment status. Two have academic positions, two work for government/military employers and the rest work in industry. Companies such as Amazon, EMC, Raytheon, NUWC, BTEch Acoustics, Rowe's Technology have hired our PhD graduates. The salary range reported by the 2017 respondents who chose to report it was over \$100K.

MS ELE

Graduating students are asked to complete an exit survey as part of their certification process (not all do it). Of the 71 MS ELE graduates who have completed the survey since 2011, 37 indicated their employment status. The vast majority have jobs in industry at companies such as Raytheon, The Mathworks, MIT Lincoln Labs, MIKEL, EverSource, NUWC, BAE Systems, Bose, Cummins Inc., DocBox Inc., WSP/Parsons Brinckerhoff, SAIC, Qualcomm, Pall Corp., Belcan Engineering, Tervela. Two respondents indicated they were continuing on to pursue a PhD. The salary ranges reported by the 2018 respondents who chose to report it varied from \$60K to \$85K.

MS CPE

Graduating students are asked to complete an exit survey as part of their certification process (not all do it). Of the 83 MS CPE graduates who have completed the survey since 2011, 38 indicated their employment status. The vast majority have jobs in industry at companies such as Raytheon, Lockheed, NUWC, BrainCo Tech., Sloan, General Dynamics, Dell EMC, SAIC, Magna International, Deloitte, Google, MIKEL, Kforce, SeaCorp, Seagate Technology, Netapp, Recombinant DNA Corp., eClinicalWorks, Fidelity Investments, MIT Lincoln Labs. Three respondents indicated they had academic positions, either as staff or as doctoral students. The salary ranges reported by the 2018 respondents who chose to report it varied from \$60K to over \$100K.

II.E. RESOURCE ALLOCATION

Consistent with AQAD Criterion 5, the ECE Department ensures that resources are used wisely.

II.E.1. Allocation of Human Resources

Faculty

The faculty in the Electrical and Computer Engineering (ECE) Department support 5 distinct programs: BS in Electrical Engineering, BS in Computer Engineering, MS in Electrical Engineering, MS in Computer Engineering, and PhD in Electrical Engineering.

The nominal distribution of workload at the university is 60% teaching, 20% scholarship and 20% service (60/20/20 model). However, in recent years with the growth of the research enterprise, research active and research-intensive faculty usually have a 40/40/20 model. Within the ECE Department, this is reflected as follows. Full-time faculty members who conduct minimal research teach approximately 9 teaching units a semester. Faculty members who are research active, which includes the support/mentorship of graduate students, teach approximately 6 teaching units per semester. Faculty who are research intensive often “buy-out” of up to 3 teaching units per semester if a funded research project compensates the university for 20% of the faculty member’s time during a semester. Table II.C.-4 summarizes faculty workloads within the department for AY 2017-2018. Forty or fifty percent in the Research column indicates the corresponding faculty member buys out of three or six teaching units per year, respectively.

Tenured faculty members are expected to take leadership roles in department, college or university committees. These faculty members are advised to chair at least one committee and play a secondary role in at least one other committee. Untenured tenure-track faculty members are not expected to take such a large role for their service component. Secondary roles in one or two committees are considered adequate for junior faculty. Faculty with significant service duties (e.g., ECE Department Chairperson, Graduate Program Director) are given a course release in one or both semesters and can be identified in Table II.E.-1 as those with thirty to forty percent in the Other category.

In Table II.E.-1, courses numbered 1XX through 4XX are undergraduate courses and those numbered 500 and above are courses in our graduate programs. Some courses are dual numbered (4XX/5XX in the table) which means that some students in the class are taking it for graduate credit while others are taking it for undergraduate credit. Additional expectations of those taking the course for graduate credit are usually stipulated in the class syllabus. ECE 458 is the second semester of our Senior Design sequence. In the spring semester, faculty members are given contact-hour credit for advising design project groups. Since the actual credit goes to the course instructor, group advisors are indicated with (0**) in the credit category. ECE 595 is Independent Study and ECE 596 is Directed Study for graduate students and are typically one-on-one instruction that a faculty member agrees to above and beyond their assigned teaching load.

Courses associated with graduate research (ECE 501, 600, 602, 603, 604 and 701) can be taken for variable credits, depending on where a student is in his/her academic program. In reading the contents of Table II.E.-1, for example, ECE 600 (6) [2] means 2 students taking 6 credits of ECE 600 Master’s

Thesis and ECE 701 (9) [1] means 1 student taking 9 credits of ECE 701 Doctoral Dissertation Research.

Based on the currently-approved Agreement between the University of Massachusetts Board of Trustees and the UMass Faculty Federation, Local 1895, the standard teaching load for full-time faculty is 18 teaching units (TUs) per academic year. A TU, like a contact hour, is equivalent to one hour of lecture, recitation or laboratory. Also, as outlined in the Faculty Federation contract, faculty members who advise graduate students obtain the equivalent of up to 4 TUs per semester.

Untenured faculty members are restricted to two courses per academic year for their first year or two (according to the stipulations in the original contract and start-up package), and to no more than four courses per academic year while they are untenured.

The allocation of faculty to teach graduate courses is done by the Department chair. The Chairperson tries to ensure that a research-active faculty member teaches at least one graduate course during the academic year with the goal of having each research-active faculty member teach at least one graduate course per semester. This goal could eventually be realized if the number of faculty recovers from the continual decline.

In most cases lecturers are assigned to undergraduate courses, not graduate courses. However, because all our lecturers have terminal degrees, there is nothing to prevent them from being assigned to graduate courses.

Courses associated with graduate research: ECE 600, 602, 603, 604 and 701 can be taken for variable credits, depending on where a student is in his/her academic program.

Two faculty taught service courses: EGR 111, ECE 211 and ECE 251 – courses required by majors outside the department (EGR 111 also is required by ELE and CPE majors).

To the extent possible, the department attempts to offer required freshman and sophomore courses both semesters. A couple of required sophomore courses also are offered in the summer. These efforts are designed to help students who are not prepared to take Calculus I their first semester and those who struggle with the transition to college and end up doing poorly in one of the introductory engineering courses. Only one section of a course is typically offered; except for lab sections where enrollments are capped at a lower number of students per section. Beyond the sophomore year, required courses are offered once a year and specific technical electives are offered once a year or on a rotating basis every other year.

Table II.E.-1. Faculty Workload Summary: Electrical and Computer Engineering (AY 2017-2018)

Faculty Member (name)	PT or FT	Classes Taught (Course No./Credit Hrs.) Term and Year	Program Activity Distribution			% of Time Devoted to the Program
			Teaching	Research or Scholarship	Other	
Electrical Engineering						
Brown, David	FT	ECE 490/557* (3) Fall 2017 ECE 501 (3) [2] Fall 2017 ECE 600 (0) [1] Fall 2017 ECE 701 (9) [1] Fall 2017 ECE 458 (0**) Spring 2018 ECE 497/597* (3) Spring 2018 ECE 501 (0) [1] Spring 2018 ECE 701 (9) [1] Spring 2018	40%	50%	10%	100%
Buck, John	FT	Sabbatical Leave for AY 2017-2018 ECE 701 (0) [2] Fall 2017 ECE 600 (3) [1] Spring 2018 ECE 701 (0) [1] Spring 2018	40%	50%	10%	100%
Costa, Antonio	FT	ECE 250 (2) Fall 2017 ECE 355 (3) Fall 2017 ECE 250 (2) Spring 2018 ECE 384 (3) Spring 2018	40%	20%	40%	100%

* Dual-numbered course, both sections are worth the number of credits listed in parentheses.

** Senior Design faculty advisor.

Table II.E.-1. Faculty Workload Summary: Electrical and Computer Engineering (AY 2017-2018) (continued)

Faculty Member (name)	PT or FT	Classes Taught (Course No./Credit Hrs.) Term and Year	Program Activity Distribution			% of Time Devoted to the Program
			Teaching	Research or Scholarship	Other	
Electrical Engineering						
Gendron, Paul	FT	ECE 471 (3) Fall 2017 ECE 600 (0) [5] Fall 2017 ECE 672 (3) Fall 2017 ECE 458 (0**) Spring 2018 ECE 521 (3) Spring 2018 ECE 571 (3) Spring 2018 ECE 600 (0) [5]; (3) [1]; (6) [1] Spring 2018	40%	50%	10%	100%
Kasilingam, Dayalan	FT	ECE 335 (3) Fall 2017 ECE 403/532* (3) Fall 2017 ECE 595 (3) [1] Fall 2017 ECE 600 (0) [4] Fall 2017 ECE 602 (3) [1] Fall 2017 ECE 701 (0) [1]; (6) [1] Fall 2017 ECE 201 (3.5) Spring 2018 ECE 432/591* (3) Spring 2018 ECE 458 (0**) Spring 2018 ECE 596 (3) [1] Spring 2018 ECE 600 (0) [2]; (6) [1] Spring 2018 ECE 701 (0) [1]; (6) [1] Spring 2018	60%	20%	20%	100%

* Dual-numbered course, both sections are worth the number of credits listed in parentheses.

** Senior Design faculty advisor.

Table II.E.-1. Faculty Workload Summary: Electrical and Computer Engineering (AY 2017-2018) (continued)

Faculty Member (name)	PT or FT	Classes Taught (Course No./Credit Hrs.) Term and Year	Program Activity Distribution			% of Time Devoted to the Program
			Teaching	Research or Scholarship	Other	
Electrical Engineering						
Li, Yifei	FT	ECE 435/591* (3) Fall 2017 ECE 600 (6) [1] Fall 2017 ECE 336 (3) Spring 2018 ECE 403/534* (3) Spring 2018 ECE 595 (3) [1] Spring 2018 ECE 600 (0) [1] Spring 2018	50%	40%	10%	100%
McCollough, William Vance	PT	ECE 457 (3) Fall 2017 ECE 403/578* (3) Spring 2018 ECE 458 (3) Spring 2018	100%	0%	0%	25%
Payton, Karen	FT	EGR 111 (3) Fall 2017 ECE 320 (3) Fall 2017 ECE 701 (0) [1] Fall 2017 ECE 202 (3.5) Spring 2018 ECE 321 (3) Spring 2018 ECE 458 (0**) [2] Spring 2018 ECE 701 (0) [1] Spring 2018	50%	20%	30%	100%
Rancour, David	FT	ECE 201 (3.5) Fall 2017 ECE 311 (4) Fall 2017 ECE 413/533* (3) Fall 2017 ECE 211 (3) Spring 2018 ECE 251 (1) Spring 2018 ECE 312 (4) Spring 2018 ECE 414/535* (3) Spring 2018	70%	10%	20%	100%

* Dual-numbered course, both sections are worth the number of credits listed in parentheses.

** Senior Design faculty advisor.

Table II.E.-1. Faculty Workload Summary: Electrical and Computer Engineering (AY 2017-2018) (continued)

Faculty Member (name)	PT or FT	Classes Taught (Course No./Credit Hrs.) Term and Year		Program Activity Distribution			% of Time Devoted to the Program
				Teaching	Research or Scholarship	Other	
Computer Engineering							
Fiondella, Lance	FT	ECE 455/591 * (3) ECE 603 (0) [4] ECE 161 (4) ECE 458 (0**) ECE 501 (3) [1] ECE 600 (6) [1] ECE 603 (0) [4]	Fall 2017 Fall 2017 Spring 2018 Spring 2018 Spring 2018 Spring 2018 Spring 2018	40%	50%	10%	100%
Fortier, Paul	FT	ECE 257 (2) ECE 388 (3) ECE 595 (3) [1] ECE 596 (3) [3] ECE 600 (0) [2]; (3) [1]; (6) [1] ECE 603 (3) [1] ECE 310 (1) ECE 368 (3) ECE 458 (0**) ECE 501 (3) [1] ECE 568 (3) ECE 595 (3) [1] ECE 596 (3) [2] ECE 600 (0) [2]; (3) [1]; (6) [4] ECE 603 (0) [1]; (3) [1]	Fall 2017 Fall 2017 Fall 2017 Fall 2017 Fall 2017 Fall 2017 Spring 2018 Spring 2018 Spring 2018 Spring 2018 Spring 2018 Spring 2018 Spring 2018 Spring 2018 Spring 2018	60%	20%	20%	100%

* Dual-numbered course, both sections are worth the number of credits listed in parentheses.

** Senior Design faculty advisor.

Table II.E.-1. Faculty Workload Summary: Electrical and Computer Engineering (AY 2017-2018) (continued)

Faculty Member (name)	PT or FT	Classes Taught (Course No./Credit Hrs.) Term and Year	Program Activity Distribution			% of Time Devoted to the Program
			Teaching	Research or Scholarship	Other	
Computer Engineering						
Liu, Hong	FT	ECE 488/548* (3) Fall 2017 ECE 565 (3) Fall 2017 ECE 600 (3) [2] Fall 2017 ECE 700 (9) [1] Fall 2017 ECE 369 (3) Spring 2018 ECE 458 (0**) Spring 2018 ECE 501 (3) [1] Spring 2018 ECE 596 (3) [1] Spring 2018 ECE 600 (3) [2] Spring 2018 ECE 600 (6) [1] Spring 2018 ECE 701 (9) [1] Spring 2018	50%	20%	30%	100%
Viall, Benjamin***	PT	ECE 260 (3.5) Fall 2017 ECE 263 (3.5) Fall 2017 ECE 260 (3.5) Spring 2018 ECE 263 (3.5) Spring 2018 ECE 458 (0**) Spring 2018	50%	50%	0%	50%
Viall, Philip	FT	ECE 160 (4) Fall 2017 ECE 264 (4) Fall 2017 ECE 160 (4) Spring 2018 ECE 264 (4) Spring 2018 ECE 458 (0**) Spring 2018	60%	20%	20%	100%

* Dual-numbered course, both sections are worth the number of credits listed in parentheses.

** Senior Design faculty advisor.

*** Was a Part-Time Lecturer (PTL) during AY 2017-2018.

Table II.E.-1. Faculty Workload Summary: Electrical and Computer Engineering (AY 2017-2018) (continued)

Faculty Member (name)	PT or FT	Classes Taught (Course No./Credit Hrs.) Term and Year	Program Activity Distribution			% of Time Devoted to the Program
			Teaching	Research or Scholarship	Other	
Computer Engineering						
Wang, Honggang	FT	ECE 501 (3) [1] Fall 2017 ECE 520 (3) Fall 2017 ECE 561 (3) Fall 2017 ECE 595 (3) Fall 2017 ECE 599 (0) Fall 2017 ECE 600 (0) [2] Fall 2017 ECE 603 (3) [1] Fall 2017 ECE 701 (3) [1] Fall 2017 ECE 701 (9) [3] Fall 2017 ECE 501 (0) [1] Spring 2018 ECE 501 (3) [2] Spring 2018 ECE 562 (3) Spring 2018 ECE 595 (3) [2] Spring 2018 ECE 599 (0) Spring 2018 ECE 701 (3) [2] Spring 2018 ECE 701 (9) [2] Spring 2018	50%	30%	20%	100%
Xing, Liudong	FT	Sabbatical Leave for Fall 2017 ECE 595 (3) Fall 2017 ECE 600 (0) [3] Fall 2017 ECE 603 (0) [2] Fall 2017 ECE 604 (6) [1] Fall 2017 ECE 701 (9) [1] Fall 2017 ECE 501 (3) [1] Spring 2018 ECE 560 (3) Spring 2018 ECE 596 (3) Spring 2018 ECE 600 (0) [1] Spring 2018 ECE 603 (0) [1] Spring 2018 ECE 620 (3) Spring 2018 ECE 701 (3) [1]; (9) [1] Spring 2018	60%	30%	10%	100%

Staff

The Electrical and Computer Engineering department is very fortunate to have excellent support staff. The ECE Department has one full-time administrative assistant, one full-time and one half-time professional technician. Work-study students are routinely hired to assist staff with routine office tasks. The administrative staff provides logistical support along with services related to budgets, payroll, and purchasing. Since the loss of a clerk several years ago due to budget constraints, the current administrative assistant has regularly worked significant overtime in order to complete her tasks in a timely manner.

Some of the duties of the ECE Department Administrative Assistant are to:

- provide information and documentation to be used by the chairperson to develop departmental budget;
- provide accounting for the individual department accounts using the PeopleSoft system (purchasing);
- process the payroll for faculty, part time lecturers, consultants, and staff, using Human Resource PeopleSoft system (payroll);
- assist in the development brochures for the undergraduate and graduate programs;
- assist students in filling various academic forms and in preparation of presentations;
- supervise work-study students in the office while introducing them to work ethics; and
- organize and update students' advising folders.

The full-time technician in the ECE Department is expected to:

- assist instructors in the preparation of equipment for the operation of all instructional labs;
- build test equipment needed for research;
- regularly service, maintain, calibrate, modify, and make minor repairs to lab equipment;
- maintain adequate stock materials and consumables;
- maintain a schedule of the labs for each semester;
- process orders and receive new equipment needed in the department and in the labs;
- ensure all safety regulations are met; and
- monitor all equipment by using a computer inventory system.

The half-time technician in the ECE Department is responsible for the maintenance and upkeep of software used by students and faculty in the department. This includes laboratories with over 200 computers and a dozen servers. These laboratories are integrated into an Active Directory infrastructure with Enterprise class file sharing capabilities across a broad range of platforms. Department servers provide remote access for students to use various software packages from their homes and dorms. In addition to laboratory support, the computer technician is responsible for coordinating with Computer Services all department computer assets, faculty and enrolled majors into the university IT infrastructure.

Students

The Administration allocates a budget to each department to cover the stipends of Graduate Teaching Assistants (TAs) to help with both the graduate and undergraduate programs. These students also receive a tuition remission directly from the Administration.

A separate budget is also made available to cover the hiring of hourly-paid graduate and undergraduate students to assist with the teaching mission (grading and lab assistance). Hourly-paid workers do not receive a tuition remission. The use of hourly-paid students is both cost effective and is extremely helpful for faculty leading to an improved educational experience for the students.

Research Assistantships (RAs) are awarded by faculty members from their research budgets. Research funds can be used to support either doctoral or MS thesis track students.

In recent years, in view of the growth in our undergraduate and graduate programs, the Administration has honored all of our requests for funds for hourly-paid assistants. In Spring 2015, all undergraduate courses and most graduate courses have at least one TA or hourly-paid assistant.

The number of Graduate Teaching Assistants assigned yearly to the ECE Department by the Administration has been constant at seven for at least the past decade.

II.E.2. Allocation of Material Resources

Research Facilities

The Department of Electrical and Computer Engineering has the following research laboratories, which directly support the doctoral program and the thesis-track master's programs. In some cases, these laboratories also support graduate-level course instruction. The following is a list of the departmental laboratories and lab capabilities.

Signal Processing Lab

The research in this lab focuses on the measurement and processing of acoustic signals, both in air and underwater. The projects include both manmade sonar systems and animal communication and echolocation. Prof. John R. Buck leads this lab, and four ECE MS students currently conduct research in the lab. Equipment includes a 64-element Visionics VDAS microphone array with real time USB interface, 16 hydrophones and an underwater video camera for measuring marine mammal acoustic behavior, multichannel recording devices for array measurements, acoustic sources, and high-speed ultrasonic data acquisition equipment. The lab is supported by Office of Naval Research grants.

Software Intensive Systems Reliability Lab

The research in this lab focuses on modeling to assess and guide the optimization of systems that heavily depend on software to operate. Projects include modeling to assess the reliability and security of complex systems. Prof. Lance Fiondella leads this lab, and five PhD students currently conduct research in the lab. Tools produced by the lab are used to assess software for government and industry collaborators. The lab is supported by grants from the Army Research Laboratory, National Space and Aeronautics Administration, Massachusetts Department of Transportation, and the National Science Foundation.

Autonomous Networking Dependable Systems (ANDS) Laboratory

The research conducted in this lab focuses on sensor networking and dependable computing. The sensor networking research involves the design and analysis of wireless multimedia sensor networks, body area networks and general wireless sensor networks. The dependable computing research includes cyber and multimedia security, reliability modeling, analysis and optimization of complex systems and networks, probabilistic reliability and security assessments. The type of equipment in the lab includes computers and sensor motes. The lab is co-directed by Prof. Honggang Wang and Prof. Liudong Xing. Currently there are five PhD students in ECE doing research in the lab. Results of research conducted by members of the ANDS laboratory have been published in numerous peer-reviewed journal papers and conference papers, including best paper awards and best student paper awards winning papers.

IoT and Data Engineering Lab

The research in this lab focuses on the design of Internet Things, Wireless Health, Body Area Networks (BAN), Cyber and Multimedia Security, Mobile Multimedia and Cloud, Wireless Networks and Cyber-physical Systems, and BIG DATA in mHealth. Prof. Honggang Wang leads this lab where four ECE PhD and three MS students currently conduct their research. The lab hosts more than 270K equipment mainly funded by NSF projects, which includes 60 USRPs (Universal Software Radio Peripheral), 2 Spectrum Analyzer, Dell Servers, IBM GPU, PCB printer, Drones, laptops and desktops, and Wireless Biomedical Sensors. Currently, the lab also has a collaborative NSF project with UC Davis and Stevens Institute of Technologies.

Speech Processing Laboratory

The research conducted in this lab focuses on speech intelligibility algorithm development, blind source separation algorithm development and collection of acoustic recordings to be used to assess algorithms developed. The lab is directed by Dr. Karen Payton. Currently there is one PhD student in ECE doing research to develop a software platform for blended blind source separation. The type of equipment in the lab includes a single walled IAC sound-attenuating chamber with additional Sonex sound-absorbing material, a MOTU – A/D/A hardware able to record/play 8 channels simultaneously, connected to a Windows PC. There is an audio power amp to drive up to 4 orb speakers. There is also a sound level meter, multimeter, oscilloscope, function generator, etc. The lab is occasionally used by other faculty and students in the department to either make audio recordings or for senior design projects.

Embedded Systems and IoT Laboratory

The research conducted in this lab focuses on embedded systems and sensor development and applications. Embedded systems and sensors work is further divided into sensor characterization and development, processing and control sub-system design and fabrication, and actuator characterization and development. System integration, testing, verification and validation is performed in the laboratory aimed at a variety of IoT applications supporting a variety of research. The laboratory is directed by Professor Paul J. Fortier. Currently there are two PhD students in Electrical Engineering, computer engineering option, and six MSc Computer Engineering doing research in the laboratory. The type of equipment in the lab includes: Optical microscope, Laser cutter, 3D printer, various signal generators,

and test equipment an electronics workbench with surface-mount reworking station. The laboratory is also used for graduate Teaching Assistants course and laboratory instruction services.

Electro-Acoustics Research Laboratory

This industry- and grant-sponsored lab supports research and intern opportunities for undergraduate and graduate study in acoustics, medical ultrasonics, and transducers. Prof. David Brown leads this lab.

RF Photonics Lab

The Radio Frequency (RF) Photonics Group conducts pioneering research to advance technologies covering electromagnetic spectrum from radio to optical frequencies. This lab is led by Prof. Yifei Li. The lab's focus is on integrated microwave/photonic microsystems for high performance radar and electronic sensing. Novel system architecture, integration, and device technologies are explored in this lab.

III. REPORT AND RECOMMENDATIONS FROM EXTERNAL REVIEW TEAM

The external review team's report will be placed here.

IV. RESPONSE TO EXTERNAL REVIEW TEAM

Department's response to external review team's report will be placed here.

V. CONCLUSIONS

(After Review Team Report) Department will provide a conclusion to the analysis – highlight the positives along with challenges that exist and how they will be addressed, including the resources needed to meet those challenges.

VI. STRATEGIC PLANNING: FUTURE GOALS & SPECIFIC OBJECTIVES

APPENDIX A



ABET

Engineering Accreditation Commission

Final Statement of Accreditation
to

University of Massachusetts Dartmouth
Dartmouth, MA

2016-2017 Accreditation Cycle

ABET
ENGINEERING ACCREDITATION COMMISSION
UNIVERSITY OF MASSACHUSETTS DARTMOUTH
Dartmouth, MA

FINAL STATEMENT
Visit Dates: October 30-November 1, 2016
Accreditation Cycle Criteria: 2016-2017

Introduction & Discussion of Statement Construct

The Engineering Accreditation Commission (EAC) of ABET has evaluated the bioengineering, civil, computer, electrical, and mechanical engineering programs of the University of Massachusetts Dartmouth.

This statement is the final summary of the EAC evaluation, at the institutional and engineering-program levels. The statement consists of two parts: the first addresses the institution and its overall engineering educational unit, and the second addresses the individual engineering programs. It is constructed in a format that allows the reader to discern both the original visit findings and subsequent progress made during due process.

A program's accreditation action will be based upon the findings summarized in this statement. Actions will depend on the program's range of compliance or non-compliance with the criteria. This range can be construed from the following terminology:

- **Deficiency:** A deficiency indicates that a criterion, policy, or procedure is not satisfied. Therefore, the program is not in compliance with the criterion, policy, or procedure.
- **Weakness:** A weakness indicates that a program lacks the strength of compliance with a criterion, policy, or procedure to ensure that the quality of the program will not be compromised. Therefore, remedial action is required to strengthen compliance with the criterion, policy, or procedure prior to the next review.

**Computer Engineering Program
BSCpE Program****Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and
Similarly Named Engineering Programs**Introduction

The computer engineering BSCpE program focuses on preparing undergraduates for careers in software and hardware aspects of computing. The program has existed within the Department of Electrical and Computer Engineering (ECE) since 1975. The program has graduated more than 90 students over the last five years. The program currently has 98 undergraduate students. The program is supported by 15 faculty members in the Department of Electrical and Computer Engineering, eleven faculty members in the Department of Computer Science, one-and-one-half technicians and one administrative staff member. The program had 13 graduates in 2015-16.

Program Concerns

1. Criterion 1. Students This criterion requires that students must be advised regarding curriculum and career matters. Evidence indicates that students are being advised by the faculty and staff regarding curriculum matters. Ad hoc information regarding career opportunities is provided via various means of faculty-student interaction. However, the possibility exists that students may proceed through the program without career advising. This suggests that future compliance with this criterion may be jeopardized.
 - 30-day due-process response: The EAC acknowledges receipt of documentation showing a new advising form. This form includes a check box for career advising and space for comments on career paths. Several completed forms from student advising sessions have been included as examples of the implementation of the new procedure.
 - The concern is resolved.
2. Criterion 6. Faculty This criterion requires that the program must demonstrate that the faculty members are of sufficient number. The program has lost some faculty members over the last

few years without replacing them. Moreover, several current faculty members are nearing retirement. The program does not have a clear policy or plan for faculty recruitment and replacement. A possibility exists that the program may face a shortage of qualified faculty members which could impact the ability of the program's students to meet student outcomes in the future. Thus, future compliance with this criterion may be compromised.

- 30-day due-process response: The EAC acknowledges receipt of documentation stating that the program is currently working with the Dean's office to formulate a faculty strategic hiring plan. Evidence of this activity, or other positive initial steps for faculty recruitment and replacement, was not included..

- The concern remains unresolved.

3. Criterion 8. Institutional Support This criterion requires that resources including institutional services, financial support, and staff (both administrative and technical) provided to the program must be adequate to meet program needs. To date, it appears that the program's administrative staff members are meeting the program's needs while also providing clerical, administrative, and budgetary support to the department's research, graduate program, and undergraduate office. The program appears to lack plans to augment these administrative staff members. A possibility exists that the program may not have adequate administrative staff if high workload situations arise in the future, and, thus, future compliance with criterion may be jeopardized.

- 30-day due-process response: The EAC acknowledges receipt of documentation stating that some administrative functions have been centralized and operational efficiencies introduced, and that the department will work with the Dean's office to formulate a plan to augment administrative support. Evidence of these changes, or positive initial steps to develop the plan, was not included.

- The concern remains unresolved.

**Electrical Engineering
BSEE Program****Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and
Similarly Named Engineering Programs**Introduction

The electrical engineering BSEE program focuses on preparing its undergraduates for careers in the field of electrical engineering. The program has been in existence since 1965. The program currently has 149 undergraduate students. The program had 47 graduates in 2015-16. The program is served by 15 faculty members in the Department of Electrical and Computer Engineering. It is supported by one-and-one-half technicians and one administrative staff member.

Program Concerns

1. Criterion 1. Students This criterion requires that students must be advised regarding curriculum and career matters. Evidence indicates that students are being advised by the faculty and staff regarding curriculum matters. Ad hoc information regarding career opportunities is provided via various means of faculty-student interaction. However, the possibility exists that students may proceed through the program without career advising. This suggests that future compliance with this criterion may be jeopardized.
 - 30-day due-process response: The EAC acknowledges receipt of documentation showing a new advising form. This form includes a check box for career advising and space for comments on career paths. Several completed forms from student advising sessions have been included as examples of the implementation of the new procedure.
 - The concern is resolved.
2. Criterion 6. Faculty This criterion requires that the program must demonstrate that the faculty members are of sufficient number. The program has lost some faculty members over the last few years without replacing them. Moreover, several current faculty members are nearing retirement. The program does not have a clear policy or plan for faculty recruitment and replacement. A possibility exists that the program may face a shortage of qualified faculty

members, which could impact the ability of the program's students to meet student outcomes in the future. Thus, future compliance with this criterion may be compromised.

- 30-day due-process response: The EAC acknowledges receipt of the documentation stating an intent to formulate a hiring plan. Evidence of positive initial steps taken to develop the plan was not included.

- The concern remains unresolved.

3. Criterion 8. Institutional Support The criterion requires that resources including institutional services, financial support, and staff (both administrative and technical) provided to the program must be adequate to meet program needs. To date, it appears that the program's administrative staff members are meeting the program needs while also providing clerical, administrative, and budgetary support to the department's research, graduate program, and undergraduate office. The program appears to lack plans to augment these administrative staff members. A possibility exists that the program may not have adequate administrative staff if high workload situations arise in the future, and, thus, future compliance with criterion may be jeopardized.

- 30-day due-process response: The EAC acknowledges receipt of documentation stating that some administrative functions have been centralized and operational efficiencies introduced, and that the department will work with the Dean's office to formulate a plan to augment administrative support. Evidence of these changes, or positive initial steps to develop the plan, was not included.

- The concern remains unresolved.

Academic Quality Assessment and Development Self- Assessment Report

Mechanical Engineering MS Option in Industrial & System Engineering

**Department of Mechanical Engineering
College of Engineering**

**University of Massachusetts Dartmouth
North Dartmouth, MA**



Spring 2019

Contents

Academic Quality Assessment and Development Self- Assessment Report	1
Self-Study Development.....	1
About the Mechanical Engineering Graduate Program and Curriculum.....	1
Core Criteria	4
1) Programs shall ensure that their goals and objectives are linked to the campus mission and strategic priorities.	4
2) Programs shall ensure that curriculum is relevant, rigorous, current, and coherent.....	7
3) Programs shall ensure faculty quality and productivity	11
4) Programs shall ensure teaching/learning environments that facilitate student success.....	14
5) Programs shall ensure that resources are used wisely.	16
MNE AQAD Report Appendices	19
Appendix A.....	20
AQAD GUIDELINES	21
Mechanical Engineering Department.....	25
Undergraduate Admissions	25
Faculty Headcount with FTE.....	26
Average Class Size by Department.....	28
MNE MS Completers 2011-2018.....	30
Appendix B Curricula Vitae.....	32
Table of Faculty Qualifications.....	142
MECHANICAL ENGINEERING ADVISORY BOARD (MEAB)	144
Appendix C Curriculum	147
UNIVERSITY OF MASSACHUSETTS DARTMOUTH.....	148
5-YEAR COMBINED BSMS – THESIS OPTION	148
MASTERS-MECHANICAL ENGINEERING DEGREE REQUIREMENTS CURRICULUM PROGRESS REPORT	150
MASTERS-INDUSTRIAL & SYSTEM ENGINEERING DEGREE REQUIREMENTS CURRICULUM PROGRESS REPORT	151
MNE MS Courses.....	152
MNE MS-ISE Courses	153
Fall 2017 - Spring 2018 Schedule	154
Appendix D Research Expenditures.....	159
Appendix E MNE Graduate Student Handbook.....	160

Self-Study Development

This self-study is in response to a mandate from the trustees of the UMass system to the Mechanical Engineering (MNE) Department. All information about the Mechanical Engineering Graduate Program including regular MS program (MSME) and Industrial & System Engineering (ISE) sub-program option for professional engineers at UMASS Dartmouth are reported here. Details including curriculum, student success, and the faculty are reported as a measure of the quality of the program.

To accomplish the self-study, a committee of the MNE Department was formed and included the following: the Chairperson of the Department, Dr. Sankha Bhowmick; the Director of the MNE Graduate Committee, Dr. Wenzhen Huang; and members of the MNE Graduate Committee, Dr. Amit Tandon, Dr. Mehdi Raessi, and Dr. Jun Li. The committee met on September 25, 2018 to develop an action plan. Important pages from documents needed for study development were handed out: “AQAD Handbook: Process and Procedures” and “AQAD Data Book for the Academic Departments”, (see Appendix A). The core criteria and related questions that needed to be addressed in the AQAD review were discussed in general. Then ideas were generated on gathering information about department quality and assessing it. Tasks were assigned among the committee members to develop the following self-study document. The ad-hoc committee met multiple times to finalize the document and then sent it to all MNE faculty and Dean of Engineering for final review and comments.

About the Mechanical Engineering Graduate Program and Curriculum

The inception of the Master’s Degree program in Mechanical Engineering was in 1998 at the authorization of the Massachusetts Board of Higher Education. It has been expanded to include a new ISE sub-program since 2015. The Master’s Degree program in Mechanical Engineering currently has 30 students enrolled including 7 students in the Industrial and System Engineering i.e. ISE program. Currently, there are seven tenured/tenure-track faculty and two full time lecturers in the department, a majority of whom are involved in the graduate program(see the curricula vitae in Appendix B).

The Mechanical Engineering Master's Program is structured to insure that each graduate has a firm foundation that supports further graduate studies at the Ph.D. level or to succeed at an advanced level in industry or government. The Industrial & System Engineering Master's Program is designed for professional engineers/personnel to update and enhance their knowledge and skills in both industrial/systems engineering and management. The ISE curriculum is composed of the courses from Mechanical Engineering Department and Charlton College of Business at UMassD. Please see the MSME/ISE curriculums in Appendix C.

The specializations of the MEMS/ISE MS programs are in the areas of

- Atmosphere/ocean dynamics
- Bioengineering
- Composite materials
- Computational multiphase flow
- Experimental fluid mechanics
- Heat and mass transfer
- Manufacturing systems
- Materials science
- Mechanical behavior of emerging advanced materials
- Nano-composites
- Quality engineering
- Robotics
- Solid mechanics

Along with the twenty-five MNE MS course credits requirements, the MNE MS program offers two options: thesis/project option and course option. The former requires a student conduct a thesis research or complete an industrial project, and successfully defend their thesis/project work before the advising/defense committee. The latter requires a student take 33 credits of MNE courses and pass a comprehensive oral exam. The requirement of ten credits from core courses is designed to ensure a solid broad science and engineering foundation and academic training for students, these courses include Continuum Mechanics (MNE 503), Advanced Engineering Mathematics (MNE 501), Applied Numerical Methods (MNE 502) and a one credit Mechanical Engineering Seminar (MNE 500). Please see the attached Appendix C for MEMS program degree requirements and course list.

The MEMS program has an ISE MS sub-program option that offers the advanced level education for professional personnel from industry in Industrial and System Engineering. ISE MS program provides students with courses offered by a group of faculty from Mechanical Engineering Department and Charlton College of Business. It is a graduate program designed to provide graduate education to working engineering professionals to advance their careers in industrial and systems engineering. The Program provides an integrated approach to engineering and management for production systems and engineering organization. Courses are offered in manufacturing systems, quality engineering, system modeling, analysis, optimization, and simulation, engineering project managements and economic analysis, operations research, supply chain management, engineering/business informatics etc. Graduates of the program will achieve professional competence in concepts, knowledge, methodologies, and skills required for production system design/operations, quality assurance, and management in an engineering industrial environment. Besides the 24-course credits requirement, an ISE MS student is required to complete an industrial project and then present their work before an advisory committee. ISE students choose their project advisors in the group of faculty from Mechanical Engineering Department and Charlton College of Business. Students are highly encouraged to choose their projects from their working companies/institutions. In the last three years since the inception of the ISE program, about 85~90% of the projects were sponsored by local industry. All MNE/ISE courses are scheduled in late afternoon or evening to permit students from industry and government to attend. Please see the attached Appendix C for ISE MS program degree requirements and course list.

To encourage advanced students in the undergraduate pool of Mechanical Engineering to join the MEMS program, an accelerated BS/MS program was designed. This fast-track program enables well-qualified BS degree students in Mechanical Engineering to complete both the BS and the MS by using three courses (9 credits) to count towards both their BS and MS. Outstanding mechanical engineering undergraduate students will be recruited during the second semester of their junior year. The Graduate Committee will select students who satisfy the admission standards. Students who wish to enroll in the program will indicate their intention to do so by filing an application to the graduate school. The criterion of admission is GPA of 3.0/4.0 or higher after the completion of 75-credit hours or more. When enrolled, the students may take three graduate courses as

their MNE BS-degree technical electives. These credits will be counted towards their BS degree as well as their MS degree provided they obtain a grade of B- or better. This plan allows students to finish their MS within a year of their BS thereby allowing them to graduate with a MS after a year of earning their BS, therefore allowing them to graduate with a BS and MS within five years. Please see the attached Appendix C for the five-year BS/MS program curriculum.

The MNE department maintains the following research and educational laboratories in the areas of Control engineering, Bioengineering, Power/Thermal systems, Upper Ocean Lab, CAD/CAM, Advanced Manufacturing, Advanced Materials, Robotics, Nano-Material/Mechanics, Computational Multiphase Flows, Computational Mechanics, Center of High-Performance Computing (COE). In addition to campus laboratories and facilities, several faculty also have affiliations and laboratories at the School for Marines Sciences and Technology (SMaST) and the Center for Innovation & Entrepreneurship (CIE).

Graduate Program Director works with the Graduate Committee to administer and coordinate all activities of the MNMS/ISE programs, including students' recruiting, curriculum development, administration of defenses/examinations, judgements on academic probation and dismissal, selection and recommendation of teaching assistants, etc. The director reports to the Department Chair and Industrial Advisory Board in the IAB annual meeting.

The next section will address the five core criteria and related questions for the review as listed in the AQAD Handbook. Data from the "AQAD Data Book for the Academic Departments" was used to respond to the criteria (see Appendix A).

Core Criteria

1) Programs shall ensure that their goals and objectives are linked to the campus mission and strategic priorities.

What is the Program's mission and is it clearly aligned with the campus mission and direction? How does the Program's mission relate to curriculum; enrollments; faculty teaching, research/professional/creative activity, and outreach? Is it aligned with the campus strategic priorities?

The University's mission, as stated in the university Graduate Catalogue, is "to provide an affordable and accessible education of high quality and to conduct programs of research and public service that advance knowledge and improve the lives of the people of the Commonwealth, the nation and the world."

The 5 strategic priorities of this mission are:

1. Innovative and High-Impact Research and Academic Programs

UMass Dartmouth will vigorously contribute to the advancement of knowledge through the development of innovative and high-impact research and academic programs that are integrative, interdisciplinary, and promote critical thinking, problem-solving, and creativity.

2. Integrated Student-Centered Experiences

The success of undergraduate and graduate students through a transformative educational experience will be UMass Dartmouth's highest priority. To enable students to progress toward achievement of their educational, personal, and career goals, investments will be made in key areas that support student success.

3. An Active and Engaged University Community Focused on Excellence in Research, Scholarship, and Innovation

UMass Dartmouth will be recognized globally, nationally, and regionally for impactful research, scholarship, and innovation that reflect the expertise of its faculty and staff, the strengths of its programs, and the needs of the region and the Commonwealth. To accomplish this goal, the University will be actively engaged in a well-defined pathway to obtain Carnegie Doctoral Research University (DRU) status.

4. Highly Productive Collaborations, Partnerships, and Community Engagement

From its inception, UMass Dartmouth has played a catalytic role in the region in economic, social, and cultural development. True to its history and rich legacy, the University will continue to support and expand collaborations that enable a mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity to address critical societal issues and contribute to the public good in areas such as sustainable economic development, education, environment, fishing industry, health care, manufacturing, and transportation.

5. Infrastructure and Processes in Support of Excellence

A robust physical, technological, and administrative infrastructure that ensures a productive, safe, and positive environment for faculty, students, and staff is essential to the achievement of the strategic goals of *UMassDTransform2020*.

From its inception, the MNE department has aligned its mission and strategic priorities with the university mission and priorities in: <http://catalog.umassd.edu> and <https://www.umassd.edu/strategicplan/>. The program furthers the mission of the university by providing a professionally oriented graduate program. The program maintains the highest standard of academic excellence by requiring high standards for admission, learning, and graduation. All applicants are screened and recommended by the MNE Graduate Committee, Director of the Graduate Program, the Chairperson of the MNE department, the Dean of Engineering, and the Associate Vice Chancellor for Graduate Studies. A grade point average of 3.0 or beyond is expected for admission, as is a background in the appropriate areas of undergraduate engineering, mathematics and science. Highly capable students in science and engineering but with course work

deficiencies are individually assessed and have programs of study that are designed to address their specific deficiencies. Other students, who do not meet the strict 3.0 GPA requirement, but demonstrate other indications of academic potential such as a GPA that improved with time, special skills or abilities or distinguished professional accomplishments (as indicated in the recommendation letters in particular in ISE program), may be considered for admission on case-by-case bases. BS/MS fast program attracts and recruits most talented undergraduate students. The opportunities of the teaching and research assistantships are allocated to attract and support excellent students based on their academic performance assessment. The admission rate has been kept on about less than 50%. All students shall keep their course GPA no lower than 3.0 and no more than two courses lower than B- is allowed for graduation.

All faculty who teach in the graduate program have doctorates from leading engineering institutions around the world. All MS advisors have Ph.D. degrees. Faculty pursue research on diverse topics, such as atmosphere/ocean dynamics, advanced materials, nano-micro mechanics, computational multiphase flow, simulation based additive manufacturing, manufacturing system modeling and simulations, CAD/CAM, quality engineering and applied statistics, computational fluid mechanics, bioengineering, renewable energy, robotics, etc.

Many faculty are respected scholars in their areas as evidenced by external grants, publications, serving as panel reviewers and prestigious journal editor or reviewers, organizing and chairing conferences. Faculty have served industry in a variety of ways. For example, ISE program requires and encourages students select and conduct industrial R&D project (as the required six credits project course of MNE590) from their companies (e.g. Nye, Philip Lighting. Lockheed Martin, Johnson & Johnson, etc.). The faculty provide expertise and academic advises, forming an academic-industry partnership to achieve both educational and company's business/technological goals. The faculty pride themselves in creating interdisciplinary research cohorts and maintaining an intimate environment for learning, working closely one-on-one with individual students or small groups involved in project work. Examples include collaborations of MNE faculty with faculty and scientists in bioengineering, civil engineering, mathematics, computer science, physics, business, and external institutions such as Woods Hole Oceanographic Institution, NUWC, and Nye R&D lab.

The MEMS and ISE programs and high quality research of MNE faculty benefit both the undergraduate and graduate programs. Some graduate courses are open to qualified senior undergraduate students as technical electives. Qualified students in MNE honored program have the opportunity to take honored courses that are usually research-oriented, seminar-based courses. Some of the faculty's research expertise, experiences, and new findings have enriched the courseware. Students use these courses to expand their knowledge in advanced and specialized topics to prepare for careers or graduate school (e.g. MNE five years BS/MS program). Talented undergraduate students have the opportunity to participate undergraduate research program in faculty's research teams, working with other graduate students. Such interaction in research between graduate and undergraduate students enriches both and promotes creativity and critical thinking.

MSME Program courses have small class sizes, ranging from 4 to about 25. Courses with larger class size usually are those open to undergraduates and are popular in applications. Small classes are usually specialized in certain areas. The adjusted average (removing individual classes: independent study, thesis, etc.) for 2017-2018 for core courses is above 12 and for non-core courses is about 8-10 students. This is understandable since the program has many offerings per semester, some being very specialized. Upon students' requests and availability of faculty, special topics and directed study courses are also offered when students' number is less than 4. The small classes allow faculty to work closely with students. Large class sizes are in the high twenties while the smallest class size is strictly controlled at an enrollment of four.

The department maintains an atmosphere where each person, regardless of religion, ethnic, economic or social background, will be comfortable. The faculty, within the MNE department, are very diverse in terms of their gender, ethnic, and racial backgrounds. Among the faculty are women, Asian-Americans, and some with a variety of European ancestors. The graduate student population is also very diverse with students from Africa, Asia, Europe, and North America. Roughly 10% of our graduate population are women.

All the above-mentioned efforts have been made to create a student-centered learning environment supported by high quality faculty research, talented student recruitment, and well designed curriculum to ensure that MEMS graduate program's goals and objectives closely linked to University's mission and priorities.

2) Programs shall ensure that curriculum is relevant, rigorous, current, and coherent.

How does the program determine curricular content?

The MSME program curriculum content is determined through a process that includes the departmental Graduate Committee and the MNE Industrial Advisory Board, which is an external advisory committee(See current IAB list in Appendix B). The Graduate Committee is composed of four members of the department. One of the members serves as the Graduate Program Director (GPD). All the members and the GPD are appointed by the department Chair on a yearly basis. Typically, the Chair appoints faculty who are involved in cutting edge research and have a strong pool of graduate students participating in their research program. In this manner, the department can ensure that the curricular content is lined up to serve the most relevant and current topics in Mechanical Engineering. It also ensures that students recruited to the program are in a position to succeed. Members of the Graduate Committee currently include one Assistant Professor, one Associate Professor, and two Professors. Their areas of interest represent a large spectrum of the department both in terms of areas of expertise, including computational mechanics, computational fluid dynamics, manufacturing and oceanography.

The Graduate Committee serves as the curriculum committee for the graduate program. The primary focus of the Graduate Committee with regard to curriculum is to ensure that the curriculum has offerings in the areas of interest to our diverse student population and local industry; that they are structured in such a way that students are able to complete a degree in a reasonable amount of time while being able to take the courses that serve their interest. The Graduate Committee ensures the ‘core courses’ in the program prepare a student analytically, numerically and mathematically to succeed in his/her elective courses and thesis or masters project. It has recommended restructuring core course requirements in a variety of ways to meet the needs of our student population. The elective courses are designed for students to pursue their MS in a specific area of interest usually dovetailed with a faculty’s research interest. Faculty often propose new courses that are approved by the Graduate Committee.

The department also works closely with the department Industrial Advisory Board (IAB) (please refer to the Appendix B for the IAB list). Any curricular changes at the graduate level is discussed with the IAB. As an example, when the ISE subprogram was proposed, there were extensive discussion with the IAB for relevant topics that the program had to cover. The curriculum was designed to explicitly serve the requirement of our industrial partners in the local and broader community.

The Graduate Committee and the IAB are strictly recommending bodies. All recommendations from committees must be approved by the MNE faculty at large before any action can be taken. Recommendations made by any of these committees must be approved by a vote of the entire faculty in the department before being implemented in the curriculum.

How does the curriculum relate to the current standards of the discipline?

The MSME and ISE sub-option curriculum at UMass Dartmouth are rigorous and exhaustive. They are comparable to most other institutions that are at our level of graduate work and research. Curriculum of the Mechanical Engineering MS program varies across universities, where in some schools, there are no required core courses, while some schools require extensive numbers of core courses and courses for particular areas of specialization. The MSME program follows a moderate, in-between approach: Each candidate for the MSME Degree must obtain a minimum of 31 graduate credits (Thesis or Project tracks) or 34 graduate credits (Course Work track). Out of the 31 or 34 credits, 10 credits are required to be the following core courses: MNE 500 (Graduate Seminar – 1 Credit), MNE 501 (Advanced Engineering Mathematics – 3 Credits), MNE 502 (Applied Numerical Methods – 3 Credits), and MNE 503 (Continuum Mechanics – 3 Credits). The 1 credit seminar, split into two half credit seminars over one year was added to the curriculum in 2008 to ensure that students stayed current with research and development going on beyond what they learn in class. Typically 4-5 seminars every semester allows students to learn some of the most advanced works by researchers in academia as well as the industry.

The MSME candidates are required to maintain a grade point average of at least 3.0 out of a 4.0 grading scale in course work with no more than two course grades below B-minus before the degree is awarded. Only courses with a C or better grade will be accepted toward fulfilling the degree requirements. Students receiving three or more grades below a B-minus are normally dismissed from the program. 15 credits – may be selected from any advisor-approved graduate level courses. No more than six of these credits may be in graduate courses offered outside the Mechanical Engineering Department. Any course taken outside the department must be approved by the thesis advisor or graduate program director. These requirements are well within the norms for MSME programs throughout the nation.

Please refer to Appendix E for more details on the MSME degree requirements.

What internal or external measures of review are employed to ensure that the curriculum is up to date?

Our MSME program is in its 20th year of operation. While Mechanical Engineering continues to find new areas of application, the core courses of the MSME curricular across universities, including ours, remain largely unchanged. The program however has flexibility in terms of the elective programs. Offering new courses as graduate electives that are in the research domain of faculty keeps our graduate programs current and relevant.

The Graduate Committee receives requests from faculty to add new graduate courses or remove old courses based on the present faculty research interests. This is perhaps the most important factor keeping our curriculum up to date because it needs to support the growing research interests of our faculty. As research activity is by its nature state of the art, course offerings developed in support of research will typically represent the most cutting edge topics in the field. This has resulted in the development of a variety of new courses (e.g., Heat Transfer with Phase Change, FEM Simulations for Additive Manufacturing, etc.). The entire course list of ISE option was based on the research interest of two faculty in that broad area. Secondly, the Graduate Program Director meets with graduate students and inquires about how well their needs are being met. Finally, we meet annually with our Department Industrial Advisory Board to assess the needs of local industries, government and other constituents. Local industry and government have hired a large number of MNE graduate students over the past several years. These students need to be trained to be effective at working on industrial /governmental projects for which they are supported. Using these three internal review strategies, we identify strengths and weaknesses within our programs, make changes to the curriculum by developing new courses aimed at addressing specific research and/or industry needs. An example of those changes is the formation of the ISE track in the MSME program. These evolutionary changes allow us to offer flexible degrees meeting the needs and interests of our students better, particularly in the research areas where we have strategic thrusts. Additionally, the changes have allowed our department to support the EAS PhD program.

Are the curricular offerings structured in a logical, sequential and coherent manner? Is there an appropriate balance between breadth and depth?

Yes. We rely on the strength of our core courses to provide a fundamental knowledge in advanced mathematics, numerical methods, and continuum mechanics. The courses instill the knowledge breadth expected to be gained by our students. Beyond this core a student must typically take at least five courses, which serve to provide the depth in a specific area of interest or broaden their horizon to seek breadth. Two of those courses can be taken outside the department, providing sufficient flexibility. Choosing a thesis or project will provide the student both depth and breadth in that subject. If one chooses a course work option one must take up to eight courses in addition to the core. A student would discuss their course/career plan with the advisor to map this path forward. A student's advisor is the graduate program director or the person who is their thesis advisor.

The Chair of the department in consultation with the Graduate Program Director determines the graduate courses that will be offered. In several instances, the Chair consults with other departmental Chairs and faculty to ensure that similar courses are cross-listed across disciplines to maximize availability to students. On an average the department offers seven courses per year and additional four courses from other departments serve a total of eleven courses that the students can choose from.

Does the curriculum adequately prepare students for further employment or study?

It is clear that the curricula adequately prepare students for further employment or study. Many students who have graduated from our programs have gone on to successful careers in industry and/or have pursued Ph.D. study here or at other institutions such as Northeastern, RPI, WPI, URI, University of Michigan Dearborn, etc. Some of MNE MS graduates have opted for industrial research/R&D positions at companies such as McLane Research Lab., Nye, Johnson & Johnson, NUWC and other industrial or government facilities. Many MSME graduates are employed by Massachusetts and Rhode Island companies as well as from companies all over the country. For example, our graduates have been hired as Mechanical or Industrial Engineers for Ford, Naval Undersea Warfare Center (NUWC), Lockheed Martin, General Dynamics, Electric Boat, Philips, Johnson & Johnson, Caterpillar, Nye, Philips Light, MicroWay, Fastech Consulting Engineers, Mathworks, to name a few. . Reports indicate that our students felt well prepared. Obviously, for the MSME/ISE a larger number of graduates will enable us to assess this more fully in the future.

In what way does the program contribute to the education of students in terms of general knowledge, critical thinking and other essential cognitive skills?

While virtually every course in the program contributes to these educational goals, the most critical contribution to these areas is in the student's capstone/thesis experience. Before entering the thesis or project phase, the students are exposed to a broad spectrum of courses in mechanical and industrial/system engineering. The program also provides the flexibility of special topic courses and directed study courses that are tailored to

accommodate recent developments and new requirements. The structure of most courses are analytical heavy, problem solving driven framework with a majority of the electives having a project at the end. This structure nurtures improvement in cognitive skills and critical thinking. Some of the MNE/ISE courses require students to accomplish a team based open-end term project with brainstorming and discussions for solutions. The results and experiences from faculty research (e.g. NSF) and invited external scholars are disseminated through courseware and seminar (MNE 500) that enrich the students' knowledge and enhance the critical thinking and problem solving capability beyond lectures. Finally, the process of completing a MS thesis or project relies almost entirely on the student's development of critical thinking; and the process of deeply researching such open ended activities and exploring numerous solution methods leads inevitably to a great increase in the student's general knowledge.

3) Programs shall ensure faculty quality and productivity

Do faculty possess the appropriate background, experience and credentials?

Please refer to the curricula vitae and faculty List in appendix B for detailed information on the faculty.

All the faculty in the department (Tenure track and Full Time Lecturers) have PhD degrees in Mechanical Engineering. A brief write up on each tenure track faculty's background appears below, as they are involved in the graduate program.

Dr. Sankha Bhowmick's primary research interest are in applications of heat and mass transfer in bioengineering and energy. He has worked in thermal therapy of benign and cancerous tissues, cryo and desiccation preservation of cells and other biologics and in thermal management of infrastructure with a focus on roads and buildings.

Dr. Vijay Chalivendra's research expertise is experimental solid mechanics. His research is focused on damage detection of multi-functional composites, mechanics and fracture of bones and additive manufacturing materials, nano-mechanics of fibers, and high strain rate deformation and fracture of materials using high-speed imaging. His research has been supported by National Science Foundation, US Army Research Laboratories, Office of Naval Research, and internal grants.

Dr. Wenzhen Huang has been devoting his research efforts in the areas of complex system modeling and quality engineering. By fusion of system modeling, stochastic simulation, and advanced computational statistics, he has been addressing the challenges in: 1) statistical tolerance modeling and simulation in complex manufacturing systems, 2) multiscale fractal surface modeling and contact mechanics in MEMS, 3) quality control in high-dimension multivariate processes, 4) hybrid modeling, adaptive learning, and simulation for quality optimization in additive manufacturing. His research has been funded by National Science Foundation, National Institute of Standard Technology, and internal funds.

Dr. Jun Li's research interest is to develop theoretical and computational methods combined with experiments for the assessment, design, optimization and manufacturing of novel materials and structures in various applications. In particular, he has been investigating: (1) 3D printing polymer composites, (2) hierarchical materials and lightweight structures, (3) soft materials, flexible and deployable structures, (4) 3D imaging based modeling of bones and biological tissues. He has received the NASA RHG Exceptional Achievement for Engineering award in 2016 and the first place award of "Emerging Researchers in Biomedical Engineering" in 2011 ASME International Mechanical Engineering Congress and Exposition.

Dr. Mehdi Raessi's research expertise is multi-phase flow and computational fluid dynamics. Using advanced computational simulations, he has been investigating (i) ocean wave energy conversion, (ii) impact of raindrops and ice formation on wind turbine blades, (iii) liquid fuel injection in internal combustion engines, and (iv) surfactant replacement therapy in lungs. His research has been supported by National Science Foundation, Department of Energy, Department of Defense, Massachusetts Clean Energy Center, and internal grants.

Dr. Caiwei Shen joined the mechanical engineering department this fall semester (2018). His research focuses on new materials and technologies for energy-related applications and various sensors. He is currently developing (1) wearable energy-storage textiles, (2) multifunctional structural energy storage devices, and (3) 3D printable multifunctional materials. He is also interested in the synthesis of nanomaterials and the development of biomimetic sensors and actuators.

Dr. Amit Tandon's research expertise is in the fluid dynamics and heat transfer of the ocean circulation, geophysical fluid dynamics and topics in physical oceanography. He combines fieldwork in the oceans with modeling and analysis. He is the Chief scientist for a USA-Indian collaborative program called MISOBAB (2018-23). His recent projects are on Indian ocean's role in Monsoons, On Monsoon intra-seasonal oscillations, Ocean internal waves and their energy dissipation and flows near oceanic fronts that have important implications for the ecosystem and chemical balances in the ocean. His research is supported by multiple grants from the National Science Foundation and the Office of Naval Research.

Are faculty current in relation to the knowledge base and content of the discipline and curricular offerings?

Faculty are current in the knowledge base and content of their discipline. This is most evident by the productivity of the faculty in terms of both grants and publications as shown in the faculty CVs in Appendix B. Please refer to Appendix D for the department research expenditures.

The MNE faculty members keep abreast of trends in their respective disciplines and professional fields by being active in their research areas and by attending and contributing to professional and research conferences. These include regional and

national conferences, as well as research conferences in various branches of Mechanical Engineering. They are also involved in many major professional societies namely, AIAA (American Institute of Aeronautics and Astronautics), ASME (American Society of Mechanical Engineers), APS (American Physical Society), SIAM (Society of Industrial and Applied Mathematics), AMS (American Meteorological Society) and AGU (American Geophysical Union). These three avenues, namely, active research, conferences and professional societies ensure that faculty are current in relation to the knowledge base. Additionally most faculty take advantage of sabbatical leave opportunities to enhance their professional development.

Are the Program expectations for faculty involvement in teaching, research/ professional/creative activity, and public service/academic outreach activities appropriate; and how are these expectations met? Are these expectations consistent with program policies regarding teaching assignments, merit allocations, and other aspects of faculty roles and rewards?

The program expectations for faculty involvement in teaching, research, professional activities, etc. are appropriate and consistent with program policies regarding teaching assignments. Two new faculty with active research portfolios joined in the last three years, and there are two faculty member searches going on in the current AY (2018-19), as many of the department faculty members have been absorbed in the University administration (Associate Provost of Graduate Studies, Associate Provost of Research and Associate Dean of Engineering), and 5 have retired in the last 7 years.

The new hires are granted a reduction in the teaching load to initiate their research programs, as will be the case for future new hires. In addition, faculty with funded research are granted release to provide the time needed to carry out their research programs on a case by case basis. The faculty are also lend their professional expertise to the regional industries by guiding senior design projects which are posed by the regional engineering industry including the MBTA and Lockheed-Martin. MNE Faculty also conducting industry funded research (e.g. Sunwell Technologies Inc.) which supported MS students' research. In addition, since the graduate classes are offered in late afternoon, employees of local industries such as NUWC, Raytheon, Lockheed Martin, Nye, Phillips Light, Johnson & Johnson, and Teleydne earn their MSME degrees by doing this degree on a part-time basis.

Department faculty with demonstrable graduate activities have a teaching assignment of two courses a semester. Graduate activities include advising graduate thesis and dissertation, funded research, proposal activity, etc. Since all committee/service assignments are self-selected, faculty tend to gravitate towards their areas of interest and contribute to a level consistent with their available time. Primary annual evaluations are departmental peer review by tenured faculty and the department chair. The form of the review and process are specified by contractual agreement.

In what ways does the Program foster professional development and growth of faculty?

The Program fosters professional development and growth of faculty by encouraging faculty to pursue research ideas and to develop advanced research programs. New faculty are given a reduced teaching load (on the average a reduced load is one course per semester) so that they will have time for grant writing, publications, and other research tasks. They are also provided with graduate student support to assist in getting their research programs off the ground. These activities not only foster faculty growth but are also instrumental in the further development of the Graduate Program.

All faculty in the program are given professional development funds mandated by contract and used at their discretion. The funds are mainly used to fund travel to conferences, costs associated with publishing papers or to defray the cost professional society fees. Sabbatical leaves are available and most faculty make use of them. Provost's office supports seminar series and many faculty participate in the EAS and BMB PhD program. Sigma Xi sponsors an annual campus research symposium in which many department faculty and their students participate. Department and College research indirect funds have also been available to support faculty development and research initiatives.

In what way does the Program faculty lend its professional expertise – as expressed through teaching and research, scholarly and creative activity – to off-campus constituencies?

Several graduate students have been supported by grants from the National Science Foundation and the Office of Naval Research and local industry (e.g. Sunwell Technologies Inc. and Nye Inc.) to solve research problems. These include students under the supervision of Dr. Raessi, Dr. Huang, Dr. Tandon, Dr. Li, Dr. Bhowmick, Dr. Chalivendra and Dr. Shen. More than 10 ME/ISE students have been supported (tuition, financial support, and lab research facility) by local industries, for example, by NUWC, Lockheed Martin, Raytheon, Nye Inc., Philips Light, Johnson & Johnson etc.

4) Programs shall ensure teaching/learning environments that facilitate student success.

To what extent does the program have articulated learning outcomes (content and skills) for students? By what means are these outcomes measured? Are they achieved by most students?

Learning objectives of the program were outlined in the university catalog as general information to incoming students. The learning outcomes are articulated for each course in syllabus and are handed out to students taking the course at the beginning of the semester. Through the master's level studies, students will gain:

- an advanced level of understanding in the general areas of mechanical engineering

- depth of knowledge and an understanding of advanced topics in your chosen area of specialization

The students will have the ability to:

- identify and formulate complex engineering problems
- develop solutions to complex engineering problems
- communicate technical material effectively both orally and through technical reports and publications

Further information is contained on the web-site:

<https://www.umassd.edu/engineering/mne/graduate/program-objective-and-outcomes/>), Graduate Student Handbook and the MNE Department Graduate Student Handbook in Appendix E.

The following are the variety of the methods used to measure learning outcomes.

- (a) Short tests and hour-long exams are given several times during the course of the semester. These exams are meant to check whether or not the learning outcomes of individual courses are actually achieved.
- (b) Home works assignments are assigned during the semester to enhance learning and check the learning outcomes. Graded home works and feedbacks/discussions in class or office hours enrich students' learning experiences.
- (c) Course project assignment and reports are required in some courses, these projects are designed to test students' learning results and outcomes. Some of these assignments are open-ended (e.g. ISE students shall identify a project in MNE 564/560 by reaching out local industry or institutions) to promote creativity, problem solving, and critical thinking.
- (d) Students enrolled in the MS thesis or project option are required to submit their theses/project reports to committee member for review and present and defend their work in an hour-long seminar open to the entire university community. They are also expected to answer questions from the audience to the satisfaction of the thesis or project committee. The committee consists of three or more faculty specializing in that area.

The learning outcomes are achieved by most of the students enrolled in the program (all graduated students have no more than two courses lower than B-, about 2% enrolled students were dismissed because of poor performance), and excellent universities and companies accept our graduates.

How is assessment of student learning outcomes used in reviewing or evaluating program curriculum and faculty?

Faculty, through experience and observation bring recommendations to the appropriate committee for action. Changes are made to individual courses, and they are added or removed from the curriculum based on feedback received from current students(e.g. by the end of semester course evaluation forms and via emails), alumni and the Industrial Advisory Board (annual IAB meeting). Feedback from the Department Industrial

Advisory Board is given a serious consideration. Faculty assignments are also reviewed in light of assessment of student learning outcomes and evaluation of faculty by students taking the courses.

In what ways does the program evaluate student success following graduation and the program's contribution to that success?

One of the goals of the MNE MS/ISE programs is to encourage students who are enrolled in the thesis or project options to publish a paper or to write a technical reports upon graduation for wide dissemination of their work to benefit the scientific community or industry. ISE students also helped industry with their project results and reports, there have been several successful examples (e.g. Nye Lubricant Inc.(Fairhaven, MA), Phillip Light Inc. (Fall River, MA), etc.), that showed how these projects helped in solving the chronic problems of their company by applying what they learnt in the program. The programs have been successful in achieving this objective as evidenced by the papers and reports that have been written by those who have already graduated.

The program evaluates student success by following their careers. Recent graduates have successfully joined the work force. Our graduates have been hired as Mechanical Design Engineers and Manufacturing Engineers for numerous corporations (e.g. Caterpillar, Nye, NUWC, Raytheon, Johnson & Johnson, Lockheed Martin, etc.). Some very successful students got promoted to higher positions. For example, one ISE MS graduate has been promoted to the manager position of the R&D lab at Nye Lubricant Inc. Several MNE MS graduates have entered UMassD EAS Ph.D. program or enrolled in Ph.D. programs of other schools(e.g. Northeastern University, RPI, WPI, URI).

Over the long term, many of our former graduate students have found employment in the nearby area and have remained in contact with former instructors and mentors. They have consistently provided feedback on program quality through formal and informal mechanisms. Many now hold leadership positions in industry and government.

What is the role of the core faculty in teaching lower division, upper division and graduate courses? What is the rationale for these assignments?

Essentially, all faculty are expected to be able to teach lower division courses in their major (MNE), most upper divisional courses in their discipline (i.e. design, manufacturing, energy etc.) and graduate course in their interest area. Assignments are made nearly one year in advance by the Chairperson. Faculty are solicited as to what courses they want to teach and the schedule. The Department Chair inform the faculty as to courses that need to be offered. The Chairperson makes final determinations based on need, resources and negotiations with faculty. Faculty requests are usually met.

5) Programs shall ensure that resources are used wisely.

Programs shall ensure that the resources available are used to meet Program goals and objectives, and as appropriate, engage in use of innovation to enhance resources; should

engage in both intra- and inter-campus collaboration; and should demonstrate a commitment to effective and efficient use of resources. The review should answer the following questions:

- *What process does the Program use to allocate resources?*

The direct financial resources available to the MNE department are through the Major Fees, CSF and Indirect account (build through indirect recovery of grant-funded research). Major Fees are used to support all instructional needs of faculty. This fee is also used for all the support for instructional laboratories. This includes all physical and computational laboratories (excluding faculty research laboratories). In particular, this fee supports the license for all our software needs. A majority of the software license fees are instructional fees for classes that students take at the undergraduate and graduate level. In addition, part of the license fee pays for research license for certain modules of a software. The amount for 2017-2018 was \$10000 and the amount will be increasing in subsequent years. This is used to support thesis for students in the MS program. The major fee also has a portion allocated to faculty travel grants for their research.

The CSF fee is used to support outstanding graduate students as teaching assistants during their MS program. The amount of CSF fees allocation comes from the Dean's office in consultation with the department. Over the last seven years, Mechanical Engineering has been receiving between five and six positions per year amounting to an allocation of \$80-100K/year approximately.

The indirect account has been used by the department as additional resource to augment our programs. This account is a discretionary account that the department Chair uses to support department goals and objectives. It has been used as seed money and start-up support for faculty in their research. This has in turn helped faculty to support graduate students to do research and work towards their thesis. This fund has also been used to support graduate student and faculty travel for conferences to present their research.

- *In what ways does the Program maximize the use of its human resources?*

The department has limited faculty and staff resources. It currently has seven faculty and two Full time lecturers (FTLs). In addition, we have a laboratory technician, a machinist, a half-time computer technician and an administrative assistant. We cater to the undergraduate program (320 students), the MS program which has approximately twenty students distributed between the regular MS and the ISE program. The department also participates in three interdepartmental Ph. D. programs and we have graduated eight Ph. D. students in the last eight years.

Faculty recruitment has been strategic to allow resources to be allocated in the growth areas. For our MS programs we teach in an interdisciplinary manner where some core courses (MNE 501 and MNE 502) are cross-listed with other departments and taught by faculty from the department of Mathematics. Similarly students are able to take interdisciplinary technical elective courses from other departments to fulfill their requirement. Our faculty are typically asked to teach one graduate course in their area of

expertise every year. In some cases they are asked to teach a core course for the curriculum (MNE 503). In this way we are offering 6-7 courses per year from the department. Another manner in which we optimize our resources is by allowing cross-listing of the graduate courses with undergraduate technical elective courses, thereby allowing a healthy class size with both undergraduate and graduate students. In summary, all creative ways are used to maximize our faculty resources.

Our newly instituted ISE option requires offering two courses per semester or four courses per year. Our department had two faculty in the ISE program who offered two courses per semester. With one faculty having retired and the ISE student population having grown to be half of the graduate program, we need the additional resource for teaching the other set of courses. Currently they are being taught by an FTL.

- *In what ways does the Program maximize the use of material resources such as space, equipment, operating funds, etc.?*

Faculty have research spaces assigned to them from the University administration. Graduate students working with research active faculty have space in the research buildings. They would have easy access to centralized computing facilities remotely from their research space. Over the last several years, there are rooms in several buildings that have been designated as graduate student offices by the College of Engineering for MS and Ph. D. students from several engineering disciplines.

The Mechanical Engineering department has a machine shop supported by a full time machinist, a technician and a half time computer technician. These people are always available for support to the students and faculty for their research. Graduate students working on their thesis have access to all the equipment in the shop with proper safety training.

MNE AQAD Report Appendices

Appendix A

UMASSD AQAD Guidelines and Process Timeline and AQAD Data Book for the MNE Departments

**UNIVERSITY OF MASSACHUSETTS ACADEMIC QUALITY
ASSESSMENT AND DEVELOPMENT
(Doc. T97-111, Performance Measurement System)
AQAD GUIDELINES**

Academic Quality Assessment and Development is a component of the University Performance Measurement System. The primary purpose of this component is to assess and improve the core academic functions of teaching and learning, research/professional/creative activity, and public service/academic outreach through an ongoing system of quality control/program assessment at the unit level (i.e., department or program).

Each campus will establish, in consultation with the President's office and in accordance with these guidelines, procedures for implementing the Academic Quality Assessment and Development. These procedures will include a list of units (programs/departments), hereinafter called "Programs", to be reviewed; the cycle of reviews; and a list of core data to be used in Program reviews on that campus. The "Program Chair" shall be defined as the person with administrative oversight of the Program. Campus procedures shall be approved by the President.

All Programs will address the same core evaluation criteria, although these criteria will have varying degrees of relevance and applicability across the campus. Programs undergoing reviews for other purposes (e.g., accreditation) may submit these reviews in lieu of the Academic Quality Assessment and Development review, provided the review addresses the core criteria. If not, the Program shall prepare and submit a supplemental document addressing the core criteria.

Process

1. Each Program shall be reviewed on a regular cycle. Ordinarily, the length of time between reviews may be no more than five to seven years, but campus procedures may establish the circumstances under which exceptions to this timeframe may be granted.
2. Each Program review shall be conducted with the participation of Program faculty members.
3. Each Program review shall consist, minimally, of the following written documents: a Program self-assessment, the external reviewers' report, a Program response to the reviewers' report, and an action plan based on the review. These written documents will be submitted to the Dean. Faculty within the Program will receive copies of all documents.
4. Each Program shall be reviewed by a team of no fewer than two external reviewers from outside the campus (one reviewer may be from another campus within the University system). The Dean, in consultation with the Program chair and faculty members, will choose the external reviewers. The campus procedures shall stipulate the questions to be addressed by the external reviewers.
5. The Dean will review and comment on the written reports. The Dean's comments will be distributed to all Program faculty, who may prepare a written response to his/her comments. The Dean will forward the Program self-assessment, external reviewers' report, Program response to the reviewers' report, and his/her comments with faculty responses, if any, to the Provost. Prior to accepting the review, the Provost will meet with the Program chair and the Dean to discuss the review and action plan.

6. The Provost of each campus shall forward to the President's office annually an executive summary of the Program reviews conducted. The summaries shall be submitted no later than June 30th. The documents comprising a review shall not, as a general matter, be circulated beyond the campus.

Core criteria and related questions

1. Programs shall ensure that their goals and objectives are linked to the campus mission and strategic priorities.

The Program should evaluate its purpose and planning in light of the campus mission and strategic priorities. The review should answer the following questions:

- What is the Program's mission and is it clearly aligned with the campus mission and direction?
- How does the Program's mission relate to curriculum; enrollments; faculty teaching, research/professional/creative activity, and outreach? Is it aligned with the campus strategic priorities?

2. **Programs shall ensure that curriculum is relevant, rigorous, current and coherent.**

The need to provide a high quality education for students should be the primary consideration when evaluating the relevancy, currency, and coherence of curricula. Evaluation of the curriculum should reflect an awareness of changing knowledge, trends in the discipline, and the professional context for curriculum. The review should answer the following questions:

- How does the Program determine curricular content? How does the curriculum relate to current existing standards, if any, of the discipline?
- What internal or external measures of review are employed to ensure that the curriculum is relevant and up-to-date?
- Are the curricular offerings structured in a logical, sequential and coherent manner? Is there an appropriate balance between breadth and depth?
- If consistent with the Program mission, does the curriculum adequately prepare students for further study or employment?
- In what way does the Program contribute to the education of students in terms of general knowledge, critical thinking capacity and other essential cognitive skills?

3. **Programs shall ensure faculty quality and productivity.**

Programs shall ensure that faculty possess the expertise to assure effective curriculum development, instructional design and delivery, and evaluation of outcomes. Faculty should exhibit awareness of trends in the discipline and the professional field as appropriate. Collectively, faculty should be involved in teaching, research/ professional/creative activity, and public service/academic outreach as appropriate to the mission and regional context of the campus. The review should answer the following questions:

- Do faculty possess the appropriate background, experience and credentials?

- Are faculty current in relation to the knowledge base and content of the discipline and curricular offerings?
- Are the Program expectations for faculty involvement in teaching, research/ professional/creative activity, and public service/academic outreach activities appropriate; and how are these expectations met? Are these expectations consistent with program policies regarding teaching assignments, merit allocations, and other aspects of faculty roles and rewards?
- In what ways does the Program foster professional development and growth of faculty?
- In what ways does the Program faculty lend its professional expertise – as expressed through teaching and research, scholarly and creative activity – to off-campus constituencies?

4. Programs shall ensure teaching/learning environments that facilitate student success.

Programs shall provide learning environments that promote student success. Students are expected to learn both content and skills appropriate to the discipline. The program should indicate clear expectations for student learning outcomes. The teaching/learning environment should be accessible to all students, should include a variety of instructional methodologies, and should provide timely feedback to students. The review should answer the following questions:

- To what extent does the Program have articulated learning outcomes (content and skills) for students? By what means are these outcomes measured? Are they achieved by most students?
- How is assessment of student learning outcomes used in reviewing or evaluating Program curriculum and faculty?
- In what ways does the Program evaluate student success following graduation and the Programs' contribution to that success?
- What is the role of the core faculty in teaching lower division, upper division and graduate courses? What is the rationale for these assignments?
- Metrics on Freshman and overall retention and graduation rates shall be provided for the period since the previous AQAD review.

5. Programs shall ensure that resources are used wisely.

Programs shall ensure that the resources available are used to meet Program goals and objectives, and as appropriate, engage in use of innovation to enhance resources; should engage in both intra- and inter-campus collaboration; and should demonstrate a commitment to effective and efficient use of resources. The review should answer the following questions:

- What process does the Program use to allocate resources?
- In what ways does the Program maximize the use of its human resources?
- In what ways does the Program maximize the use of material resources such as space, equipment, operating funds, etc.?

	Process Task	by	Resource Names	Action
1	AQAD Process Initiation	Thu Jul 19, 2018	Provost's Office, Dean, Dept. Chairs, OIRA	Review process
2	AQAD Repository	Fri July 27, 2018	Dean	Share data, samples of reports and template for self-study
3	Identify AQAD Team Leaders	Fri Aug 17, 2018	Dept. Chair	Identify dept. coordinator(s). Form AQAD committee
4	Begin Self-Study	Fri Sep 14, 2018	AQAD Committee, Dept. Chair	Review process begins
5	Complete Self-Study Draft	Fri Nov 9 2018	AQAD Committee, Dept. Chair	Dept. prepares AQAD report
6	Review Draft & Provide Feedback	Mon Nov 26, 2018	AQAD Committee, Dept. Chair, Provost's Office	Dean/Provost Office review initial draft. Feedback provided
7	Identify External Evaluation Team	Fri Dec 14, 2018	AQAD Committee, Dept. Chair	Identify potential reviewers. Share list with the Dean
8	Finalize List of Reviewers Send out Invites	Fri Jan 18, 2019	Dept. Chair, Dean	Dean reviews list, approves & selects external reviewers. The Provost must approve the final external evaluation team
9	Finalize Site Visit Date	Fri Feb 1, 2019	AQAD Committee, Dept. Chair, Provost's Office, Dean, External Reviewers	Dept. Chair coordinates with Dean, Provost's office, and external reviewers to finalize site visit dates
10	Review & Finalize Report	Fri Feb 1, 2019	AQAD Committee, Dept. Chair	Revision of report based on feedback from Provost/Dean
11	Provide Agenda for Site Visit	Fri March 1, 2019	Dept. Chair, Provost's Office	Finalize agenda for site visit including exit meeting with Provost
12	Email Report to Reviewers	Fri March 15, 2019	Dept. Chair	Final self-study emailed to external reviewers. Copies provided to the Dean, Provost's office, and OIRA
13	External Reviewer Visit Prep	Fri April 19 2019	AQAD Committee, Dept. Chair, Provost's Office, Dean	Dept. Chair arranges for accomodation, travel, parking etc. Thank you letters sent out with inquiry on anticipated timetable for receipt of reviewers report
14	Receipt of External Reviewers Report	Fri May 24, 2019 (moving target)	Dept. Chair, Provost's Office, Dean	Dept. Chair receives report. Provides copies to the Dean and Provost's office
15	Department Responds	Fri Jun 7, 2019	Dept. AQAD Committee, Dept. Chair	Dept. reviews and prepares response. Submit to Dean
16	Dean Responds	Fri Jun 21, 2019	Dean	Dean reviews external report and departmental response. Dean provides reponse to Provost's office and OIRA
17	Meet with Provost	Date (moving target)	Dean, Dept. Chair	Upon receipt of Dean's response, Provost meets with Dept. Chair, AQAD committee and Dean
18	Provost Provides Notes & Summaries	Date (moving target)	Provost's Office, OIRA	Provost compiles a report for submission to UMass President's Office
19	Submit AQAD report to UMass President's Office	Date (moving target)	Provost's Office, OIRA	Final submission to UMass President's Office

Mechanical Engineering Department
Undergraduate Admissions

	Fall 2011		Fall 2012		Fall 2013		Fall 2014		Fall 2015		Fall 2016		Fall 2017	
	Freshmen	Transfers	Freshmen	Transfers	Freshmen	Transfers	Freshmen	Transfers	Freshmen	Transfers	Freshmen	Transfers	Freshmen	Transfers
Applied	212	34	265	36	292	42	282	26	276	42	288	29	277	48
Accepted	174	26	218	30	254	32	247	19	230	35	246	23	144	41
Denied	37	8	46	6	36	10	34	6	45	7	42	6	23	5
Enrolled	37	16	60	17	58	16	77	11	68	23	51	17	57	21
% Accepted	82%	76%	82%	83%	87%	76%	88%	73%	83%	83%	85%	79%	52%	85%
% Enrolled	21%	62%	28%	57%	23%	50%	31%	58%	30%	66%	21%	74%	40%	51%
Average High School GPA	3.31	**	3.33	**	3.36	**	3.19	**	3.36	**	3.37	**	3.48	**
Average Verbal SAT	520	**	544	**	520	**	523	**	534	**	538	**	****	**
Average SAT ERWS	****	****	****	****	****	****	****	****	****	****	****	****	560	**
Average Math SAT	597	**	596	**	579	**	575	**	582	**	590	**	****	**
Average SAT MSS	****	****	****	****	****	****	****	****	****	****	****	****	597	**
Average Total SAT	1118	**	1140	**	1099	**	1098	**	1116	**	1128	**	****	**
Average New SAT Total	****	****	****	****	****	****	****	****	****	****	****	****	1157	**
Average Writing SAT	***	**	***	**	503	**	499	**	472	**	507	**	****	**

*Average test scores are only shown when 3 or more enrolled students submitted scores.

**Transfer students do not have to submit SAT scores and High School GPAs.

***Started to report Average Writing SAT Fall 2013.

****College Board redesigned the SAT test new scoring started Fall 2017.

Graduate Admissions							
	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017
Applied	16	35	28	30	40	57	53
Accepted	10	22	14	18	31	29	24
Denied	5	11	14	12	9	19	17
Enrolled	6	8	7	2	8	11	9
% Accepted	63%	63%	50%	60%	78%	51%	45%
% Enrolled	60%	36%	50%	11%	26%	38%	38%
Average College GPA	***	3.44	3.42	***	3.37	3.13	3.38
Average GRE Quan	*	747	--	--	--	--	--
Average GRE Quan Scaled	--	--	164	*	159	*	*

*Average test scores are only shown when 3 or more enrolled students submitted scores.

**Starting Fall 2011 College GPA was reported.

***Average College GPA is only shown when 3 or more enrolled students submitted College GPA.

Enrollment by Major														
	Fall 2011		Fall 2012		Fall 2013		Fall 2014		Fall 2015		Fall 2016		Fall 2017	
	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2	Major 1	Major 2
MNE-BS	284	0	270	0	271	0	294	1	337	1	334	0	305	0
MNE-BS MNEM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MNE-MS	35	0	21	1	26	0	19	0	18	1	18	0	22	0
MNE-MS ISE	0	0	0	0	0	0	0	0	4	0	12	0	9	0
ISE-PBC	*	*	*	*	*	*	*	*	0	0	0	0	0	0
Total	319	0	291	1	297	0	313	1	359	2	364	0	336	0

*ISE-PBC began in Fall 2015.

Enrollment in Minors							
	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017
MNE-MN	1	0	0	0	0	1	2

*Includes Minor 1 and Minor 2

LAR Majors with Mechanical Engineering Subplan							
	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017
	--	--	--	--	--	--	--

*Liberal Arts major with a subplan of Mechanical Engineering is not available

First Year Retention Rate			
	Within Department	Within College	Within University
Fall 2016 Cohort	71.7%	71.7%	77.4%
Fall 2015 Cohort	66.2%	66.2%	70.6%

Fall 2014 Cohort	68.8%	70.1%	74.0%
Fall 2013 Cohort	67.2%	74.1%	84.5%
Fall 2012 Cohort	81.0%	84.5%	86.2%
Fall 2011 Cohort	72.2%	77.8%	83.3%
Fall 2010 Cohort	67.9%	71.4%	76.8%

Six Year Graduation Rate			
	Within Department	Within College	Within University
Fall 2011 Cohort	55.6%	66.7%	72.2%
Fall 2010 Cohort	41.1%	42.9%	51.8%
Fall 2009 Cohort	29.3%	32.0%	42.7%
Fall 2008 Cohort	33.3%	36.4%	50.0%
Fall 2007 Cohort	45.3%	47.2%	56.6%
Fall 2006 Cohort	31.6%	35.1%	42.1%
Fall 2005 Cohort	41.3%	50.0%	63.0%

Academic Standing														
	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018
Academic Dismissal	2	8	1	2	7	9	4	10	6	13	4	9	6	12
Academic Probation	12	17	4	18	25	12	34	15	35	10	25	25	27	10
Academic Warning	59	43	55	39	22	24	35	30	41	52	48	53	40	52
Chancellor's List	12	8	13	10	17	14	11	18	14	16	18	16	18	23
Dean's List	47	61	46	46	54	50	70	61	69	71	58	60	52	43
Dismissed - Reinstated by Appeal	0	0	0	0	3	5	6	4	3	6	1	5	3	5
Extended Probation	3	0	0	0	0	1	1	1	1	3	1	0	3	1
Subject to Dismissal	5	4	6	0	0	0	0	0	0	0	0	0	0	0
Total	140	141	125	115	128	115	161	139	169	171	155	168	149	146

Degrees Conferred							
	2011	2012	2013	2014	2015	2016	2017
MNE-BS	42	55	53	36	51	41	71
MNE-BS MNEM	1	0	0	1	7	4	1
MNE-MS	8	7	12	10	8	9	5
MNE-ME ISE	0	0	0	0	0	3	3
Total	51	62	65	47	66	57	80

**Includes Major 1 and Major 2*

Faculty Headcount with FTE

	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017
Tenured	9.0	9.0	10.0	9.0	8.0	8.0	6.0
Tenure Track	2.0	1.0	1.0	1.0	1.0	1.0	1.0
Full Time Lecturers	0.0	0.0	1.0	1.0	1.0	1.0	2.0
Part Time Lecturers	1.0	5.0	2.0	0.0	0.0	0.0	0.0
Instructors / PCE Instructors	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	12.0	15.0	14.0	11.0	10.0	10.0	9.0
Full Time Equivalency (FTE)	11.33	11.67	12.67	11.00	10.00	10.00	9.00

**Includes faculty on sabbatical but not those on leave of absence*

SCH by Department							
	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017
Undergraduate	1,895.0	2,098.0	2,221.0	2,556.0	2,442.0	2,312.0	2,320.0
Graduate	208.0	202.5	268.0	147.0	256.0	191.5	161.0
Total	2,103.0	2,300.5	2,489.0	2,703.0	2,698.0	2,503.5	2,481.0

**Student Credit Hours come from the Delaware Study.*

***Student Credit Hours are from the faculty department.*

SCH by Faculty Type							
	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017
Tenured / Tenure Track	1,941.0	1,543.5	1,638.0	2,170.0	2,245.0	2,043.5	1,389.0
Full Time Lecturers	0.0	0.0	396.0	429.0	369.0	312.0	699.0
Part Time Lecturers	96.0	757.0	365.0	0.0	0.0	0.0	0.0
Teaching / Research Assistants	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All Other Instructor Types	66.0	0.0	90.0	104.0	84.0	148.0	393.0
Total	2,103.0	2,300.5	2,489.0	2,703.0	2,698.0	2,503.5	2,481.0

*Student Credit Hours come from the Delaware Study.
**Student Credit Hours are from the faculty department.

Mechanical Engineering Student Credit Hours, FTEs and Student Faculty Ratios by Department

Faculty FTE	2012			2013			2014			2015			2016			2017		
	FT Faculty	PT Faculty	FTE	FT Faculty	PT Faculty	FTE	FT Faculty	PT Faculty	FTE	FT Faculty	PT Faculty	FTE	FT Faculty	PT Faculty	FTE	FT Faculty	PT Faculty	FTE
	10	5	11.67	12	2	12.67	11	0	11.00	10	0	10.00	10	0	10.00	9	0	9.00

Common Data Set	2012				2013				2014				2015				2016				2017			
	FT Student	PT Student	Student FTE	Ratio	FT Student	PT Student	Student FTE	Ratio	FT Student	PT Student	Student FTE	Ratio	FT Student	PT Student	Student FTE	Ratio	FT Student	PT Student	Student FTE	Ratio	FT Student	PT Student	Student FTE	Ratio
	261	30	271.00	23.2:1	264	33	275.00	21.7:1	278	35	289.67	26.3:1	323	36	335.00	33.5:1	315	49	331.33	33.1:1	293	43	307.33	34.1:1

Majors Method	UG FTE	G FTE	Student FTE	Ratio	UG FTE	G FTE	Student FTE	Ratio	UG FTE	G FTE	Student FTE	Ratio	UG FTE	G FTE	Student FTE	Ratio	UG FTE	G FTE	Student FTE	Ratio	UG FTE	G FTE	Student FTE	Ratio
	256.3	7.7	264.00	22.6:1	261.1	9.7	270.80	21.4:1	273.8	9.2	283.00	25.7:1	317.3	14.6	331.90	33.2:1	308.37	22.56	330.93	33.1:1	286.47	19.83	306.30	34.0:1
	U crs FTE	G crs FTE	IFTE	Ratio	U crs FTE	G crs FTE	IFTE	Ratio	U crs FTE	G crs FTE	IFTE	Ratio	U crs FTE	G crs FTE	IFTE	Ratio	U crs FTE	G crs FTE	IFTE	Ratio	U crs FTE	G crs FTE	IFTE	Ratio

Instructional Method	88.00	18.50	106.50	09.1:1	85.70	18.80	104.50	08.3:1	103.60	11.90	115.50	10.5:1	108.30	24.90	133.20	13.3:1	116.50	22.90	139.40	13.9:1	106.70	20.90	127.60	14.2:1

Faculty FTE - FT faculty + (PT faculty/3)
Common Data Set - (FT Student + (PT student/3))/Faculty FTE
Majors Method - (Student Major1 only attempted hours divided by 15 for undergraduate and law and divided by 9 for graduate)/Faculty FTE
Instructional Method - ((Undergraduate and Law courses total student credit hours/15) + (Graduate courses total student credit hours/9))/Faculty FTE.

Mechanical Engineering Direct Instructional Expenditure Per FTE Student

	Fall 2011 Ratio	Fall 2012 Ratio	Fall 2013 Ratio	Fall 2014 Ratio	Fall 2015 Ratio	Fall 2016 Ratio	Fall 2017 Ratio
Direct instructional expenditure per FTE student	\$12,876	\$11,492	\$11,759	\$12,614	\$12,281	\$12,018	NA

*Fall 2017 ratio is unavailable.

Average Class Size by Department				100			200			300			400			GRAD		
				Total Enrollment	Number of Sections	Average	Total Enrollment	Number of Sections	Average	Total Enrollment	Number of Sections	Average	Total Enrollment	Number of Sections	Average	Total Enrollment	Number of Sections	Average
2010 Fall	CEGR	Mechanical Engineering Dept	Individualized	0	0	0.0	1	1	1.0	2	2	1.0	0	0	0	29	9	3.2
			LAB	0	0	0.0	67	6	11.2	107	6	17.8	89	7	12.7	0	0	0
			Organized	0	0	0	0	0	0	61	1	61.0	102	3	34.0	65	4	16.3
	2010 Fall			0	0	0.0	68	7	9.7	170	9	18.9	191	10	19.1	94	13	7.2
2011 Spring	CEGR	Mechanical Engineering Dept	Individualized	0	0	0.0	3	3	1.0	1	1	1.0	1	1	1.0	26	8	3.3
			LAB	0	0	0.0	59	4	14.8	0	0	0	56	4	14.0	0	0	0
			Organized	0	0	0.0	78	1	78.0	0	0	0	249	9	27.7	49	5	9.8
	2011 Spring			0	0	0.0	140	8	17.5	1	1	1.0	306	14	21.9	75	13	5.8
2011 Fall	CEGR	Mechanical Engineering Dept	Individualized	0	0	0.0	1	1	1.0	1	1	1.0	1	1	1.0	25	10	2.5
			LAB	0	0	0.0	74	5	14.8	134	7	19.1	53	4	13.3	0	0	0
			Organized	0	0	0	0	0	0	71	1	71.0	89	4	22.3	51	6	8.5
	2011 Fall			0	0	0.0	75	6	12.5	206	9	22.9	143	9	15.9	76	16	4.8
2012 Spring	CEGR	Mechanical Engineering Dept	Individualized	0	0	0.0	22	2	11.0	2	1	2.0	5	4	1.3	25	9	2.8
			LAB	0	0	0.0	60	4	15.0	63	4	15.8	0	0	0	0	0	0
			Organized	0	0	0.0	83	1	83.0	0	0	0	246	8	30.8	34	4	8.5
	2012 Spring			0	0	0.0	165	7	23.6	65	5	13.0	251	12	20.9	59	13	4.5
2012 Fall	CEGR	Mechanical Engineering Dept	Individualized	0	0	0	0	0	0	0	0	0	2	1	2.0	14	11	1.3
			LAB	0	0	0.0	56	4	14.0	105	7	15.0	55	4	13.8	0	0	0
			Organized	0	0	0	0	0	0	54	1	54.0	114	5	22.8	53	6	8.8
	2012 Fall			0	0	0.0	56	4	14.0	159	8	19.9	171	10	17.1	67	17	3.9
2013 Spring	CEGR	Mechanical Engineering Dept	Individualized	0	0	0.0	9	1	9.0	0	0	0	5	5	1.0	18	10	1.8
			LAB	0	0	0.0	50	4	12.5	44	4	11.0	0	0	0	0	0	0
			Organized	0	0	0.0	82	1	82.0	0	0	0	260	8	32.5	35	5	7.0
	2013 Spring			0	0	0.0	141	6	23.5	44	4	11.0	265	13	20.4	53	15	3.5
2013 Fall	CEGR	Mechanical Engineering Dept	Individualized	0	0	0.0	3	2	1.5	0	0	0	4	4	1.0	18	13	1.4
			LAB	0	0	0.0	80	4	20.0	92	6	15.3	42	4	10.5	0	0	0
			Organized	0	0	0	0	0	0	48	1	48.0	96	5	19.2	47	5	9.4
	2013 Fall			0	0	0.0	83	6	13.8	140	7	20.0	142	13	10.9	65	18	3.6
2014 Spring	CEGR	Mechanical Engineering Dept	Individualized	0	0	0.0	11	1	11.0	0	0	0	5	5	1.0	19	7	2.7
			LAB	0	0	0.0	73	4	18.3	44	4	11.0	0	0	0	0	0	0
			Organized	0	0	0.0	93	1	93.0	0	0	0	233	8	29.1	42	6	7.0
	2014 Spring			0	0	0.0	177	6	29.5	44	4	11.0	238	13	18.3	61	13	4.7
2014 Fall	CEGR	Mechanical Engineering Dept	Individualized	0	0	0.0	3	1	3.0	0	0	0	0	0	0	16	10	1.6
			LAB	0	0	0.0	88	6	14.7	117	7	16.7	56	4	14.0	0	0	0
			Organized	0	0	0	0	0	0	59	1	59.0	118	6	19.7	31	5	6.2
	2014 Fall			0	0	0.0	91	7	13.0	176	8	22.0	174	10	17.4	47	15	3.1
2015 Spring	CEGR	Mechanical Engineering Dept	Individualized	0	0	0	15	1	15.0	0	0	0	3	3	1.0	14	4	3.5
			LAB	0	0	0	82	4	20.5	52	4	13.0	0	0	0	0	0	0
			Organized	97	2	48.5	125	1	125.0	51	1	51.0	181	7	25.9	63	8	7.9
	2015 Spring			97	2	48.5	222	6	37.0	103	5	20.6	184	10	18.4	77	12	6.4
2015 Fall	CEGR	Mechanical Engineering Dept	Individualized	0	0	0	1	1	1.0	0	0	0	1	1	1.0	13	8	1.6
			LAB	0	0	0	98	6	16.3	174	7	24.9	52	4	13.0	0	0	0
			Organized	0	0	0	0	0	0	0	0	0	108	4	27.0	75	6	12.5
	2015 Fall			0	0	0	99	7	14.1	174	7	24.9	161	9	17.9	88	14	6.3

Average Class Size by Department				100			200			300			400			GRAD		
				Total Enrollment	Number of Sections	Average	Total Enrollment	Number of Sections	Average	Total Enrollment	Number of Sections	Average	Total Enrollment	Number of Sections	Average	Total Enrollment	Number of Sections	Average
2016 Spring	CEGR	Mechanical Engineering Dept	Individualized	0	0	0	5	1	5.0	0	0	0	2	2	1.0	15	12	1.3
			LAB	0	0	0	79	4	19.8	76	5	15.2	0	0	0	0	0	0
			Organized	94	2	47.0	127	1	127.0	151	2	75.5	146	9	16.2	73	7	10.4
	2016 Spring			94	2	47.0	211	6	35.2	227	7	32.4	148	11	13.5	88	19	4.6
2016 Fall	CEGR	Mechanical Engineering Dept	Individualized	0	0	0	1	1	1.0	0	0	0	2	2	1.0	16	14	1.1
			LAB	0	0	0	90	6	15.0	148	7	21.1	74	5	14.8	0	0	0
			Organized	0	0	0	0	0	0	0	0	0	189	6	31.5	59	6	9.8
	2016 Fall			0	0	0	91	7	13.0	148	7	21.1	265	13	20.4	75	20	3.8
2017 Spring	CEGR	Mechanical Engineering Dept	Individualized	0	0	0	7	1	7.0	0	0	0	2	2	1.0	23	16	1.4
			LAB	0	0	0	91	4	22.8	59	4	14.8	0	0	0	0	0	0
			Organized	79	2	39.5	136	1	136.0	118	2	59.0	238	11	21.6	45	9	5.0
			Other	0	0	0	6	1	6.0	0	0	0	0	0	0	0	0	0
2017 Spring			79	2	39.5	240	7	34.3	177	6	29.5	240	13	18.5	68	25	2.7	

*Day Session only

MNE MS Completers 2011-2018

First Name	Middle Name	Last Name	Person ID	Academic Career Code	Academic Group Code	Program Code	Plan Code	Subplan	Degree Conferred Date
Adeel		Ahmed	01620332	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2018
Behrooz		Amirzadeh	01364983	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2015
Ardavan		Ardeshirilajimi	01316237	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2014
Joshua	David	Avery	00879164	GRAD	CEGR	MNE-G	MNE-MS	-	05/14/2016
Umesh		Babariya	01541559	GRAD	CEGR	MNE-G	MNE-MS	ISE	05/13/2017
Matthew	R	Bach	00774656	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2016
Ranjoy		Barua	01541964	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2018
Allen	Lee	Beaune	00234490	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2011
Richard		Bellizzi	01230944	GRAD	CEGR	MNE-G	MNE-MS	ISE	01/31/2018
Steven	Paul	Bender	00732818	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2011
Samuel	G.	Benoit	01069970	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2015
Leandre	Rand	Berard	01014390	GRAD	CEGR	MNE-G	MNE-MS	-	05/16/2015
Bryan	M	Blair	00166127	GRAD	CEGR	MNE-G	MNE-MS	-	05/17/2014
Thomas	John	Calef	00147077	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2013
Shane	Michael	Cardoso	00874877	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2012
Prasun		Chatterjee	01180250	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2014
Noemi	Asia	Chiriack	00806343	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2012
Stephen	Robert	Codyer	00879201	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2012
Brent	Benjamin	Collins	00211033	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2011
Hector	O.	Colon	00953425	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2012
John	V	Costa	00646753	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2014
William	Augustine	Flaherty	00830775	GRAD	CEGR	MNE-G	MNE-MS	ISE	05/14/2016
Karoly		Fodor	01310207	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2017
Jason	Tyler	Galary	00315936	GRAD	CEGR	MNE-G	MNE-MS	ISE	05/14/2016
Tejaswi		Garigipati	00988615	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2011
Nicole	Elizabeth	Genco	00179399	GRAD	CEGR	MNE-G	MNE-MS	-	05/11/2013
Amirmahdi		Ghasemi	01244280	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2013
Yabo		Han	01179962	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2016
Mohammad Mukit		Hasan	01594293	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2018
John	C	Jacobsen	00331026	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2014
Niloofer		Jalali	01164085	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2013
Arun Prabhakar		Kaile	00828633	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2010
Aakash		Kardam	01676582	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2018
Anirudh		Kaushik	01005969	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2012
Jared	J	Kelly	01118413	GRAD	CEGR	MNE-G	MNE-MS	-	05/17/2014
Jonathan	Alexander	Kenney	00343726	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2015
Peter	Bassam	Khoury	01528094	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2017
Bharath Reddy		Konda	00984663	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2012
Christopher	David	Lake	00719967	GRAD	CEGR	MNE-G	MNE-MS	-	05/11/2013
Che-Wei		Liu	01012614	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2012
Jinya		Liu	01154823	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2013
Ethan		Malay	01399075	GRAD	CEGR	MNE-G	MNE-MS	ISE	01/31/2017
Eugene		Manzone	00725940	GRAD	CEGR	MNE-G	MNE-MS	ISE	05/14/2016
Keith	Daniel	Marchand	00095105	GRAD	CEGR	MNE-G	MNE-MS	-	05/17/2014
Helio	D	Matos	00989241	GRAD	CEGR	MNE-G	MNE-MS	-	05/17/2014
Jonathan	Patrick	McHale	00726506	GRAD	CEGR	MNE-G	MNE-MS	-	05/16/2015
Matthew	R	Medas	00162972	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2012
Salman	Sohel	Mia	01612444	GRAD	CEGR	MNE-G	MNE-MS	ISE	01/31/2018
Brian		Mingels	01275718	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2017
Merrick		Monteiro	01557390	GRAD	CEGR	MNE-G	MNE-MS	ISE	08/31/2017
Arun Kumar		Mutyala	01627315	GRAD	CEGR	MNE-G	MNE-MS	ISE	01/31/2018
Bahaa	Samir	Nashed	00863949	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2012
Vinh	The	Nguyen	00911537	GRAD	CEGR	MNE-G	MNE-MS	-	05/14/2016
Vinay Kumar		Ningagalla	01061765	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2013
Matthew	Joseph	Oliveira	00734383	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2014
Sashank		Padamati	00883368	GRAD	CEGR	MNE-G	MNE-MS	-	05/22/2011
Abhishek		Pathri	01488922	GRAD	CEGR	MNE-G	MNE-MS	ISE	01/31/2017
Michael	Anthony	Pinto	00864660	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2013
Md Fazlay		Rabbi	01586960	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2018
Milad		Rakhsha	01417973	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2015
Spencer	Herbert	Rode	00711528	GRAD	CEGR	MNE-G	MNE-MS	-	05/22/2011
David	John	Ruggeri	00327174	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2012
Michael	Vincent	Salvucci	00860032	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2014
Aakash	Milind	Sathe	01592508	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2018
Koray		Senol	01420943	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2016

Bolong		Shi	01418840	GRAD	CEGR	MNE-G	MNE-MS	-	05/13/2017
Kirill		Shkolnik	01327351	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2016
Alexander	Nicholas	Sinkevich	00863124	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2015
Benjamin	D	Smith	00860889	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2015
Ramesh		Srivathsavai	00915171	GRAD	CEGR	MNE-G	MNE-MS	-	05/22/2011
Suchil Kumar		Suryadevara	00980705	GRAD	CEGR	MNE-G	MNE-MS	-	05/22/2011
Bennett	Thorton	Turk	00725306	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2014
Venkat Kalyan		Vadlamani	01015797	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2012
Pres	P	Valkovski	00810734	GRAD	CEGR	MNE-G	MNE-MS	-	09/01/2012
Gurudutt		Venkatesh	00890304	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2011
Xuyang		Wang	01445577	GRAD	CEGR	MNE-G	MNE-MS	-	01/31/2017
Sen		Yang	01342759	GRAD	CEGR	MNE-G	MNE-MS	-	08/31/2016
Josep	Patrick	Yarmac	00743614	GRAD	CEGR	MNE-G	MNE-MS	-	05/17/2014

Appendix B Curricula Vitae

EDUCATION

Ph.D. (University of Toronto, Department of Mechanical and Industrial Engineering (MIE)) 2010

Thesis: *Producing small droplets of aqueous solutions and molten metals using a pneumatic droplet generator*

Advisor: Professor Sanjeev Chandra

M.A.Sc. (University of Toronto, Dept. of MIE) 2006

Thesis: *Producing droplets smaller than the nozzle diameter by using a pneumatic droplet generator*

Advisor: Professor Sanjeev Chandra

B.Sc. (University of Tehran, Department of Mechanical Engineering) 1999

Thesis: *Optimization and enhancing the efficiency of heat exchangers used in condensers*

Advisor: Professor Ali Akhavan

TEACHING EXPERIENCE

University of Massachusetts, Dartmouth

Lecturer

EGR242 - Engineering Mechanics II (Dynamics) Spring semesters 2011 to 2018

PHY111- Physics for Science and Engineering I Spring 2011 and 2012

MNE391 - Mechanical Systems Spring semesters 2013 to 2018

EGR301 - Applied Engineering Mathematics Fall 2012

EGR102 - Introduction to Engineering & Applied Science II Fall 2011, 2014

MNE381 - Design of Machine Element

Fall 2013 and 2014, Spring 2016

EGR241 - Engineering Mechanics I (Statics)

Fall semesters 2013 to 2017, Spring 2014

EGR131 - Introduction to Design

Fall 2014

MNE101 - Introduction to Mechanical Engineering

Spring semesters 2015 to 2017

EGR111 - Introduction to Engineering and Computing

Fall semesters 2015 to 2017

University of Toronto, Department of MIE**Invited Lecturer****Dynamics**

Winter 2009 (90 students)

Taught the following topics to a class of 90 sophomore students:

- Planar kinetics of a rigid body
- Linear and angular momentum
- Conservation of momentum and energy

Teaching Assistant**Heat and Mass Transfer** (~120 students each year)

2006 – 2008

- Designed several heat transfer lab projects that involved experiments and numerical analyses using MATLAB programming.
- Demonstrated the general project procedure to the class. Supervised students throughout the course, and graded the project reports.

Dynamics (~90 students each year)

2006 – 2010

- Administered tutorials, demonstrated solutions to selected problems, and assisted students with problem sets and with understanding the concepts.
- Designed problems for midterm exams and quizzes.

Fluid Mechanics III (25 graduate students)

2008

- Assisted students with understanding the concepts, problem sets, and term projects.

RESEARCH EXPERIENCE**Graduate Research Assistant**

2004 – 2010

University of Toronto, Dept. of MIE, Center for Advanced Coating Technologies (CACT)

- Designed a pneumatic drop-on-demand droplet generator for producing micro-droplets (< 100 microns) of aqueous solutions and molten metals, with applications in bioengineering, rapid prototyping, and micro-soldering.
- Developed a novel methodology to produce droplets smaller than the nozzle diameter by application of controlled pressure pulses.
- Theoretical analysis of the flow and droplet formation in order to predict the pressure pulse

required for obtaining a desired droplet size.

- Experimentally investigated the effects of nozzle geometry on droplet formation and size.
- Optimization of the on-demand droplet generator for upward shooting of droplets in micro-soldering applications.
- Designed a special droplet generator with a secondary airflow for producing droplets of highly viscous fluids.

PUBLICATIONS

Peer-reviewed journal papers

1. **A. Amirzadeh**, M. Raessi, and S. Chandra, *Producing molten metal droplets smaller than the nozzle diameter using a pneumatic drop-on-demand generator*, Exp. Therm. Fluid Sci., Vol. 47, pp. 26-33 (2013).
2. **A. Amirzadeh** and S. Chandra, *Small droplet formation in a pneumatic drop-on-demand generator: Experiments and analysis*, Exp. Therm. Fluid Sci., Vol. 34, pp. 1488-1497 (2010).
3. **A. Amirzadeh** and S. Chandra, *Producing droplets smaller than the nozzle diameter by using a pneumatic drop-on-demand droplet generator*, Exp. Fluids, Vol. 44, pp. 105-114 (2008).

Publication in refereed conference proceedings (* indicates the presenter)

1. **A. Amirzadeh*** and S. Chandra, *Analytical and experimental study of small droplet formation in a pneumatic drop-on-demand generator*, International Conference on Liquid Atomization and Spray Systems ICLASS, Vail, CO, July 26-30 2009.
2. **A. Amirzadeh*** and S. Chandra, *Producing small molten tin droplets by using a pneumatic droplet generator*, Proceedings of the 20th Annual ILASS-Americas Conference, Chicago, IL, May 15-18, 2007.
3. **A. Amirzadeh*** and S. Chandra, *Producing droplets smaller than the nozzle diameter by using a pneumatic droplet generator*, Proceedings of the 19th Annual ILASS-Americas Conference, Toronto, ON, May 23-26, 2006.

ACADEMIC SERVICE

Advised senior design teams (each team 4 or 5 students) and engineering internship projects in the Mechanical Engineering Department at the University of Massachusetts, Dartmouth. Some projects include:

Spring 2014:	Wave Energy Converter
Academic year 2014-2015:	1) Plug insertion Fixture/Tooling 2) AFC Work Station
Academic year 2015-2016:	1) Seal Redesign 2) Miniature Manufacturing 3) Boiler Life Extension 1)
Academic year 2016-2017:	Time-Out Safety Valve 2) Dual-Reel Take-Up
Academic year 2017-2018:	1) Wheel Flange Lubrication System 2) Automated Small Part Orientation
3) Stylet Cap Automation	4) Redesign and standardization of elastic coupling

APPLIED ENGINEERING EXPERIENCE

Mechanical Engineer (full-time position)

1999 – 2002

Iran Auto Test and Research Co. (ITRAC), Tehran, Iran

- Established a climatic simulation lab, and performed thermal shock and climatic tests on automobile parts according to international standards such as Chrysler, Peugeot, and JASO.
- Analyzed and studied test results and recommended technical improvements to the part manufacturers.
- Trained and supervised lab technicians.

Engineering Intern

Summer 1997

Supplying Automotive Parts Co. (SAPCO), Tehran, Iran

Designed various testing devices according to international automobile standards for testing rubber materials used in automobile parts.

VOLUNTEER SERVICE

“All Science Challenge Event”, Toronto, Ontario

May 2007

Conducted and explained Aerodynamics and Fluid Mechanics experiments to students in grades 6-8.

“Society of Women Engineers Outreach Event”, Umass-Dartmouth

April 2013

Conducted and explained Pneumatic experiments to students in grades 5-8.

"College of Engineering Open House", Umass-Dartmouth

2013 -2018

Events are held in October, November and April every year

"Engineering Accepted Students Day", Umass-Dartmouth

March 2015

Explained the experiments conducted in the Robotics lab

"Freshman Orientation", Umass-Dartmouth

June and August 2016

AWARDS

- *Ontario Graduate Scholarship*, Government of Ontario (2008 and 2009).
- *Ontario Graduate Scholarship in Science and Technology*, Government of Ontario, University of Toronto, DuPont Canada (2006 and 2007).
- *University of Toronto Open Fellowship*, University of Toronto (2004 and 2005).

PROFESSIONAL AFFILIATIONS

American Society for Mechanical Engineering (ASME)
Institute of Liquid Atomization and Spray Systems (ILASS)

Amit Tandon
atandon@umassd.edu

ADDRESS:

University of Massachusetts
Dept. of Mechanical Engineering, College of Engineering
SMAST Affiliate Faculty, Dept. of Estuarine and Ocean Sciences
285 Old Westport Road, North Dartmouth, MA 02747

COMMUNICATIONS:

(508) 264-6617 Mobile
(508) 999-8357 Work

HIGHER EDUCATION:

1990-1992 Cornell University, Ph.D., Mechanical Engineering, 1992
1987-1990 Cornell University, M.S., Mechanical Engineering, 1990
1983-1987, IIT Kanpur, India, B. Tech., Mechanical Engineering Class of 1987

Academic Appointments:

University of Massachusetts Dartmouth: September 2010-Present. *Professor*, College of Engineering, 2004- August 2010, *Associate Professor with Tenure*, 1999-2004, *Assistant Professor*. Joint faculty with School of Marine Sciences (SMS) University of Massachusetts (intercampus), 1999-Present; Mechanical Engineering Graduate Program Director 2015-16; Affiliate Faculty SMAST 1999-Present.

Woods Hole Oceanographic Institution, 2013-present *Adjunct Scientist*.

University of California, Santa Cruz , January 1997 - June 1999. *Assistant Researcher*, Institute for Nonlinear Sciences.

University of Victoria (UVic): 1992-1996,UCAR postdoctoral fellowships

Awards:

Principal Scientist MISO-Bob 2017-2021, ASIRI- 2013-2017: Coordinating scientist and one of the Chief Scientists for the U.S. Office of Naval Research Air-Sea Interactions in the Northern Indian Ocean – Regional Initiative (ASIRI Departmental Research Initiative), as well as Oceanic Control of Monsoon Intra-seasonal Oscillations in the Tropical Indian Ocean and the Bay of Bengal (MISO-BOB) Air-Sea interaction initiative. Both ONR DRIs collaborate with Ocean Mixing and Monsoons (OMM) program of India supported by their Ministry of Earth Sciences. These DRIs bring together the ocean community from ten major US research institutions and nine Indian institutions.

Co-Chair, Second International Indian Ocean Expedition (IIOE-2, 2015-2020), Theme 4: Circulation, climate variability and ecosystem response.

Fulbright-Nehru Scholar award, 2017-2018: This award allowed me to work with multiple scientists and institutions in India 11/17 to 03/18, while mainly hosted at the Indian Institute of Science, Bangalore.

Fulbright Specialist Scholar, July 2014: Organized and taught workshop on Upper Ocean Physics with applications to the Bay of Bengal at Indian Institute of Science Bangalore.

University Corporation for Atmospheric Research (UCAR) Climate System Modeling Fellowship, 01/1995 - 12/1996: UVic Canada. Only two fellowships awarded.

UCAR Ocean Modeling Postdoctoral Fellowship, 11/1992 - 10/1994: UVic,

Canada. Only two fellowships awarded, on the basis of proposed research and past performance.

REFEREED PUBLICATIONS

Student advisees and **postdoc** co-authors appear in bold font.

Submesoscale Processes at Shallow Salinity Fronts in the Bay of Bengal: Observations during the Winter Monsoon, **Sanjiv Ramachandran** and Amit Tandon and nine others, Journal of Physical Oceanography, 48, 479-509, 2018, <https://doi.org/10.1175/JPO-D-16-0283.1>

[Book] Observing the Oceans in Real Time, Venkatesan, R., Tandon, A., D'Asaro, E., Atmanand, M.A. (Eds.), DOI 10.1007/978-3-319-66493-4, 323pp, 2018, Springer pub., <http://www.springer.com/us/book/9783319664927>

Recent Trends in Ocean Observations, R. Venkatesan, Amit Tandon, Debasis Sengupta, K. N. Navaneeth, 3-13, book chapter in Observing the Oceans in Real Time, Venkatesan et al. eds. 2018.

The impact of vertical eddy viscosity parameterizations on forced submesoscale eddy-resolving simulations, **Sonaljit Mukherjee**, **Sanjiv Ramachandran**, Amit Tandon and Amala Mahadevan. Ocean Modelling, September 2016. <http://www.sciencedirect.com/science/article/pii/S1463500316300737>

Introduction to the Special Issue on the Bay of Bengal: From Monsoons to Mixing. Mahadevan, A., T. Paluszkievicz, M. Ravichandran, D. Sengupta, and A. Tandon. 2016. Oceanography 29(2):14–17, <http://dx.doi.org/10.5670/oceanog.2016.34>.

A Tale of Two Spicy Seas, MacKinnon, J.A., J.D. Nash, M.H. Alford, A.J. Lucas, J.B. Mickett, E.L. Shroyer, A.F. Waterhouse, A. Tandon, D. Sengupta, A. Mahadevan, M. Ravichandran, R. Pinkel, D.L. Rudnick, C.B. Whalen, M.S. Albery, **J. Sreelekha**, E.C. Fine, **D. Chaudhuri**, and G.L. Wagner. 2016. Oceanography 29(2):50–61, <http://dx.doi.org/10.5670/oceanog.2016.38>.

Adrift Upon a Salinity-Stratified Sea: A View of Upper-Ocean Processes in the Bay of Bengal During the Southwest Monsoon. Lucas, A.J., J.D. Nash, R. Pinkel, J.A. MacKinnon, A. Tandon, A. Mahadevan, M.M. Omand, **M. Freilich**, D. Sengupta, M. Ravichandran, and A. Le Boyer. 2016. Oceanography 29(2):134–145, <http://dx.doi.org/10.5670/oceanog.2016.46>.

The Interplay Between Submesoscale Instabilities and Turbulence in the Surface Layer of the Bay of Bengal. Sarkar, S., H.T. Pham, S. Ramachandran, J.D. Nash, A. Tandon, **J. Buckley**, A.A. Lotliker, and M.M. Omand. 2016. Oceanography 29(2):146–157, <http://dx.doi.org/10.5670/oceanog.2016.47>.

Decay Mechanisms of Near-Inertial Mixed Layer Oscillations in the Bay of Bengal. Johnston, T.M.S., **D. Chaudhuri**, M. Mathur, D.L. Rudnick, D. Sengupta, H.L. Simmons, A. Tandon, and R. Venkatesan. 2016. *Oceanography* 29(2):180–191, <http://dx.doi.org/10.5670/oceanog.2016.50>.

Large-Scale Air-Sea Coupling Processes in the Bay of Bengal Using Space-Borne Observations. Sharma, R., N. Agarwal, A. Chakraborty, **S. Mallick**, **J. Buckley**, V. Shesu, and A. Tandon. 2016. *Oceanography* 29(2):192–201, <http://dx.doi.org/10.5670/oceanog.2016.51>.

Technological Advancements in Observing the Upper Ocean in the Bay of Bengal: Education and Capacity Building. Tandon, A., E.A. D'Asaro, K.M. Stafford, D. Sengupta, M. Ravichandran, M. Baumgartner, R. Venkatesan, and T. Paluszkiwicz. 2016. *Oceanography* 29(2):242–253, <http://dx.doi.org/10.5670/oceanog.2016.56>.

ASIRI: An Ocean-Atmosphere Initiative for Bay of Bengal, by Hemantha W. Wijesekera, Emily Shroyer, Amit Tandon, M. Ravichandran, Debasis Sengupta and co-authors including **Sanjiv Ramachandran** and **Sonaljit Mukherjee**. Bulletin of American Meteorological Society, DOI: <http://dx.doi.org/10.1175/BAMS-D-14-00197.1> March, 2016

Evidence of enhanced double-diffusive convection below the main stream of the Kuroshio Extension by Takeyoshi Nagai, Ryuichiro Inoue, Amit Tandon, Hidekatsu Yamazaki, Volume 120, Issue 12 December 2015, Pages 8402–8421, *Journal of Geophysical Research Oceans*. <http://onlinelibrary.wiley.com/doi/10.1002/2015JC011288/full>

Majumder, S., A. Tandon, D. L. Rudnick, and J. Thomas Farrar, 2015, Near-inertial kinetic energy budget of the mixed layer and shear evolution in the transition layer in the Arabian Sea during the monsoons, *Journal of Geophysical Research Oceans*, 120, <http://dx.doi.org/10.1002/2014JC010198>.

Takeyoshi Nagai, Amit Tandon, Eric Kunze, and Amala Mahadevan, 2015: Spontaneous Generation of Near-Inertial Waves by the Kuroshio Front. *J. Phys. Oceanogr.*, 45, 2381–2406. doi: <http://dx.doi.org/10.1175/JPO-D-14-0086.1>

Sanjiv Ramachandran, Amit Tandon and Amala Mahadevan, Enhancement in vertical fluxes at a front by mesoscale-submesoscale coupling, *Journal of Geophysical Research: Oceans*, Volume 119, Issue 12 (December 2014), pages 8495–8511, <http://onlinelibrary.wiley.com/doi/10.1002/2014JC010211>

Robert A. Weller, **Sudip Majumder**, Amit Tandon, Diurnal Restratification Events in the Southeast Pacific Trade Wind Regime, 2569–2587, *Journal of Physical Oceanography*, Volume 44, Issue 9 (September 2014). <http://journals.ametsoc.org/doi/abs/10.1175/JPO-D-14-0026.1>

A. J. Lucas, E. L. Shroyer, H. W. Wijesekera, H. J. S. Fernando, E. D'Asaro, M. Ravichandran, S. U. P. Jinadasa, J. A. MacKinnon, J. D. Nash, R. Sharma, L. Centurioni, J. T. Farrar, R. Weller, R. Pinkel, A. Mahadevan, D. Sengupta and A. Tandon, Mixing to Monsoons: Air-Sea Interactions in the Bay of Bengal. *Eos, Transactions American Geophysical Union* Volume 95, Issue 30, pages 269–270, 29 July 2014. <http://onlinelibrary.wiley.com/doi/10.1002/2014EO300001>

Rocha, Cesar B., A. Tandon, I. C. A. da Silveira, and J. A. M. Lima. Traditional quasi-geostrophic modes and surface Quasi-geostrophic solutions in the Southwestern Atlantic. *Journal of Geophysical Research: Oceans*, 2013, DOI: 10.1002/jgrc.20214.

Ramachandran, S., A. Tandon and A. Mahadevan, 2013, Effect of subgrid-scale mixing on the evolution of forced submesoscale instabilities, *Ocean Modelling*, Vol. 66, 45-63, <http://dx.doi.org/10.1016/j.ocemod.2013.03.001>

Nagai, T., Tandon, A., Yamazaki, H., Doubell M. J., and Gallagher S., Direct Observations of Microscale Turbulence, Subduction and Upwelling in the Kuroshio Front, *Journal of Geophysical Research, Oceans*, Vol. 117, No. C8, C08013, 2012 <http://onlinelibrary.wiley.com/doi/10.1029/2011JC007228/abstract>

G. Badin, A. Tandon, A. Mahadevan, 2011. Lateral mixing in the pycnocline by baroclinic mixed layer eddies, *Journal of Physical Oceanography*, 41, 2080-2101. <http://journals.ametsoc.org/doi/pdf/10.1175/JPO-D-11-05.1>

Tandon, A. and J. Marshall, Einstein's Tea Leaves and Pressure Systems in the Atmosphere, *The Physics Teacher*, Vol. 48, 5, p292-295, May 2010. (online at http://scitation.aip.org/journals/doc/PHTEAH-ft/vol_48/iss_5/292_1.html?bypassSSO=1)

Mahadevan, A., A. Tandon and R. Ferrari (2010) Rapid changes in mixed layer stratification driven by submesoscale instabilities and winds, *Journal of Geophysical Research-Oceans*, 115, C03017, <http://dx.doi.org/10.1029/2008JC005203>

Illari, L., J. Marshall, A. Tandon, S. Lee, P. Bannon, R. Najjar, G. McKiley, M. Morgan, T. Haine, R. Clark, T. Sikora, J. Mackin, 'Weather in a Tank': Exploiting laboratory experiments in the teaching of meteorology, oceanography and climate, *Cover story in the November 2009 issue of Bulletin of American Meteorological Society*, 2009. <http://journals.ametsoc.org/doi/abs/10.1175/2009BAMS2658.1?>

Nagai, T., A. Tandon, H. Yamazaki, and M. J. Doubell (2009), Evidence of enhanced turbulent dissipation in the frontogenetic Kuroshio Front thermocline, *Geophys. Res. Lett.*, 36, L12609, <http://dx.doi.org/10.1029/2009GL038832>

Beesley, D., J. Olejars J., A. Tandon and J. Marshall, A laboratory demonstration of Coriolis effects on wind-driven ocean currents, *Oceanography*, 21, Issue 2, 72-76, June 2008. (http://www.tos.org/oceanography/issues/issue_archive/21_2.html)

Mahadevan, A., Thomas, L.N., & Tandon, A. Technical comment: Eddy/wind interactions stimulate extraordinary mid-ocean plankton blooms. Science, Technical Comment, Science 320, 448b, <http://dx.doi.org/10.1126/science.1152111>

Thomas, L. N., A. Tandon, and A. Mahadevan, Submesoscale processes and dynamics. In Hecht, M. and Hasumi, H., editors, Ocean Modeling in an Eddying Regime, (AGU Monograph), American Geophysical Union, Washington DC, pages 17-38, 2008.

Nagai, T., A. Tandon, N. Gruber, J. C. McWilliams, Biological and physical impacts of ageostrophic frontal circulations driven by confluent flow and vertical mixing, Dynamics of Atmospheres and Oceans, 45, Issue 3-4, Pages 229-251, 2008. <http://dx.doi.org/10.1016/j.dynatmoce.2007.12.001>

Mahadevan, A. and A. Tandon, An Analysis of Mechanisms for Submesoscale Vertical Motion at Ocean Fronts, Ocean Modelling, 14, Issue 3-4 , 2006, Pages 241-256, 2006. doi:10.1016/j.ocemod.2006.05.006

Nagai, T., A. Tandon and D. L. Rudnick, Two dimensional Ageostrophic Secondary Circulation at Ocean Fronts due to Vertical Mixing and Large Scale Deformation. JGR-Oceans, 111, C09038, 2006, doi:10.1029/2005JC002964.

Tandon, A. and **L. Zhao**. Mixed Layer Transformation for the North Atlantic for 1990-2000. Journal of Geophys. Res., Vol. 109, No. C5, C05018 doi 10.1029/2003JC002059, 2004.

Tandon, A. and **K. Zahariev**. Quantifying the Role of Mixed Layer Entrainment for Water Mass Transformation in the North Atlantic. Journal of Physical Oceanography, 31, 1120-1131, 2001.

Garrett, Chris and Amit Tandon. The Effects on Water Mass Formation of Surface Mixed Layer Time-dependence and Entrainment Fluxes. Deep Sea Research, 44/12, 1991-2006, 1997.

Tandon, Amit and Chris Garrett. On a Recent Parameterization of Mesoscale Eddies. Journal of Physical Oceanography, 26, 406-411, 1996.

Tandon, Amit and Chris Garrett. Geostrophic Adjustment and Restratification of a Mixed Layer with Horizontal Buoyancy Gradients Above a Stratified Layer. Journal of Physical Oceanography, 25, 2229-2241, 1995.

Tandon, Amit and Chris Garrett. Mixed Layer Re-stratification due to a Horizontal Density Gradient. Journal of Physical Oceanography, 24, 1419-1424, 1994.

Tandon, Amit and Sidney Leibovich. Simulations of Three-dimensional Langmuir Circulation in Water of Constant Density, Journal of Geophysical Research, 100, 22,613-22,623, 1995.

Tandon, Amit and Sidney Leibovich. Secondary Instabilities of Langmuir Circulations. Journal of Physical Oceanography, 25, 1206-1217, 1995.

Leibovich, Sidney and Amit Tandon. Three-dimensional Langmuir Circulation Instability in a Stratified Layer Journal of Geophysical Research, 98, 16501-16507, 1993.

Cox, Steve M., Sidney Leibovich, Irene M. Moroz and Amit Tandon. Nonlinear dynamics in Langmuir circulations with $O(2)$ symmetry. Journal of Fluid Mechanics, 241, 669-704, 1992.

Cox, Steve M., Sidney Leibovich, Irene M. Moroz and Amit Tandon. Hopf bifurcations in Langmuir circulations. Physica D, 59, 226-254, 1992.

Thesis:

Tandon, A. 1992. Ph.D. Thesis, Cornell University, Direct Numerical Simulations and Hydrodynamic Stability Problems in the Upper Oceanic Mixed Layer, 127 pp. (Professor S. Leibovich, Major Advisor)

Conference and non-refereed publications not listed (numerous, available on request)

EXTRAMURALLY FUNDED RESEARCH AWARDS (amounts listed awarded to Tandon):

2017-2021: Understanding the ocean-atmosphere coupling in the Northern Indian Ocean, ONR, \$753,841

2016-2019: Competition between mixed-layer instabilities in shallow fronts at subtropical latitudes in the ocean, NSF, \$223,297.

2014-2018: Collaborative Research: Role of mixed layer eddies on phytoplankton productivity in seasonally variable regimes, NSF, \$324,615.

2013-2018: Coastal and Submesoscale Process Studies for ASIRI, ONR \$647,173.

2014-2018: Data serving for ASIRI participants, ONR, \$149,988.00.

2012-2013: Interpreting the ocean's interior from surface data, NASA, \$129,318.

2010-2011: Interpreting the ocean's interior from surface data, NASA, \$155,538.

2009-2013: On the importance of submesoscale processes for ocean productivity, NSF, \$328,384.

2008-2013: Submesoscale routes to lateral mixing in the ocean (LATMIX), ONR, \$349,641.

2012: MOPE: Multi-scale Ocean Modeling in Support of the Pioneer Array, MGHPCC Seed Fund, UMass President's Office. \$20,000.

2008-2009: From Stirring to Mixing: Submesoscale Routes to Lateral Dispersal of Tracers in Upper Ocean. ONR, \$21,369.

2006-2010: The effect of submesoscale processes on property fluxes and distributions in the upper ocean, NSF, \$177,110.

2006-2010: Exploiting laboratory experiments in the teaching of Meteorology, Oceanography and Climate: Phase II (MIT), NSF, \$31,745.

2006-2008: Interaction of Eddies with Mixed Layers, NSF, \$32,800.
2003-2006: Interaction of Eddies with Mixed Layers, NSF, \$47,446.
2002-2005: Diapycnal fluxes in the Southern Ocean, NSF, \$173,782.
1999-2003: Large scale property fluxes in the North Atlantic, NSF, \$140,000.
2001-2002: REU Supplement to Large Scale fluxes, NSF, \$20,000.
1997-2001: The Significance of time dependence and entrainment fluxes to water mass formation, NSF, \$168,713.

Recent invited and contributed presentations (2014-current only)

2017: IIOE2 USA meeting September 2017, Scripps Institution of Oceanography, Results, status and plans for recent Bay of Bengal and northwestern Indian Ocean physical oceanographic process studies - Eric D'Asaro (APL/UW) and Amit Tandon (UMass/Dartmouth); Naval future force science and technology, July 21 2017. Task Force Ocean Panel Discussion — Plenary Session Panelist; MISOBOP PI planning meeting WHOI July 13-14, 2017 (organizer and presenter); Invited talk on mesoscale/submesoscale eddies and their large-scale impacts, IndOOS Review, IIOE-2 International meeting Perth Australia January 2017.

2016: Submesoscale Processes: Mechanisms, Implications and new Frontiers, University of Liège, Belgium, May 23-27, 2016. Seven presentations by myself or collaborators on which I am a co-author. **Ocean Sciences Meeting AGU/ASLO/TOS, New Orleans, LA, 21-27 Feb.** Seven presentations by myself or collaborators on which I am a co-author.

2015: Dynamics of the Indian Ocean: Perspective and Retrospective, International Symposium on the Indian Ocean, Nov 30-Dec 4, 2015, Goa India. Session-14 (Mixing to Monsoons: Many scales in the Bay of Bengal Nine presentations by myself or collaborators on which I am a co-author. Also presented at the 20th Conference on Atmospheric and Oceanic Fluid Dynamics, 15-19 June 2015, Minneapolis, MN

2014: Ocean Sciences Meeting: Invited Panelist for Dual Careers: Challenges and Opportunities, an evening workshop hosted by the MPOWIR (Mentoring Physical Oceanography Women to Increase Retention), Feb 24, 2014 at the International Ocean Sciences Meeting 2014. Also, five presentations by myself or collaborators on which I am a co-author.

GRADUATE STUDENTS ADVISED: More than 15 MS and PhD students advised. Additionally co-advised or served on committees of about 12 graduate students.

POSTDOCTORAL MENTOR: Dr. Takeyoshi Nagai (now Asst Prof. Tokyo Univ.), Dr. Liuzhi Zhao (now Research Associate at School of Marine Science and Technology, UMass), Dr. Jorge Mesias (now in Chile), Dr. Sanjiv Ramachandran (now Research Associate with PI privileges), Dr. Farid Karimpour (current).

TEACHING: Two to four courses per year, 6 new courses introduced: EGR 301 Advanced Engineering Mathematics (with lab), MNE 101 Introduction to Mechanical Engineering, MNE 504 Advanced Fluid Mechanics, MAE 557/PHY557/MAR 557 Geophysical Fluid Dynamics, PHY 234 Mathematical Physics, PHY 515 Physics of Ocean boundary layers (graduate), PHY 554 Physics of Fluids (graduate), PHY 182 An Introduction to Weather, PHY 183 Climate Change (General education, undergraduate), PHY 111 Freshman Engineering course in Mechanics (in the Integrated Studio mode), PHY 115 Freshman Physics course in Waves, Thermodynamics and Optics, SUS 201-Topics in Sustainability: Coastal Zone (team taught), PHY 421 Physics Senior Lab (team taught).

OTHER PROFESSIONAL ACTIVITIES AND HONORS:

Panel reviewer, GOMRI (2017), Physical Oceanography panel, NASA (2016). National Science Foundation Physical Oceanography Panel (5 times), National Ocean Partnership Program, Panel Reviewer, NSF Arctic Natural Sciences – Arctic System Science panel.

Editor for the Oceanography Special Issue: Bay of Bengal: From Monsoons to Mixing June 2016 issue. Solicited articles and conducted the editorial process for the articles for which I did not have any conflicts of interest.

Associate Editor, Limnology, 2005-2011; Reviewer for more than ten professional journals; Proposal Reviewer for all major federal funding agencies (multiple programs).

Membership in Professional Societies: American Geophysical Union, 1992-Present; American Meteorological Society, 1992-Present; The Oceanography Society, 1992-Present; Sigma Xi, 1999-2007; American Association of Physics Teachers 2002-2011; Association for the Sciences of Limnology and Oceanography 2011-2015.

2014-2016: MPOWIR Steering Committee member. (Mentoring Physical Oceanography Women to Increase Retention). Primary Chair, Session organizer, PO43C: From Monsoons to Mixing: Coupled Ocean-Atmosphere Processes and Biogeochemical Response in the Indian Ocean I, 2016 Ocean Sciences Meeting, February 2016. Conference session Chair and member of the Organizing committee, Submesoscale Processes: Mechanisms, Implications And New Frontiers, May 2016, 48th Liege Colloquium, Belgium.

2015: Presenter at the Office of Naval Research, at the Basic Research Forum, October 2015. Attended by the ONR, ARO, AFOSR program managers, organized by Dr. Richard Ames, AAAS S&T Policy Fellow; Research presentation to the Department of State, US Embassy in Chennai, August 2015. Speaker, Dean's Advisory Board Fall 2015, Fall 2014. University Research Committee Chair 2015-2016.

Chancellor's Lecture, *From Stirring Physics to Blooming Biology: Life on a Rotating Planet*, April 2009.

Recipient of **Outstanding Teaching Assistant awards** at **Cornell University** for 1990, 1991.

Third position in the country in the Indian School Certificate Exam 1982-1983.

Recent Service to UMass Dartmouth (Examples only, full list available on request).

AY 2016-17: Member Faculty Senate Steering committee, Member Faculty Senate, Member College Academic Council, Member Graduate Committee.

AY 2015-16: Chair, University Research Committee; Member Faculty Senate Steering committee; Graduate Program Director Mechanical Engineering; Presentation to College of Engineering Dean's Advisory Board; Presenter to Interagency workshop at ONR.

COE Member for MSACC (Marine Science Admission and Curriculum Committee) AY 12-Present; Member COE College Academic Council (AY 11-Present).

College of Engineering Coordinator for the Honors Program AY 13-14;

Chair Research Scholarship and Innovation Committee UMassD Transform 2020 – coordinated many meetings with the members, helped prepare the presentation to Faculty Senate and the final RSI document for the strategic plan (AY 2013-2014).

Chair, RSI subcommittee on Faculty retention and workloads 2013-2014. Presented RSI report and recommendations to Faculty Senate, and held subsequent discussions with administrative leadership, Senate and Faculty federation leaders.

PUBLIC OUTREACH : Many demonstrations at the New Bedford Waterfront Festival (2008-Present), and with the New Bedford Ocean Explorium (closed 2015). Tandon and students have demonstrated many concepts about atmosphere and ocean flows using the rotating tank which they setup "live" at the Waterfront over the past many years. Demonstrations to High school student groups at the High School Marine Science Symposium organized by the Massachusetts Marine Educators, each year, 2002-2014.

Other Public Outreach, University Service, Honors during 1983-2014 are omitted for brevity, available on request.

Sankha Bhowmick, Ph.D.

Department of Mechanical Engineering, University of Massachusetts at Dartmouth

(a) Professional Preparation

Jadavpur University, Calcutta, India	Mechanical Engineering	1988-1992, BE
Villanova University, Villanova, PA	Mechanical Engineering	1995-1996, MS
University of Minnesota, Minneapolis, MN	Mechanical Engineering	1996-2000, Ph.D
Harvard Med School/MGH, Boston, MA	Bioengineering	2000-2001, Post Doc

(b) Appointments

2014- present	Professor, University of Massachusetts, N. Dartmouth, MA
2007– 2014	Associate Professor, University of Massachusetts, N. Dartmouth, MA
2007 - 2012	Research Associate/Visiting Faculty, MGH/HMS, Boston, MA
2002 - 2007	Assistant Professor, University of Massachusetts, N. Dartmouth, MA
2000 – 2007	Research Fellow, Harvard Medical School/ MGH, Boston, MA
1996 – 2000	Research Assistant, University of Minnesota, Minneapolis, MN
1995 – 1996	Research Assistant, Villanova University, Villanova, PA.
1992 – 1994	Executive Engineer - Process Dev., Philips, India, Ltd., Calcutta, India.

(c) Products

Closely Related Products

1. Kershaw, T.C., Peterson, R.L. and **Bhowmick, S.**, 2016, “The Influence of Group Interaction on Creativity in Engineering Design,” *Proceedings of the 38th Annual Conference of the Cognitive Science Society*, A. Papafragou, D. Grodner, D. Mirman, and J.C. Trueswell, eds., Cognitive Science Society, Austin, TX, pp. 2135–2140.
2. Kershaw, T.C., Seepersad, C.C., Hölttä-Otto, K., Williams, P.T., Young, A.P., **Bhowmick, S.**, and McCarthy, M.A., 2015, “A Cross-Sectional and Longitudinal Examination of the Development of Innovation Capability in Undergraduate Engineering Students,” Paper number: DETC2015-47650, *Proceedings of the 2015 ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, Boston, MA.
3. Kershaw, T.C., Seepersad, C.C., Hölttä-Otto, K., Williams, P.T., Young, A.P., **Bhowmick, S.**, and McCarthy, M.A., 2014, “The Effects of the Undergraduate Curriculum and Individual Differences on Student Innovation Capabilities,” Paper number: DETC2014-35540, *Proceedings of the 2014 ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, Buffalo, NY.
4. LeGendre A, Kershaw T. C., Peterson, R.L. and **Bhowmick, S.**, 2017, “The relationship between fixation and originality in undergraduate Mechanical Engineering students,” Paper number: DETC2017-67833, *Proceedings of the 2017 ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, Cleveland, OH (accepted)
5. Kershaw T. C., Bhowmick, S., Seepersad C. C Holtta Otto K, , 2018, A Decision Tree Based Methodology for Evaluating Creativity in Engineering Design, *Frontiers in Psychology (invited paper- in submission)*

6. Simmons C, LeGendre A, Kershaw T. C., and **Bhowmick, S.**, 2018, THE INFLUENCE OF PHYSICAL EXAMPLES ON ORIGINALITY AND FIXATION IN ENGINEERING DESIGN Paper no: DETC2018-85396, Proceedings of the ASME 2018 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, IDETC 2018, August 26-29, 2018, Quebec City, Quebec, Canada (*accepted*)

Other Significant Products

1. Regis S, Youssefian S, Jassal M, Phaneuf MD, Rahbar N, **Bhowmick S.** 2013, “Fibronectin adsorption on functionalized electrospun polycaprolactone scaffolds: Experimental and molecular dynamics studies,” *Journal of Biomedical Materials Research Part A*, 2013:00A: 000–000. DOI: 10.1002/jbm.a.34843. [Epub ahead of print]
2. Rajib B Mallick, Bao Liang Chen, A Veerragahavan, GL Shivkumar Babu and **Sankha Bhowmick**, (2014) Reduction of Pavement High Temperature with the Use of Thermal Insulation Layer and High Reflectivity Surface. *International Journal of Pavement Research and Technology* Volume 7 (2).
3. Jassal M., **Bhowmick S.**, Sengupta S., Patra P.K., and Walker, D.I.(2014) Hydrolyzed Poly(acrylonitrile) Electrospun Ion Exchange Fibers. *Environmental Engineering and Science*. 31(6): 288-299
4. Functionalization of electrospun poly(caprolactone) fibers for pH-controlled delivery of doxorubicin hydrochloride,, Manisha Jassl, Sukalyan Sengupta and **Sankha Bhowmick** *Journal of Biomaterials Science, Polymer Edition*, 26:18, 1425-1438, DOI: 10.1080/09205063.2015.1100495
5. Sinkevich A, **Bhowmick S** and Raessi M. 2016 Strategies for overcoming transport limitations of convective desiccation of trehalose solutions for ambient temperature preservation of biologics, (Chapter in *Biopreservation: Bischof and He as co-editors*)
6. Nawaz T, Jassal M, Nawaz T, Sengupta S, & **Bhowmick S**, 2017 “Functional group penetration thickness and intraparticle diffusivity of electrospun poly(acrylonitrile) ion-exchange,” *Colloid and Polymer Science*, Volume 295, [Issue 10](#), pp 2069–2075.

(d) Synergistic Activities

1. Participated in LSAMP project of NSF and supported Undergraduate student from Bristol Community College
2. Member of Sustainability Task Force on UMass Dartmouth campus; project advisor of Solar Heating and Biodiesel projects on campus
3. Undergraduate Education curriculum reform in the department of Mechanical Engineering by introducing courses in Sustainability
4. Participated in Greenlight for Girls – Promotion of STEM in middle school girls
5. Senior Design advising for Sustainable Energy Projects at UMass
 - Mike West, Dana Brown, Shawn Almond and Wade Ammouri (2008): Design of a solar heating pool for the Tripp Athletic Center at UMass Dartmouth
 - John Mackie, Kevin Brolin, Andrew Getto and Matt Swirbalus (2009): Wind turbines for power generation at University of Massachusetts Dartmouth

May 2016

FARHAD AZADIVAR, Ph.D.

<http://www.umassd.edu/engineering/mne/people/facultyandstaff/farhadazadivar/>

ADDRESS

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South Dartmouth, MA 02748
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(508) 984 - 5756 home
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PROFESSIONAL HISTORY

2005 – Present	Professor, Mechanical Engineering University of Massachusetts, Dartmouth
2012 Spring	Sabbatical Leave, Vietnam International University, Ho Chi Minh City, Vietnam
2000 – 2005	Dean, College of Engineering, University of Massachusetts, Dartmouth
2000 – 2002	Director, Advanced Technology and Manufacturing Center, University of Massachusetts, Dartmouth
1990 - 2000	Director, Advanced Manufacturing Institute, Professor, Industrial and Manufacturing Systems Engineering, Kansas State University.
1997	Fulbright Scholar, Distinguished Professor of Advanced Technologies, Asian Institute of Technology, Bangkok, Thailand
1987 - 1990	Associate Professor and Chair, Department of Industrial Engineering; Director, Interdisciplinary Manufacturing Research Laboratory, Northern Illinois University.
1982 - 1987	Assistant Professor of Industrial and Systems Engineering, University of Illinois at Chicago.

EDUCATION

Certificate, 2002	Management and Leadership in Education, Harvard University
Ph.D., 1980	Industrial Engineering, Purdue University
M.Sc., 1972	Systems Engineering
B.Sc., 1970	Mechanical Engineering (Suma Cum Laude)

ACADEMIC EXPERIENCE

Teaching Graduate and Upper Level Courses:

Modeling of Manufacturing Systems
Computer Simulation
Advanced Computer Simulation
Stochastic Processes
Stochastic Optimization
Nonlinear Programming
Engineering Optimization

Teaching Undergraduate Courses:

Mechanical Engineering Senior Design
Production Planning and Inventory Control
Quality Control and Reliability
Engineering Economy
Methods Analysis and Work Measurement
Manufacturing Processes
Facilities Planning and Layout
Operations Research
Senior Design Projects

Direction of Theses and Dissertations

i) Ph.D. Dissertations Directed

- “Modeling Information Systems in Supply Chain Management”, Tu Truong, 2002.
- "Similarity Based Reasoning, A Genetic Model", Amarnath Poola, 1999.
- "A Generic Simulation Model Generator" , Jianping Zhang, 1997.
- "Optimization of Preventive Maintenance Policies in a Pull Type Manufacturing Operation", Junhong Shu, 1996.
- "A Customer Driven Information Decomposition and Control System", Amit Shekhar, 1995.
- "Non-Parametric Optimization of the Design of Manufacturing Systems Using Computer Simulation", George Tompkins, 1995.
- " Design of an Expert System for the Diagnosis of Faults in Machines and Other Equipment", G.L. Yang, 1991.
- "Optimum Traffic Control Mechanisms Around Highway Construction Zones: A Simulation Optimization Approach", N. Afshar, 1991.

- " Optimization of Robotic Operations based on The Measurement and Analysis of the Positioning Errors", K.S. Moon, 1990.
- " An Algorithm for Multiple Objective Optimization of Manufacturing Systems Using Computer Simulation", R. Teleb, 1989.
- " Optimization of Discrete Variable Stochastic Systems", Y.H. Lee, 1986.

M.Sc. Theses Directed

- "Application of Genetic Algorithms to Gene Interactive Rules to Design a Process for Preventing the Formation of Cancerous Cells", Danh Cong Nguyen, May 2008.
- "Behavior-Based Topological Navigation System for a Restroom Cleaning Robot using RFID-Tags", Martin Rawski, 2008.
- "An Expert System for Managing Technological Innovations for Small Manufacturers", Sharon Xue, 1999.
- "Computer Simulation Assisted Optimum Facility Layout Design", Jiang Wang, 1998.
- "Strategic Allocation of In-Process Inventories for Maximum Utilization of Material and Minimum Lead Times", M. Ahmad, 1993.
- "An easy to use Computer Aided Scheduling System for Small Manufacturers", R. Poola, 1993.
- "Combat Simulation Output Data Analysis", R. L. Jassey, 1992.
- "An Expert System for Planning Optimum Manufacturing Processes", P. Manivannan, 1990.
- "Control of Precision of Robots in Manufacturing Operations", D. Cui, 1989.
- "Optimum In-process Inventory in Flexible Manufacturing Systems Operating in Just-in-time Environment", J. Koh, 1989.
- "A General Purpose Modeling Tool for Optimizing Flexible Manufacturing Systems", Andy Hartunian, 1990.
- "Analysis of Traffic Delays at Urban Intersections under Traffic Light and 4-Way Stop Sign Control", G.L. Yang, 1987.
- "Optimum Operating Conditions for Robots in Welding", K.S. Moon, 1987.
- "Operating Flexible Manufacturing Systems with High Utilization", A. Martinelli, 1986.
- " Optimum operation of Automated Warehousing Systems", T. Illango, 1985.

Post Doctorate Research Assistant Advised:

- "A Decision Support System for Fisheries Management using Operations Research and Systems Science Approach", Tu Truong.
- "Estimation of Catch-Per-Unit-Effort for Georges Bank Using Data from Commercial Fishing Vessels", June Yue.

PROFESSIONAL REGISTRATION

Registered Professional Engineer, State of Illinois
License No. 062-044752

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

Member	INFORMS
Member	ASEE

REFEREE FOR JOURNALS AND FUNDING AGENCIES

- Journals:
 - Management Science
 - European Journal of Operational Research
 - IIE Transactions
 - International Journal of Production Research
 - Material Flow
 - Large Scale Systems
 - Optimal Control: Applications and Methods
 - Simulation
 - Transportation Research
 - ICES Journal of Marine Science
 - Computers & Industrial Engineering
 - Computational Management Science
- Funding Agencies:
 - National Science Foundation
 - Fulbright Foundation
 - National Marine Fisheries Service

SPONSORED PROJECTS

PI on over \$16 million awarded in external grants and contracts:

At UMASS

Awarded:

- “An Industry-State-University Partnership for Southeastern Massachusetts Economic Development through Innovations in Technologies”, NSF Partnership for Innovation Program, (\$600,000 NSF, \$600,000 private companies), May 2004 to April 2007.
- “Scholarships for Computer Science and Engineering Students”, National Science Foundation, \$392,000. 10/1/2001 to 9/30/2005.
- “Optimum Policies for Scallops Harvesting in Atlantic Ocean”, Center for Marine Sciences and Technology, \$65,000, 1/1/2001 to 1/1/2003.

At Kansas State University

Awarded:

List of Projects Funded by Federal and State Governments

- “An Innovative Model for Manufacturing Engineering Education”, 1999-2001, \$586,000:
 - Society of Manufacturing Engineers Education Foundation, \$336,000
 - Private funds, \$250,000
- “An Engineering Learning Center, A Model for Systemic Engineering Education Reform”, \$1.25 million, 1998 – 2001
 - NSF, \$800,000
 - Kansas Technology Enterprise Corporation, \$450,000
- "Tools for Managing Technological Innovations for Small Manufacturers", NSF, \$213,000, 1996-1998
- “A Learning Center for Manufacturing Education and Training”, NSF, \$650,000, 1/10/96 – 30/9/98
- "A Manufacturing Processes Prototyping System", NIST, \$855,000, 1/1/94 to 1/1/96.
- "Manufacturing Learning Center", Western Resources, \$125,000, 7/1/94 to 6/30/97.
- "Manufacturing Learning Center", KTEC, \$100,000, 7/1/94 to 6/30/95.

- "Manufacturing Learning Center", \$300,000, City of Manhattan, 1995.
- Advanced Manufacturing Institute, Kansas Technology Enterprise Corporation (KTEC), \$900,000, 7/1/99 to 6/30/2000.
- Advanced Manufacturing Institute, KTEC, \$895,000, 7/1/98 to 6/30/99.
- Advanced Manufacturing Institute KTEC, \$880,000, 7/1/97 to 6/30/98.
- Advanced Manufacturing Institute KTEC, \$870,000, 7/1/96 to 6/30/97.
- Advanced Manufacturing Institute KTEC, \$865,000, 7/1/95 to 6/30/96
- Advanced Manufacturing Institute KTEC, \$865,000, 7/1/94 to 6/30/95.
- Advanced Manufacturing Institute KTEC, \$800,000, 7/1/93 to 6/30/94.
- Advanced Manufacturing Institute KTEC, \$800,000, 7/1/92 to 6/30/93.
- Advanced Manufacturing Institute KTEC, \$725,000, 7/1/91 to 6/30/92.
- Over \$3.4 million grants from Mid America Manufacturing Technology Center (MAMTC) 1993 - 2000.

At Northern Illinois University

- "Boom Welding Line Design and Analysis", Caterpillar Co., \$11,500, 2/1/88 to 7/1/88

At University of Illinois at Chicago

- "A Methodology for Optimizing Traffic Control Procedures at Highway Work Zones", NSF, \$131,810, 12/15/85 to 6/15/88.

PUBLICATIONS

Textbook

Azadivar, F., "Design and Engineering of Production Systems," Engineering Press, San Jose, CA, 1984, 630 pages.

Book Chapter

"Inventory Control", In Operations Research And Management Science Handbook, Edited by A. Ravindran, CRS Press, 2007.

Papers

"Reverse supply chain plan for remanufacturing commercial returns", International Journal of Advanced Manufacturing Technology, (2015), 77, 1767-1779, (with Ardavan Ardeshirilajimi)

"Remanufacturing of commercial returns in a market with a variable quality tolerance," Industrial Engineering and Operations Management (IEOM), 2015 International Conference, IEEE Explorer, doi: 10.1109/IEOM, 7093946, pp.1-6, (with Ardavan Ardeshirilajimi)

"Application of Computer Simulation and Genetic Algorithms to Gene Interactive Rules for Early Detection and Prevention of Cancer", IEEE Systems Journal, 2014, Volume 8, No. 3, (with Danh Nguyen)

"Design for Optimal Quality by Recycling Returned Products", International Journal of Sustainable Engineering, 2013, Volume 6, No. 3, pp. 267-277, (with Neda Masoud)

"Early Detection of Cancer by Regression Analysis and Computer Simulation of Gene Regulatory Rules", Journal of Medical Imaging and Health Informatics, Volume 2, Number 3, September 2012, pp. 336-342(7), (with Danh Nguyen).

"A Model for Minimizing Production Costs in a Sustainable Manufacturing Environment", Proceedings of the 7th International Congress on Logistics and SCM Systems, June, 2012, (with Neda Masoud)

"Decision Rules for Recycling Returned Products", Accepted for International Journal of Sustainable Engineering, v.5, No. 3, 2012, pp. 208-219, (with S. Ordoobadi).

"Early detection of cancer by regression analysis and computer simulation of gene regulatory rules", Proceedings of International Conference on Biomedical Engineering, Penang, Malaysia, February, 2012, (With Nguyen, D. C.)

"A Simulation Model to Justify Remanufacturing Policies", Proceedings of 2010 Winter Simulation Conference, Baltimore, December 2010, (with S. Ordoobadi).

- “An Application of Simulation Modeling and Optimization in Fisheries”, *International Journal of Simulation and Modeling*, v.30, No. 3, pp. 5243-5268, 2010., (with Truong, T., and Stokesbury, K)
- “A Decision Support System for Fisheries Management using Operations Research and Systems Science Approach”, *Expert Systems with Applications*, vol. 36, pp2971-2978, 2009. (With Truong T., and Jiao Y).
- “Rewards and Challenges of Utilizing University Research/Economic Development Centers For Enhancing Engineering Education”, *ASEE Annual Conference*, Honolulu, 2007. (with Kramer, B.)
- “A model for integration of engineering education with research and regional economic development”, Proceedings of International Conference on Engineering Education, ICEE 2006, San Juan, Puerto Rico, July, 2006. (with Kramer, B. and Curry, T.)
- “Optimal design methodologies for configuration of supply chains”, International Journal of Production Research, 2005, Vol 43, No 11, pp 2217-2236. (with T. Truong).
- “Decision support system for fisheries management”, Proceedings of the 2005 Winter Simulation Conference, Orlando, Florida. (with T. Truong, and B. Rothschild).
- “SMAST Prototype Decision Support System: a spatially quantitative tool for ecosystem fisheries management”, International Council for the Exploration of the Seas annual science conference. Aberdeen, UK. CM 2005/L:06. (with T. Truong, Y. Jiao, and B. Rothschild).
- “A simulator for design and analysis of supply chains”, Proceedings of IASTED International Conference on Applied Simulation and Modeling. Benalmadineh, Spain, 2005. (with T. Truong).
- “A new approach towards an optimal control of fisheries on Georges Bank: The SMAST Groundfish optimization simulation model”, Proceedings of International Council for the Exploration of the Seas annual science conference. Spain, 2004. (with J. Gregor, T. Truong, and B. Rothschild).
- “Simulation Based Optimization for Supply Chain Configuration Design” Proceedings of Winter Simulation Conference, December 2003, (with Tu Truong)
- “Simulation Based Optimization in Fishery Management”, Proceedings of Winter Simulation Conference, December, 2002. (With Tu Truong, Kevin Stokesbury and Brian Rothschild)
- “Manufacturing System Design Experiences for Engineering Students: Means to Address Competency Gaps,” *Proceedings of the 2002 American Society for Engineering Education Annual Conference & Exposition*. (with Kramer, B., Tucker, J., and Windholz, R.)
- “Manufacturing Learning Center: A Model to Enhance Manufacturing Engineering Education,” Proceedings of NAMRC XXX, May 2002. (With Kramer, B., Tucker, J.)

- “A management system for the Atlantic sea scallop using video survey, simulation modeling and optimization”. Proceedings of International Council for the Exploration of the Seas annual science conference. Norway, 2001. (with K. Stokesbury, T. Truong, and B. Rothschild).
- “Dynamic Facility Layout Design Using Simulation and Genetic Algorithms”, International Journal of Production Research, Vol. 38, No. 17, pp. 4369-4383, 2000. (With Jian Wang)
- “The Manufacturing Learning Center, A Model for Assisting in the Innovation Process for Small to Medium-Sized Manufacturers”, Industry and Higher Education, August 2000, pp. 254-259. (with Jeff Tucker)
- “A Decision Support System for the Initiation of Technological Innovation in Small Manufacturing Enterprises”, Industry And Higher Education, August 2000, pp. 249-253. (with Yan Xue and Sharon Ordoobadi)
- “Maintenance Policy Selection for JIT Production Systems”, International Journal of Production Research. Vol. 37, No. 16 (1999), pp. 3725-3738, (with Victor Shu).
- “Simulation Optimization with Qualitative Variables and Structural Model Changes: A Genetic Algorithm Approach”, European Journal of Operational Research, 113 (1999) 169-182. (With George Tompkins)
- “Simulation-Optimization Based Facility Layout Design”, Proceedings of 1999 International Conference on Production Research, Limerick, Ireland, (with John Wang).
- “An Engineering Learning Center”, Proceedings of Frontiers in Education Conference, San Juan, Puerto Rico, November, 1999. (With Norm Dillman, Jeff Tucker, Dean Hall)
- “Simulation Optimization Methodologies”, Proceedings of 1999 Winter Simulation Conference, Phoenix, AZ, December, 1999.
- “Use of Simulation in Optimization of Maintenance Policies”, Proceedings of 1998 Winter Simulation Conference, Washington DC, December 1998. (with Junhong Shu)
- “Technological Innovations Process in Small Manufacturing Companies”, Proceedings of International Conference on Engineering Design and Automation, Maui, August, 1998. (With Sharon Ordoobadi)
- “Automatic Generation of Simulation Models for Optimum Design of Manufacturing Systems”, Proceedings of the 14th International Conference on Production Research, Osaka, Japan, August 1997, pp. 754-757, (with Jianping Zhang).
- “Customer Driven Concurrent Engineering for Manufacturing Systems”, Proceedings of the 14th International Conference on Production Research, Osaka, Japan, August 1997, pp. 1172-1175, (with Amit Sekar).

- “Manufacturing Learning Center: A model for Manufacturing Engineering Education”, Proceedings of International Conference on Engineering Design and Automation, Bangkok, Thailand, March, 1997. (with Jeff Tucker)
- “Customer Driven Concurrent Engineering in a Manufacturing System”, Proceedings of International Conference on Engineering Design and Automation, Bangkok, Thailand, March, 1997. (with A. Shekhar)
- “Simulation Optimization in Strategic Location of Semi-finished Products in a Pull-Type Production System, Proceedings of 1996 Winter Simulation Conference, San Diego, 1996 (with J. Shu and M. Ahmad)
- “Maintenance Policies for Just-in-Time Manufacturing Environments, Proceedings of 1996 International Manufacturing Engineering Conference, ICPR, America’s Region, Storrs, Connecticut, 1996, (with J. Shu)
- "Genetic Algorithms In Optimizing Simulated Systems" , Proceedings of 1995 Winter Simulation Conference, Washington D.C., 1995, pp. 757-762 (with Tompkins, G.H.)
- "A Methodology for Solving Multi-Objective Simulation Optimization Problems," European Journal of Operational Research, 72 (1994), pp. 135-145. (with Teleb, R.)
- "Optimal Configuration of Systems Using Computer Simulation", New Directions in Simulation for Manufacturing and Communications, Operations Research Society of Japan, 1994, PP. 245-251.
- "A New Model of the Diagnosis Process for Man-made Systems", Proceedings of ASME Winter Conference, New Orleans, November, 1993. (with J. A. Rice and G.L. Yang)
- "A Simulation Study of Traffic Control Procedures at Highway Work Zones", Proceedings of 1992 Winter Simulation Conference, pp. 1210-1216, 1992. (with N. Afshar)
- "A Tutorial on Simulation Optimization", Proceedings of 1992 Winter Simulation Conference, pp. 198-203,
- "A Stochastic Optimization of the Production Speed of Robots Based on Measured Geometric and Nongeometric Errors," International Journal of Production Research, Vol. 30, No. 1, pp 49-62, 1992. (with Moon, K. S. and Kim, K.)
- "Optimum Continuous Path Operating Conditions for Maximum Productivity of Robotic Manufacturing Systems," International Journal of Robotics and Integrated Manufacturing Systems, Vol. 8, No. 4, pp 193-199, 1991. (with Moon, K. S., and Kim, K.)
- "Integrating Microscopic Simulation and Optimization Application to Freeway Work Zone Traffic Control," Transportation Research Record, No. 1254, pp 14-25, 1990. (with Mousa, R.M., and Roupail, N.M.)

- "Experimental Measurement of Robot Positioning Accuracy and its Application in Planning for Optimal Operation Speed of Robots," Proceedings of Fifth International Conference on Manufacturing Engineering, Barton, Australia, 1990. (with Cui, D., and Moon, K.S.)
- "Optimum Allocation of Resources to Random Access and Rack Storage Spaces in an Automated Warehousing System," International Journal of Production Research Vol. 27, No. 1, pp. 119-131, 1989.
- "An Algorithm for Optimization of Discrete-Variable Systems by Computer Simulation," Mathematics and Computers in Simulation, Vol.30, pp. 331-345, 1988. (with Lee, Y. E.,)
- "The Effect of Position Errors in Joints of Industrial Robots on Their Performance in Manufacturing Operations," IEEE Journal on Robotics and Automation, Vol. RA-3, No. 2, pp. 109-114, 1987.
- "Minimum Cost Modular Design of Automated Warehousing Systems," International Journal of Material Flow, Vol. 4, pp. 177-188, 1987.
- "The Effect of Precision of Robots on the Efficiency and the Quality of Their Manufacturing Processes," Proceedings of IXth International Conference on Production Research, Cincinnati, August, 1987. (with Moon, K. S.)
- "Maximization of the Throughput of an Automated Warehousing System Under Constraints," International Journal of Production Research, Vol. 24, No. 3, pp. 551-566, 1986.
- "Optimum Number of Buffer Spaces in a Flexible Manufacturing System," Proceedings of the Second Conference on Flexible Manufacturing Systems, Ann Arbor, Michigan, August, 1986. (with Lee, Y. H.)
- "An Application of Optimization-By-Simulation to Discrete Variable Systems," Proceedings of 1985 Winter Simulation Conference, San Francisco, California, pp. 173-177, 1985. (with Lee, Y. H.)
- "A Simulation Optimization Approach to Optimum Storage and Retrieval Policies in an Automated Warehousing System," Proceedings of 1984 Winter Simulation Conference, Dallas, Texas, pp. 207-214, 1984.
- "Optimization of the Combined Cost of Precision in Manufacturing and the Cost of Error Due to Link Length Tolerances in Mechanisms," ASME Paper No. 84-DET-129., 1984.
- "Optimization of Stochastic Simulation Models," Mathematics and Computers in Simulation, Vol. XXII, No. 3, pp. 231-241, 1980. (with Talavage, J. J.)

Presentations in Technical Conferences

“Remanufacturing of commercial returns in a market with a variable quality tolerance”, International Conference on Industrial Engineering and Operations Management, Dubai, United Arab Emirates, March 2015.

“The impact of customer satisfaction function on sustainable remanufacturing of commercial returns”, Institute of Operations Research and Management Science (INFORMS) Annual Conference, San Francisco, October, 2014.

“Quality decisions in sustainable manufacturing”, Institute of Operations Research and Management Science (INFORMS) Annual Conference, Minneapolis, October, 2013.

“Optimum target quality in sustainable manufacturing”, Institute of Operations Research and Management Science (INFORMS) Annual Conference, Phoenix, October, 2012.

"Optimum Quality Planning In a Sustainable Production Environment", 19th Technical Conference of the International Federation of Operation Research Societies, Melbourne, Australia, July 2011.

"Genetic Algorithms to Optimize Gene Interactive Rules to Prevent Cancer", INFORMS (Institute for Operation Research and Management Science) Healthcare, Montreal, Canada, June 2011, (with Nguyen, D. C.)

“Limits On Use of Returned Parts in After Market Products”, Institute of Operations Research and Management Science (INFORMS) Annual Conference, San Diego, 2009.

"Behavior-Based Topological Navigation System for a Restroom Cleaning Robot using RFID-Tags", INFORMS Annual Conference, Washington D.C., October, 2008.(with M. Rawski)

“Simulation Modeling for Early Detection of Cancer”, INFORMS, Seattle, 2007. (With Nguyen, D. C.)

“A teaching hospital type model for engineering education”, Panel session, International Conference on Engineering Education, ICEE 2006, San Juan, Puerto Rico, July, 2006. (with B. Kramer and T. Curry)

“Application of statistics, simulation and optimization in fishery systems”, Applied Mathematical Programming and Modeling Conference APMOD2006, Madrid, Spain, June 2006, (with T. Truong, and K. Stokesbury)

“Optimization of Harvest Strategies for Georges Bank Scallop” American Fisheries Society (AFS) meeting, CT, Jan 2004. (with Truong, T., Stokesbury, K. and Rothschild, B.J.)

“Future of Simulation”, Panelist, 2001 Winter Simulation Conference.

“A Manufacturing Learning Center” Keynote Speech, University Industry collaboration Conference, Cambridge, UK, September 2000.

Track Coordinator, Winter Simulation Conference, 1999 and 2000.

“Manufacturing Learning Center, An Innovative Model for Engineering Education”, ASEE Conference, Seattle, Washington, June, 1998.

“A Framework for Enterprise Modeling and Integration”, International Industrial Engineering Conference, Piracicaba, Brazil, 1996.

"Strategic Location of the Optimum In-Process Inventories in a Pull Type Manufacturing System", Joint National ORSA/TIMS Meeting, Chicago, 1993. (with M. Ahmad)

"A Tutorial on Simulation Optimization", Winter Simulation Conference, Washington D.C., December, 1992.

"A Multi-Objective Simulation Optimization Methodology", National ORSA/TIMS Meeting, Nashville, 1991.

"A Procedure for Optimization of Decision Rules in an FMS System," Joint National ORSA/TIMS Meeting, Las Vegas, 1990. (with R. Teleb)

"Experimental Measurement of Robot Positioning Accuracy and its Application in Planning for Optimal Operation Speed of Robots in Manufacturing", The Fifth International Conference on Manufacturing Engineering, The Institute of Engineers, Australia, Wollongong, Australia, 1990.

"Minimum In-Process Inventory in Flexible Manufacturing Systems in Just-in-Time Environment," Joint National ORSA/TIMS Meeting, Vancouver, Canada, 1989 (with J. Koh).

"Optimization of Traffic Control Procedures at Highway Lane Closures," Joint National ORSA/TIMS Meeting, Washington, D.C., April 1988.

"The Effect of Precision of Robots on the Quality and the Efficiency of Manufacturing Processes," IXth International Conference on Production Research, Cincinnati, Ohio, August 1987.

"Optimum Precision of Welding Robots," Joint National ORSA/TIMS Conference, New Orleans, May 1987. (Invited).

"Optimum Number of Buffer Spaces in a Flexible Manufacturing Systems," ORSA/TIMS Special Interest Meeting on Flexible Manufacturing Systems, Ann Arbor, Michigan, August 1986.

"Optimum Precision Requirements of Industrial Robots in Manufacturing," Joint ORSA/TIMS Meeting, Miami Beach, October 1986.

"Simulation Optimization of Discrete Variable Systems," Optimization Days Conference, Montreal, Canada, April 1986. (Invited).

"An Application of a Discrete Optimization-By-Simulation Method to a Flexible Manufacturing System," Winter Simulation Conference, San Francisco, CA, 1985. (Session Chairman)

"Optimum Allocation of Resources in Automated Warehousing Systems," Joint ORSA/TIMS Meeting, Atlanta, GA, 1985.

"A Simulation Optimization Approach to the Optimum Storage and Retrieval Policies in an Automated Warehousing System," Winter Simulation Conference, Dallas, TX, 1984. (Invited).

"Optimization of the Cost of Design and Operation of Mechanical Linkages," ASME Conference on Mechanisms, Boston, MA, 1984.

VIJAYA CHALIVENDRA
Professor
Department of Mechanical Engineering

HIGHER EDUCATION

A. Degrees

2003	Ph.D., University of Rhode Island, U.S.A Experimental & Analytical Fracture in Graded Materials
1997	M.S., Sri Venkateswara University, India Technology Management in RDBMS framework
1993	B.S., Sri Venkateswara University, India Mechanical Engineering

B. Additional Education

2003-2005	Postdoctoral Research Fellow, California Institute of Technology Experimental Validation of large scale simulations

EXPERIENCE:

A. Teaching Experience

2017- Now	Professor, Department of Mechanical Engineering University of Massachusetts Dartmouth
2011-2017	Associate Professor, Department of Mechanical Engineering University of Massachusetts Dartmouth
2005-2011	Assistant Professor, Department of Mechanical Engineering University of Massachusetts Dartmouth
2000-2003	Teaching Assistant, Department of Mechanical Engineering University of Rhode Island
1998-1999	Full-time Lecturer, Department of Mechanical Engineering Koneru Lakshmaiah College of Engineering, Vijayawada, India

B. Industrial Experience

1997-1998	Senior Officer , Industrial Engineering, Tata Refractories Ltd., Orissa, India
1993-1994	Deputy Engineer , Research & Development Bharat Electronics Ltd., Andhra Pradesh, India

ACADEMIC AND PROFESSIONAL HONORS:

A. Research Grants Received

1. "Acquisition of Nanoindentation facility", **National Science Foundation**, \$103,969, 2006-2007. (PI: Chalivendra; co-PIs: Paul Calvert, Balram Singh)
2. "Boron Nitride-Polyurethane Nanocomposites: A New Type of Acoustically Clear, High Thermal Conductivity Encapsulants", **Office of Naval Research**, \$140,000, 2007-2010. (PI: Chalivendra; No co-PI)
3. "Nano-scale embrittlement of textile fibers", **National Textile Center**, \$74,120, 2008- 2011. (PI: Chalivendra; co-PI: Paul Calvert)
4. "Collaborative Research: Electrical Response of Conductive Polymer Grafted Carbon Nanotube Reinforced Copolymers under Quasi-static and Dynamic Loading", **National Science Foundation**, \$140,776, 2009-2012. (PI: Chalivendra; No co-PI)
5. "Design and Characterization of Graded Metallic Bone Implants", \$50,000, **College of Engineering Cluster grant**, 2009-2011. (PI: Chalivendra, co-PIs: Sherif El Wakil, Sankha Bhowmick, Nima Rahbar)
6. "Development of micro-tensile tester operated in atomic force microscopy," \$27,799, **National Science Foundation**, 2010-2011. (PI: Chalivendra; No co-PI)
7. "Mechanical Characterization of Gelatinous Mesoglea of Sea Jelly Bodies for Regeneration of Synthetic Hydrogels," \$18,031, **Center for Regenerative Biomaterials**, 2009-2010. (PI: Chalivendra; No co-PI)
8. "Statistical Modeling and Contact Analysis of Fractal Topography for Radio-Frequency (RF)-MEMS", \$269,000, **National Science Foundation**, 2011-2014. (co-PI: Chalivendra, PI: Wenzhen Huang)
9. "Greener High Strength, Lightweight and Low Cost Structural Composites using Sustainable Natural Fibers" \$40,000, **Massachusetts Technology Transfer Center**, 2012-2013. (PI: Chalivendra, co-PI: Yong Kim)
10. "Novel textile based personal injury preventing cushioning pad material", \$25,000, **Commercial Ventures and Intellectual Property**, 2012-2013. (co-PI: Chalivendra, PI: Yong Kim)
11. "Non-invasive detection of biomolecules secretion from living cells using peptide nanotube arrays," \$25,080, Jan-June 2015, **Provost's Multidisciplinary Seed Funding**. (co-PI: Chalivendra, PI: Milana Vasudev)
12. "Degradation and biocompatibility of microbially synthesized poly(hydroxybutyrate-co-hydroxyhexanoate) polymer:impact on mechanical stability and medical applications," \$12,100, Jan-June 2015, **Provost's Multidisciplinary Seed Funding**. (co-PI: Chalivendra, PI: Christopher Brigham)

13. "Mechanics of Multi-functional Biocomposites" \$291,954, **National Science Foundation**, Duration: 07/01/2016-06/30/2019 (PI: Chalivendra, co-PI: Yong Kim).
14. "Applying Flock technology to Warfighter Needs in Military Helmet pads," \$158,206, **US.Army Natick Laboratory**, Duration: 07/10/15 - 04/10/17 (co-PI: Chalivendra, PI: Yong Kim)
15. "Fundamental evaluation of FEAM and FEAM structures relative to optimizing their impact energy absorption and functional properties," \$84,182, PI, **Corsair Innovations**, Duration: 01/28/16 - 01/27/18. (PI: Chalivendra)
16. "Mechanical characterization of composite structures," \$10,000, PI, **Raytheon**, Duration: 01/01/16 - 06/30/16. (PI: Chalivendra)
17. "Fabrication of Pre-flocked Carbon Fabric Pre-preg Sheet Materials," \$15,250, PI, **Wright Patterson Air Force Base**, Duration: 06/01/15-08/30/15. (PI: Chalivendra)
18. "A computational and experimental study of self-assemble peptide nanotubes for energy applications," \$13,000, co-PI, **Provost's Multidisciplinary Seed Funding**. This project will be completed in August 2016. (co-PI: Chalivendra, PI: Maricris Mayes)
19. "In vivo Degradation of polyhydroxyalkanoate biodegradable plastic fibers in a mouse model system," \$13,600, co-PI, **Provost's Multidisciplinary Seed Funding**. This project will be completed in August 2016. (co-PI: Chalivendra, PI: Christopher Brigham)
20. Energy Absorbing Materials for Mitigating Head and Other Impact Injuries," **S&T President's award**, \$125, 000, (co-PI: Chalivendra, PI: Yong Kim).
21. "Bio-based, biodegradable plastics: from "waste to treasure" with a medical focus," **S&T President's award**, \$25, 000, (co-PI: Chalivendra, PI: Christopher Brigham).
22. "Acquisition of State-of-the-Art High-Speed Video Camera for Capturing Dynamic Deformation under Impact loads," **DOD-DURIP**, \$235,000, Duration: 05/01/17-04/30/18. (PI: Chalivendra, co-PI: Yong Kim).
23. "Damage Detection in Carbon Nanotubes Embedded and Carbon Fibers Flocked Multi-functional Laminated Composites," **Army Research Laboratory**, \$671,362, 09/26/17-09/25/20. (PI: Chalivendra, co-PI: Yong Kim).
24. "MRI: Acquisition of a Scanning Electron Microscope," **National Science Foundation**, \$240.329, 2017-2018, (co-PI: Chalivendra, PI: Brigham).
25. "Multiscale Modeling with Machine Learning for Optimal Design of 3D Printed Polymers in Biomedical Implants," **Multidisciplinary Seed Funding Program**, \$ 29,541, 01/25/18-12/31/18, (co-PI: Chalivendra, PI: Jun Li).

B. Published Refereed Journal Articles

1. Yang, S. **Chalivendra, V.B.** Benjamin, E., Kim, Y. (2018) "Electrical Response of Novel Carbon Nanotubes Embedded and Carbon Fiber Z-axis Reinforced Jute/Epoxy Laminated Composites," *Polymer Composites*, DOI: 10.1002/pc.24935.
2. Md. Fazlay Rabbi, **Chalivendra, V.B.**, Kim, Y. (2018) "Dynamic constitutive response of novel auxetic Kevlar®/epoxy composites," *Composite Structures*, 195, 1-3.

3. Shkolnik, K. and **Chalivendra, V.B.** (2017) "Numerical studies of electrical contacts of carbon nanotubes-embedded epoxy under tensile loading," *Acta Mechanica*, DOI 10.1007/s00707-017-1955-8.
4. Liu, J., **Chalivendra, V.B.** and Huang, W. (2017) "Finite element based contact analysis of radio frequency MEMs switch membrane surfaces," *Journal of Micromechanics and Microengineering*, 27, 105012.
5. Abdulrahman A. Kehail, Md.Fazlay Rabbi, Nicholas Bach, **Vijaya Chalivendra**, Christopher Brigham (2017) "Modeling mechanical properties of polyhydroxyalkanoate during degradation in animal tissue," *Polymers for Advanced Technologies*, DOI: 10.1002/pat.4076.
6. Abdulrahman A. Kehail, Vijay Boominathan, Karoly Fodor, **Vijaya Chalivendra**, Tracie Ferreira, Christopher J. Brigham (2016) "In Vivo and In Vitro Degradation Studies for Poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) Biopolymer," *Journal of Polymers and the Environment*, doi:10.1007/s10924-016-0808-1 (published online)
7. Benoit, S. **Chalivendra, V.B.**, Rice, M. Doleski, R. (2016) "Characterization of the Microstructure, Fracture, and Mechanical Properties of Aluminum Alloys 7085-O and 7175-T7452 Hollow Cylinder Extrusions," *Metallurgical and Materials Transactions A*, DOI 10.1007/s11661-016-3624-2 (published online).
8. Yong Kim, John Rice, **Vijay Chalivendra**, Armand Lewis (2017), Flock fibre-reinforced laminar composites for improved Mode I fracture toughness, January-February, *JEC Composites Magazine*.
9. Sen Yang, **Vijaya B. Chalivendra**, Yong K. Kim (2017) "Fracture and impact characterization of novel auxetic Kevlar /Epoxy laminated composites," *Composite Structures* 168, 120–129.
10. Sirisha Mukkavalli, **Vijay Chalivendra**, Bal Ram Singh (2017) "Physico-chemical analysis of herbally prepared silver nanoparticles and its potential as a drug bioenhancer," *Open Nano*, 2, 19-27.
11. Joshua P. Stuckey, **Vijaya B. Chalivendra**, Mulugeta A. Haile, and Asha J. Hall (2017) "Damage Detection in Epoxy Embedded Carbon Nanotubes Using Electrical Resistance and Acoustic Emission," *Journal of Nanomechanics and Micromechanics*, DOI: 10.1061/(ASCE)NM.2153-5477.0000122.
12. Pinto, M., **Chalivendra, V.B.**, Kim, Y.K. and Lewis, A.F. (2016) "Improving the strength and service life of jute/epoxy laminar composites for structural applications," *Composite Structures*, 156, 333-337.
13. Schell, J.Y., Wilks, B.T., Patel, M., Franck, C., **Chalivendra, V.**, Cao, X., Shenoy, V.B. and Morgan, J.R. (2016) "Harnessing cellular-derived forces in self-assembled microtissues to control the synthesis and alignment of ECM," *Biomaterials*, 77, 120-129.
14. Bach, M., **Chalivendra, V.B.**, Aleves, C. and Depina, E. (2015) "Mechanical characterization of natural biodegradable sandwich materials," *Journal of Sandwich Structures and Materials*, DOI: 10.1177/1099636215622143.
15. Kehail, A.A., Foshey, M., **Chalivendra, V.** and Brigham, C.J.(2015) "Thermal and mechanical characterization of solvent-cast poly(3-hydroxybutyrate-co-3-hydroxyhexanoate)," *Journal of Polymer Research*, 22, 216.

16. Wanasekara, N.D., Ghosh, S., Chen, M., **Chalivendra, V.B.**, Bhowmick, S.B. (2014) "Effect of Stiffness of Micron/Sub-Micron Electrospun Fibers in Cell Seeding," *Journal of Biomedical Materials Research: Part A*, published online, DOI: 10.1002/jbm.a.35362.
17. Cardoso, S.M., O'Connell, C.D., Pivonka, R., Mooney, C., **Chalivendra, V.B.**, Shukla, A. and Yang, S.Z. (2014) "Effect of External Loads on Damage Detection of Rubber-Toughened Nanocomposites Using Carbon Nanotubes Sensory Network," *Polymer Composites*, DOI 10.1002/pc.23188.
18. Pinto, M., **Chalivendra, V.B.**, Kim, Y.K. and Lewis, A. (2013) "Effect of Surface Treatment and Z-axis Reinforcement on the Interlaminar Fracture of Jute/Epoxy Laminated Composites," *Engineering Fracture Mechanics*, 114, 104-114, 2013.
19. Sun, L., Wanasekara, N.D., **Chalivendra, V.B.**, Calvert, P.D. (2015) "Nano-mechanical studies on polyglactin sutures subjected to in vitro hydrolytic and enzymatic degradation," *Journal of Nanoscience and Nanotechnology*, 15, 93-99.
20. Pinto, M., **Chalivendra, V.B.**, Kim, Y.K., Lewis, A.M., (2014) "Evaluation of Surface Treatment and Fabrication Methods for Jute Fiber/Epoxy Laminar Composites," *Polymer Composites*, 35(2), 310-317.
21. Huang, W., Liu, J., **Chalivendra, V.B.**, Ceglarek, D., Kong Z. and Zhou Y. (2013) "Statistical Modal Analysis (SMA) for Variation Characterization and Application in Manufacturing Quality Control," *IIE Transactions*, 46(5), 497-511.
DOI:10.1080/0740817X.2013.814928
22. Vadlamani, V.K., **Chalivendra, V.B.**, Shukla, A., Yang, S. (2012) "In-situ sensing of Non-linear Deformation and Damage in Epoxy Particulate Composites", *Smart Materials and Structures*, 21(7), 075011.
23. Wanasekara, N.D., **Chalivendra, V.B.** and Calvert, P.D. (2012) "Effect of Accelerated Ultraviolet and Thermal Exposure on Nano-scale Mechanical Properties of Nylon Fibers", *Polymer Engineering and Science*, **52(11)**, 2482-2488.
24. Cardoso, S. **Chalivendra, V.B.**, Shukla, A. and Yang, S. (2012) "Damage detection in the fracture process zone of rubber toughened epoxy using carbon nanotube sensory network", *Engineering Fracture Mechanics*, **96**, 380-391.
25. Vadlamani, V., **Chalivendra, V.B.**, Shukla, A. and Yang, S. (2012) "Sensing of Damage in Carbon Nanotubes and Carbon Black Reinforced Epoxy Composites under Tensile Loading," *Polymer Composites*, 33(10), 1809-1815.
26. Heeder, N., Shukla, A., **Chalivendra, V.B.**, Yang, S.Z. (2012) "Sensitivity and dynamic electrical response of CNT-reinforced nanocomposites," *Journal of Materials Science*, **47**, 3808-3816.
27. Abotula, S., Kidane, A., **Chalivendra, V.B.** and Shukla, A. (2012) "Dynamic curved cracks in functionally graded materials under thermo-mechanical loading", *International Journal of Solids and Structures*, **49**, 1637-1655.
28. Gupta, S., Abotula, S., **Chalivendra, V.B.**, Shukla, A. and Chona, R. (2012) "Transient thermo-mechanical analysis of dynamic curving cracks in functionally graded materials", *Acta Mechanica*, 223(7), 1485-1506.
29. Dannemann, K., **Chalivendra, V.B.** and Song, B. (2012) "Dynamic Behavior of Materials", *Experimental Mechanics*, Editorial to Special Issue, **52(2)**, 117-118.

30. Heeder, N., Shukla, A., **Chalivendra, V.B.**, Yang, S.Z. and Park, K. (2012), "Electrical Response of Carbon Nanotube Reinforced Nanocomposites Under Static and Dynamic Loading," *Experimental Mechanics*, **52**, 315-322.
31. Bender, S., **Chalivendra, V.B.**, Rahbar N. El Wakil, S. (2012), "Mechanical characterization and modeling of graded porous stainless steel specimens for possible bone implant applications," *International Journal of Engineering Science*, **53**, 67-73.
32. Wanasekara, N.D., **Chalivendra, V.B.** and Calvert, P.D., (2011) "Sub-micron Scale Mechanical Properties of Polypropylene Fibers Exposed to Ultraviolet and Thermal Degradation," *Polymer Degradation and Stability*, **96**, 432-437.
33. Bender, S., El Wakil, S.D. and **Chalivendra, V.B.** (2011), "Fabrication and Charactersation of Powder Metallurgy Parts having Porosity Gradient, *Powder Metallurgy*, **54(5)**, 599-603.
34. Wanasekara, N.D. and **Chalivendra, V.B.** (2010), "Role of Surface Roughness on Wettability and Coefficient of Restitution in Butterfly Wings," *Soft Matter*, **7**, 373-379.
35. Aboutla, S. and **Chalivendra, V.B.**, (2010) "Experimental and Numerical Investigation of Static and Dynamic Constitutive Behavior of Aluminum Alloys," *Journal of Strain Analysis for Engineering Design*, **45(8)**, 555-565.
36. Kiddane, A., **Chalivendra, V.B.** and Shukla, A. (2010), "Thermo-Mechanical Stress Fields and Strain Energy associated with a Mixed-Mode Propagating Crack," *Acta Mechanica*, **215(1-4)**, 57-69.
37. Kiddane, A., **Chalivendra, V.B.** and Shukla, A., Chona, R. (2010), "Mixed-mode dynamic crack propagation in graded materials under thermo-mechanical loading, " *Engineering Fracture Mechanics*, **77(14)**, 2864-2880.
38. Rousseau, C.-E., **Chalivendra, V.B.**, Tippur, H. and Shukla, A. (2010) "Experimental Fracture Mechanics of Functionally Graded Materials: An Overview of Optical investigations," *Experimental Mechanics*, **50(7)**, 845-865.
39. Maclure, A., **Chalivendra, V.B.** and Ramotowski, T. (2009), "Effect of Pressure Cycling on Fracture Energy of Polyurethane/Aluminum Adhesive Bonds," *Journal of Adhesion*, **85(12)**, 869-888.
40. **Chalivendra, V. B.**, Hong, S., Arias, I., Knap, J., Rosakis, A., Ortiz, M. (2009), "Experimental validation of large-scale simulations of dynamic fracture along weak planes," *International Journal of Impact Engineering*, **36(7)**, 888-898.
41. **Chalivendra, V. B.** (2009), "Mixed-mode Crack-tip Stress Fields for Orthotropic Functionally Graded Materials," *Acta Mechanica*, **204(1)**, 51-60.
42. Crowley, J. and **Chalivendra, V.B.** (2008) "Mechanical Characterization of Ultra-High Molecular Weight Polyethylene-Hydroxyapatite Nanocomposites," *Biomedical-materials and Engineering*, **18(3)**, 149-160.
43. Lee, K.H., **Chalivendra, V. B.** and Shukla, A. (2008) "Thermo-Mechanical Stress and Displacement Fields for Propagating Crack Tip in Functionally Graded Materials," *ASME Journal of Applied Mechanics*, **75**, 1-7.
44. **Chalivendra, V. B.** (2008), "Mode-I Crack-tip Stress Fields for Inhomogeneous Orthotropic Medium," *Mechanics of Materials*, **40**, 293-301.

45. **Chalivendra, V. B.** and Rosakis, A.J., (2008), "Interaction of dynamic mode-I cracks with inclined interfaces," *Engineering Fracture Mechanics*, **75**, 2385-2397.
46. **Chalivendra, V. B.**, (2007), "Asymptotic analysis of a transient crack in functionally graded materials," *International Journal of Solids and Structures*, **44**, 465-479.
47. Arias, I., Knap, J., **Chalivendra, V. B.**, Hong, S., Ortiz, M., and Rosakis, A.J., (2007), "Numerical modeling and experimental validation of dynamic fracture events along weak planes," *Computer Methods in Applied Mechanics and Engineering*, **196**, 3833-3840.
48. Xia, K., **Chalivendra, V. B.**, and Rosakis, A.J., (2006), "Observing Ideal "Self-similar" Crack Growth in experiments," *Engineering Fracture Mechanics*, **73**, 2748-2755.
49. Xia, K., **Chalivendra, V. B.**, and Rosakis, A.J., (2006), "Spontaneous Mixed-mode Fracture in Bonded Similar and Dissimilar Materials," *Experimental Mechanics*, **46**, 163- 171.
50. **Chalivendra, V. B.**, and Shukla, A., (2005), "Transient Elastodynamic crack growth in Functionally Graded Materials," *Journal of Applied Mechanics*, March, **72**, 237-248.
51. **Chalivendra, V. B.**, Shukla, A., Bose, A. and Parameswaran, V. (2003) "Processing and Mechanical Characterization of Lightweight Polyurethane Composites," *Journal of Materials Science*, **38(8)**, 1631-1643.
52. **Chalivendra, V. B.**, Shukla, A., and Parameswaran, V. (2003), "Quasi-Static Stress Fields for a Crack Inclined to the Property Gradation in Functionally Graded Materials," *Acta Mechanica*, **162**, 167-184.
53. **Chalivendra, V. B.**, Shukla, A., and Parameswaran, V. (2002),"Dynamic Out of Plane Displacement Fields for an Inclined Crack in Graded Materials," *Journal of Elasticity*, **69**, 99-119.
54. Shukla, A., **Chalivendra, V. B.**, Parameswaran, V. and Lee, K. H., (2003), "Photoelastic Investigation of Interfacial Fracture Between Orthotropic and Isotropic Materials," *Optics and Lasers in Engineering*, **40**, 307-324.
55. Ricci, V., Shukla, A., **Chalivendra, V. B.**, Lee, K. H. (2003), "Subsonic interfacial fracture using strain gages in an isotropic orthotropic biomaterial," *Theoretical and Applied Fracture Mechanics*, **39(2)**, 143-161.
56. Lee, K.H., Shukla, A., Parameswaran, V., **Chalivendra, V. B.**, and Hawong, J. S. (2002), "Static and Dynamic Fracture Analysis for the Interface Crack of Isotropic - Orthotropic Bimaterial," *KSME International Journal*, **16**, 2, 165-174.

C. Conference Publications

1. Fodor, K., **Chalivendra, C.**, Kim, Y. "Viscoelastic and In-Plane Shear Properties of Novel Energy Absorbing Materials," SEM Annual Conference & Exposition, Indianapolis, IN, June 12–15, 2017.
2. Rabbi, F. Md., **Chalivendra, V.B.**, Kim Y., "Dynamic Constitutive Response of Novel Auxetic Kevlar/Epoxy Composites," SEM Annual Conference & Exposition, Indianapolis, IN, June 12–15, 2017.

3. Yang, S., **Chalivendra, V.B.**, Kim, Y. "Characterization of Multi-functional Natural Fiber Composites," SEM Annual Conference & Exposition, Indianapolis, IN, June 12–15, 2017.
4. J. Liu, L., **V.B. Chalivendra**, W. Huang, "Contact analysis of RF MEMS switch contact surfaces," International Conference and Exposition on Experimental and Applied Mechanics, Society for Experimental Mechanics, June 6-9, 2016.
5. S. Yang, **V.B. Chalivendra**, Y.K. Kim, "Characterization of Auxetic Kevlar/epoxy laminated composites, International Conference and Exposition on Experimental and Applied Mechanics, Society for Experimental Mechanics, June 6-9, 2016.
6. S.G. Benoit, M. Rice, R. Doleski, and **V.B. Chalivendra**, "Fracture Investigation of Aluminum Alloys for Naval Applications," Proceedings of 2015 SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Costa Mesa, CA, June 8-11.
7. M. Bach, C.H. Alves, E. Depina, **V.B. Chalivendra**, "Static and Impact Characterization of Natural Sandwich Structures," Proceedings of 2015 SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Costa Mesa, CA, June 8-11.
8. K. Shkolnik, **V. B. Chalivendra**, Modelling of Experimental Observations of Electrical Response of CNT Composites," Proceedings of 2015 SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Costa Mesa, CA, June 8-11.
9. Pinto, M., **Chalivendra, V.B.**, Kim, Y.K., Lewis, A.F., Improving the Strength and Service Life of Jute/Epoxy Laminar Composites for Structural Applications, Proceedings of 18th International Conference on Composite Structures, June 15-18, 2015 Lisbon, Portugal
10. Yong K Kim, Armand F. Lewis, John M. Rice and **Vijay Chalivendra**, Z-Direction Reinforced Laminar Composites For Improved Interlaminar Shear And Impact Resistance, Proceedings of 18th International Conference on Composite Structures, June 15-18, 2015 Lisbon, Portugal Paper Composite Structures.
11. Pinto, M., Kim, Y., Lewis, A. and **Chalivendra, V.B.** (2013) "Fabrication and Mechanical Characterization of Jute Fiber/Epoxy Laminar Composites," *Proceedings of 2013 SEM Annual Conference & Exposition on Experimental & Applied Mechanics*, Lombard, IL, June 3-5.
12. Cardoso, S., Mooney, C., Pivonka, R., **Chalivendra, V.B.**, Shukla, A. and Yang, S. (2012) "Detection of Damage of Epoxy Composites Using Carbon Nanotube Network," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics*, Costa Mesa, CA, June 12-17.
13. Heeder, N., Shukla, A., **Chalivendra, V.B.** and Yang, S.Z. (2011) "Electrical response of carbon nanotubes reinforced nanocomposites under static and dynamic loading," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics*, Uncasville, CT, June 13-17, 2011.
14. Calvert, P., Agrawal, A., Rahbar, N. and **Chalivendra, V.B.** (2011) "Tough, strong Hydrogels with Elastomeric Fiber Reinforcement, *Proceedings of Fall 2011 Materials Research Society*, Nov 28-Dec 2, Boston, MA.
15. Agrawal, A. Wanasekara, N. **Chalivendra, V.B.** Rahbar, N. and Calvert, P. (2011) "Strong fiber reinforced hydrogels for biomedical applications," *Proceedings of North*

- Eastern BioEngineering Conference, Rensselaer Polytechnic Institute, Troy, NY, USA, April 1-3, 2011.*
16. Sun, L., **Chalivendra, V.B.**, and Calvert, P. (2011) "Sub-micron scale mechanical characterization of polyglactin sutures subjected to hydrolysis and enzymatic degradation," *Proceedings of North Eastern BioEngineering Conference, Rensselaer Polytechnic Institute, Troy, NY, USA, April 1-3, 2011.*
 17. Vadlamani, V., **Chalivendra, V.B.** Shukla, A. and Yang, S. (2011) "Evaluation of resistance measurement technique in carbon black and carbon nanotubes reinforced epoxy," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Uncasville, CT, June 13-17, 2011.*
 18. Sun, L. **Chalivendra, V.B.**, Calvert, P. (2011) "Nano-indentation Studies of Polyglactin 910 Monofilament Sutures," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Uncasville, CT, June 13-17, 2011.*
 19. Purohit, K., M. Mirville, S.C. Yang, A. Shukla, and **Chalivendra, V.B.** (2010) "Conductive nano-brush synthesized by physical grafting of conductive polymers on carbon nanotube," *Proceedings of Materials Research Society, Nov 29 - Dec 2, Boston, MA.*
 20. Padamati, S., **Chalivendra, V.B.**, Agrawal, A. and Calvert, P.D. (2010), "Dynamic Constitutive Behavior of Reinforced Hydrogels Inside Liquid Environment," *Proceedings of IMPLAST, SEM Fall conference, Providence, RI, October 12-14.*
 21. Colon, H., Rice, J., Kim, Y. and **Chalivendra, V.B.** (2010), "Projectile Impact Behavior of Flock Fiber Z-Reinforced Composites," *Proceedings of IMPLAST, SEM Fall conference, Providence, RI, October 12-14.*
 22. Wanasekara, N.D., Chen, M., **Chalivendra, V.B.** and Bhowmick, S. (2010), "Investigation of the Young's Modulus of Fibers in an Electrospun PCL Scaffold Using AFM and its Correlation to cell Attachment," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Indianapolis, June 7-10.*
 23. Wanasekara, N.D., **Chalivendra, V.B.** and Calvert, P.D. (2010), "Sub-micron Scale Mechanical Properties of Polypropylene Fibers Exposed to Ultraviolet and Thermal Degradation," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Indianapolis, June 7-10.*
 24. Wanasekara, N.D., **Chalivendra, V.B.** and Calvert, P.D. (2010), "Effect of Accelerated Ultra Violet and Thermal Exposure on Nano Scale Mechanical Properties of Nylon Fibers," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Indianapolis, June 7-10.*
 25. Abotula, S. and **Chalivendra, V.B.** (2010), "Effect of Aspect Ratio of Cylindrical Pulse shapers on Force Equilibrium in Hopkinson Pressure Bar Experiments," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Indianapolis, June 7-10.*
 26. Bender, S., El Wakil, S.D., **Chalivendra, V.B.**, Rahbar, N., Bhowmick, S. (2010) "Fabrication and Characterization of Novel Graded Bone Implant Material," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Indianapolis, June 7-10.*

27. Vadlamani, V., **Chalivendra, V.B.**, Shukla, A. and Yang, S., (2010) "Electro-Mechanical Response of Carbon Nanotube Reinforced Polymer Composites," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics*, Indianapolis, June 7-10.
28. Costa, J. V., Ramotowski, T., Warner, S. and **Chalivendra, V.B.**, (2010) "High Thermal Conductivity Polyurethane-Boron Nitride Nanocomposite Encapsulants," *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics*, Indianapolis, June 7-10.
29. Wanasekara, N.D., Chen, M., Chalivendra, V.B. and Bhowmick, S. (2009) "Role of Scaffold Architecture and Mechanical Properties of Electrospun Scaffolds in Cell Seeding," *Proceedings of Materials Research Society*, Nov 30 - Dec 4, Boston, MA.
30. Maclure, A., Chalivendra, V.B. and Ramotowski, T. (2009), "Effect of Pressure Cycling on Fracture Energy of Polyurethane/Aluminum Adhesive Bonds" *Proceedings of SEM Annual Conference & Exposition on Experimental & Applied Mechanics*, June 1-4, Albuquerque, NM.
31. Wanasekara, N.D., Vadlamani, V.K., Agrawal, A., **Chalivendra, V.B.**, Calvert, P.D., (2009) Nanoindentation Studies of Epoxy Hydro gels for Tissue Engineering Applications, *Proceedings of North Eastern Bio-Engineering Conference*, April 2-4, Boston, MA.
32. Crowley, J., **Chalivendra, V. B.** (2008) "Dynamic Constitutive Behavior of UHMWPE-HAP Nanocomposites", *Proceedings of SEM XI International Congress & Exposition on Experimental & Applied Mechanics*, June 2-5, Orlando, FL.
33. Abotula, S., **Chalivendra, V. B.**, Crowley, J. (2008) "Quasi-static and Dynamic Constitutive Behavior of Aerospace Alloys", *Proceedings of SEM XI International Congress & Exposition on Experimental & Applied Mechanics*, June 2-5, Orlando, FL.
34. Kidane, A., **Chalivendra, V.B.**, Shukla, A., Chona, R. (2008) "Effect of Temperature on the Dynamic Crack-tip Stress Fields in Graded Materials", *Proceedings of SEM XI International Congress & Exposition on Experimental & Applied Mechanics*, June 2-5, Orlando, FL.
35. **Chalivendra, V. B.**, (2008) "Asymptotic Mode-I Crack-tip Stress Fields for Orthotropic Graded Materials", *Proceedings of International Conference on Computational and Experimental Sciences*, March 17-22, Honolulu, Hawaii.
36. Crowley, J., **Chalivendra, V. B.**, (2007) "Experimental Characterization of Polyethylene-Hydroxyapatite Composites," *Proceedings of SEM Annual Conference & Exposition*, June 4-7, Springfield, MA.
37. Maclure, A., **Chalivendra, V. B.**, Ramotowski T. and Ricci, V., (2007) "Effect of Pressure Cycling on Metal-Polymer Adhesive Bond Strength," *Proceedings of SEM Annual Conference & Exposition*, June 4-7, Springfield, MA.
38. **V.B. Chalivendra**, (2006) "Transient Elasto-Dynamic Crack Growth in Functionally Graded Materials", *Proceedings of Multi-scale and Functionally Graded Materials Conference*, October 16-18, Honolulu, Hawaii,
39. **Chalivendra, V. B.**, Rosakis, A. J., Hong, S., (2006) "Deflection and penetration behavior of propagating mode-I cracks towards weak inclined planes," *Proceedings of 2006 SEM*

- Annual Conference & Exposition*, June 4-7, St. Louis, MO.
40. Arias, I., Knap, J., **Chalivendra, V. B.**, Hong, S., Ortiz, M., Rosakis, A. J., (2006) "Validation of large scale simulations of dynamic fracture," *Proceedings of III European Conference on Computational Mechanics*, June 5-9, Lisbon, Portugal.
41. Arias, I., Knap, J., **Chalivendra, V. B.**, Hong, S., Ortiz M., and Rosakis, A. J., (2005) "Validation of massively parallel simulations of dynamic fracture and fragmentation of brittle solids," *Proceedings 8th U.S. National Congress on Computational Mechanics*. U. S. Association for Computational Mechanics.
42. **Chalivendra, V. B.**, Hong, S., Rosakis, A.J., Knap, J., and Ortiz, M. (2005), "Experimental Validation of Dynamic Fragmentation Simulations", *Proceedings of 2005 SEM Conference & Exposition on Experimental & Applied Mechanics*, June 7-9, Portland.
43. **Chalivendra, V. B.**, Hong, S., Rosakis, A.J., Arias, I., Knap, J., Ortiz, M. (2005), "Interaction of dynamic cracks with inclined interfaces", *Proceedings of International Conference on Fracture (ICF11)*, Turin, Italy, March 20-25.
44. Xia, K., **Chalivendra, V.B.**, Rosakis, A.J. (2005), "Experimental studies of mixed mode spontaneous fractures expanding along inclined planes" *Proceedings of International Conference on Fracture (ICF11)*, Turin, Italy, March 20-25.
45. Arias, I., Knap, J., **Chalivendra, V.B.**, Hong, S., Ortiz, M., Rosakis, A.J. (2005), "Validation of massively parallel simulations of dynamic fracture and fragmentation of brittle solids", *Proceedings of International Conference on Fracture (ICF11)*, Turin, Italy, March 20-25.
46. **Chalivendra, V. B.**, Jain, N. and Shukla, A. (2003), "Static and Dynamic Fracture of an Inclined Isotropic-Orthotropic Bimaterial Interface", *Proceedings of 2003 SEM Annual Conference and Exposition*, Charlotte, June 1-3.
47. **Chalivendra, V. B.**, Parameswaran, V. and Shukla, A., (2002), "Dynamic Characterization of Ceramic Micro Balloon Reinforced Polyurethane", *Proceedings of the SEM Annual Conference and Exposition on Experimental and Applied Mechanics*, June 10-12, Milwaukee, WI
48. Lee, K. H., Parameswaran, V., **Chalivendra, V. B.** and Shukla, A. (2001), "Evaluation of Static and Dynamic Fracture Parameters along the Interface of Isotropic-Orthotropic Bimaterial", *Proceedings of the SEM Annual Conference on Experimental Mechanics*, Portland, June 4-6.
49. Ricci, V., Shukla, A., **Chalivendra, V. B.** and Lee, K. H. (2001), "Analysis of subsonic Interfacial fracture using strain gages in an isotropic orthotropic bimaterial", *Proceedings of 10th International Congress of Fracture*, Hawaii, December 3-7.
50. **Chalivendra, V. B.**, Reddy, C. E. and Padmanabhan, G. (1998), "Development of software package for Technology Management in RDBMS framework", *Proceedings of National conference on Industrial Engineering towards 21st century*, Sri Venkateswara University, Tirupati, India, February.
51. **Chalivendra, V. B.**, Godla, J. and Reddy, C. E. (1993) "A Petrinet based analysis of Flexible Automated Forming and Assembly Systems", *Proceedings of International*

- Conference on CAD, CAM, Robotics and Automation Factories (INCARF)*, Indian Institute of Technology, New Delhi, India, December.
52. Godla, J., **Chalivendra, V. B.** and Reddy, C. E. (1992), "A stochastic Petrinet Based analysis of Tool Management Issues in FMS", *Proceedings of International Conference on Automation, Robotics, and Computer Vision (ICARCV)*, Nanyang Technological University, Singapore, June.

I. Conference Presentations

1. Kehail, A.A., **Chalivendra, V.** and Brigham, C.J. "In Vivo and In Vitro Degradation Studies for Poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) Biopolymer," American Society for Microbiology general meeting, Boston, MA, June 16th - 20th, 2016.
2. Noah S. Franklin, Lisa Perreault, Karoly Fodor, Maricris Mayes, **Vijaya B. Chalivendra**, Milana C. Vasudev, Peptide Nanotubes for the Non-invasive Detection of Biomolecule Secretion from Cells, XXV International Materials Research Congress, August 2016.
3. Kehail, A.A., **Chalivendra, V.** and Brigham, C.J., "Thermal and Mechanical Characterization of Poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) Biopolymer and In Vivo and In Vitro Degradation Studies ," International Conference for Biopolymers, 21-23 November, 2016, Dubai, UAE.
4. Liu, J-Y., **Chalivendra, V.B.**, Goldsmith, C.L. and Huang, W. (2013) "Multi-scale Regular-fractal Topography Characterization and Modeling," *2013 IEEE International Conference on Automation Science and Engineering*, August 17-21, Madison, Wisconsin, USA.
5. **Chalivendra, V. B.**, Hong, S., Rosakis, A.J., Knap, J., and Ortiz, M. (2005), "Experimental Validation of Dynamic Fragmentation Simulations", presented in *2005 SEM Conference & Exposition on Experimental & Applied Mechanics*, June 7-9, Portland.
6. Hong, S., **Chalivendra, V. B.**, Rosakis, A.J., Knap, J., and Ortiz, M. (2005), "Experimental Measurement of Mixed-mode Cohesive Zone Laws of Adhesive Bonds", presented in *2005 SEM Conference & Exposition on Experimental & Applied Mechanics*, June 7-9, Portland.
7. Xia, K., **Chalivendra, V. B.**, and Rosakis, A.J., "Spontaneous Fracture in Similar and Dissimilar Materials", presented in *2005 SEM Conference & Exposition on Experimental & Applied Mechanics*, June 7-9, Portland.
8. **Chalivendra, V. B.**, Rosakis, A.J., Arias, I., and Ortiz, M. (2004), "Dynamic Photoelastic Validation of Large Scale Fracture and Fragmentation Simulations", presented in *2004 SEM International Conference & Exposition on Experimental & Applied Mechanics*, Costa Mesa, June 7-10.
9. **Chalivendra, V. B.**, Arias, I., Knap, J., Rosakis, A.J., and Ortiz, M. (2004), "Validation of large scale dynamic fracture and fragmentation simulations", poster presentation in *Caltech ASCI Center Visit to Sandia National Laboratories*, February 2-4.
10. **Chalivendra, V. B.**, Arias, I., Knap, J., Rosakis, A.J., and Ortiz, M. (2004), "Validation of large scale dynamic fracture and fragmentation simulations", poster presentation in *Caltech ASCI Center Visit to Los Alamos National Laboratories*, February 2-4.

11. **Chalivendra, V. B.** (2002), "Fabrication and Evaluation of a Lightweight Polyurethane-Cenosphere Composite", presented at *the SEM student competition*, June 10-12, 2002, Milwaukee.
12. **Chalivendra, V. B.** (2002), "Constitutive Behavior and Fracture of Microsphere filled Polyurethane Composite", Presented in *SEM Graduate Student Symposium*, Stony Brook, New York, 6-7 May 2002.
13. **Chalivendra, V. B.** (2003), "Determination of fracture parameters for a crack inclined to the property gradation in functionally gradient materials", presented at the *Student Symposium on Mechanics and Packaging (SSMP)*, May 2-3, WPI, Worcester.

J. Invited talks

1. "Interactions of Dynamic cracks with Inclined Interfaces", *ASCI Research Review*, May 12-13, 2005, California Institute of Technology, USA.
2. "Transient Crack Growth in Functionally Gradient Materials", *Solid Mechanics Group meeting*, May 17, 2004, California Institute of Technology, USA.
3. "Dynamic Fracture in Brittle Materials", *ASCI Alliance/Laboratory V and V Workshop*, July 13-14, 2004, La Jolla, California, USA.
4. "Static and Dynamic Fracture in Homogeneous and Nonhomogeneous Materials", July 22, 2004, *The Goodyear Tire & Rubber Company*, Akron, Ohio, USA.
5. "Dynamic Fracture of Homogeneous and Nonhomogeneous Materials", February 24, 2005, *American University of Sharjah*, presented to the committee in Chicago, IL, USA.
6. "Dynamic Failure of Homogeneous and Nonhomogeneous Materials", March 28, 2005, *University of Massachusetts*, Dartmouth, USA.
7. "Dynamic Failure of Layered Materials", November 18, *University of Rhode Island*, 2005.
8. "Dynamic Failure of Engineering Materials", June 23, *Naval Underwater Warfare Center*, Newport, 2006.
9. "Dynamic Failure of Homogeneous and Non-homogeneous Materials," June 5, 2007, *Indian Institute of Technology*, Chennai, India.
10. "Dynamic Failure of Homogeneous and Non-homogeneous Solids," June 13, 2007, *Indian Institute of Science*, Bangalore, India.
11. "Crack-tip stress fields for orthotropic functionally graded materials," October 12, 2007, *Department of Materials & Textiles*, UMass Dartmouth.
12. "Solid Mechanics-Bioengineering Perspective", December 5, 2008, Invited lecture for Introduction to Bioengineering course taught by Dr. Sankha Bhowmick.
13. "Nano-mechanical Characterization of Polypropylene and Nylon Fibers Exposed to Ultraviolet and Thermal Degradation", March 29, 2010, *Materials & Solid Mechanics seminar series*, Brown University.
14. "Nano-Characterization of Polymer Fibers and Butterfly Wings; In-situ Sensing of Non-linear Deformation & Damage of Carbon Nanotubes Reinforced Composites," January 24, 2012, *Civil Engineering Department*, KL University, Vijayawada, India.

15. "Damage Detection using Carbon Nanotubes in Polymer Particulate Composites," April 24, 2013, Bristol Community College.
16. "Detection of damage using Carbon Nanotubes at Various Loading Conditions," ARL, March 18, 2015, Maryland, USA.
17. "Damage Sensing & Damage Tolerant Composite Materials," 01/06/17, Civil & Mechanical Engineering Department, KL University, Vijayawada, India.

OTHER PROFESSIONAL ACTIVITIES:

A. Editorial Services

1. Guest editor of a special issue on "Dynamic Behavior of Materials" for journal of *Experimental Mechanics* (Issue: February 2012).
2. Editor of Proceedings of 2012 Annual Conference on Experimental and Applied Mechanics, "Dynamic Behavior of Materials".
3. Editorial board of *The Scientific World Journal* (2012- current).
4. Editorial board of American Journal of Engineering and Technology Research (2012-current).
5. Editorial board of Chinese Journal of Engineering.
6. Editorial board of ISRN Nanotechnology
7. Associate Technical editor of "Experimental Mechanics" journal

B. Service in Professional Societies

1. Chaired a session "Time-dependent Constitutive Behavior-I" in 2006 SEM Annual Conference & Exposition, June 4-7, St. Louis, MO.
2. Co-organized a general session on Dynamic behavior of Materials in SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Spring Filed, Massachusetts, June 3-6, 2007.
3. Co-organized a track "Dynamic Behavior of Materials" in 2008 SEM Annual conference & Exposition, June 2-5, Orlando, FL.
4. Organized a session on "Dynamic Failure of Materials under Impact Loading" in Society for Experimental Mechanics (SEM) XI International Congress & Exposition on Experimental & Applied Mechanics, Orlando, Florida, June 2-5, 2008.
5. Co-organized a session on "Dynamic behavior of composites" in Society for Experimental Mechanics (SEM) XI International Congress & Exposition on Experimental & Applied Mechanics, Orlando, Florida, June 2-5, 2008.
6. Chaired a session "Dynamic Behavior of Composites-I" in Society for Experimental Mechanics (SEM) XI International Congress & Exposition on Experimental & Applied Mechanics, Orlando, Florida, June 2-5, 2008.
7. Chaired a session "Dynamic Behavior of Composites-II" in Society for Experimental Mechanics (SEM) XI International Congress & Exposition on Experimental & Applied

- Mechanics, Orlando, Florida, June 2-5, 2008.
8. Co-chaired a session "Dynamic Failure of Materials-I" in Society for Experimental Mechanics (SEM) XI International Congress & Exposition on Experimental & Applied Mechanics, Orlando, Florida, June 2-5, 2008.
 9. Co-chaired a session "Dynamic Failure of Materials-II" in Society for Experimental Mechanics (SEM) XI International Congress & Exposition on Experimental & Applied Mechanics, Orlando, Florida, June 2-5, 2008.
 10. Co-organized a track "Dynamic Behavior of Materials" in *2009 SEM Annual conference & Exposition*, June 1-4, Albuquerque, NM.
 11. Organized a session on "Dynamic Failure of Materials" in Society for Experimental Mechanics (SEM) Annual Congress & Exposition on Experimental & Applied Mechanics, Albuquerque, NM, June 1-4, 2009.
 12. Co-chaired a session on "Dynamic Failure of Materials" in Society for Experimental Mechanics (SEM) Annual Congress & Exposition on Experimental & Applied Mechanics, Albuquerque, NM, June 1-4, 2009.
 13. Co-chaired a session on "Dynamic Failure of Materials" in Society for Experimental Mechanics (SEM) Annual Congress & Exposition on Experimental & Applied Mechanics, Indianapolis, NM, June 7-10, 2010.
 14. Co-organized a track "Dynamic Behavior of Materials" in *2010 SEM Annual conference & Exposition*, Indianapolis, IN, June 7-10, 2010.
 15. Co-organized a track "Dynamic Behavior of Materials" in *2011 SEM Annual conference & Exposition*, Uncasville, CT, June 13-17, 2011.
 16. Co-organized a track "Dynamic Behavior of Materials" in *2012 SEM Annual conference & Exposition*, Costa Mesa, CA, June 12-14, 2012.
 17. Co-organized a symposium on "Performance of Materials and Structures under Extreme Loading Conditions", held on 12-13 October at University of Rhode Island.
 18. Co-organized sessions on "Dynamic Fracture & Failure" in 2013 SEM XI Annual conference & Exposition, Chicago, 2013.
 19. Co-organized two sessions of "Dynamic Fracture/Failure" in 2014 Society of Experimental Mechanics annual conference.
 20. Co-chaired two sessions on "Fracture of Composite Materials," International Conference and Exposition on Experimental and Applied Mechanics, Society for Experimental Mechanics, June 6-9, 2016.

C. Membership in Professional Societies:

- American Society for Mechanical Engineering
- Society for Experimental Mechanics

Caiwei Shen

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Education

University of California at Berkeley, CA

Ph.D., Mechanical Engineering,

Aug. 2018

Tsinghua University, Beijing, China

M.S., Electronics Sci. & Tech.,

July 2013

Tsinghua University, Beijing, China

B.S., Microelectronics

July 2010

Research Interests

Advanced materials

• Nanomaterials for energy storage and conversion • Multifunctional composite

Energy and power systems

• Integrated self-powering system • Structural energy storage • Power management

Microelectromechanical system (MEMS)

• Sensors and Actuators • Micro supercapacitors • Micro fuel cells • Energy Harvesters

Research Experience

Assistant Professor, Mechanical Engineering, UMASS Dartmouth (Sept. 2018-Present)

Research Assistant, Liwei Lin Group, Mechanical Engineering, UC Berkeley (Aug. 2013-Aug. 2018)

- Focused on development of flexible energy storage devices and sensors for applications in wearable electronics.
- Designed and implemented experimental strategies to investigate innovative fabrication technologies to develop supercapacitors in various form factors and configurations with high energy and power densities, and successfully fabricated them using novel nano/micro structured components:
 - Wearable woven “supercapacitor fabrics” with high energy density and load-bearing capability
 - Ultra-thin (smallest reported) coaxial fiber supercapacitors with high energy and power densities
 - Stretchable supercapacitors based on laser-induced graphene and kirigami technology
 - Supercapacitors with hybrid electrodes using Titanium disulfide coated carbon nanotubes

Caiwei Shen

- Direct-write flexible micro supercapacitors using conductive polymer nanofibers
- Supercapacitors with hybrid electrodes using Titanium disulfide coated carbon nanotubes

- Demonstrated the direct-write flexible strain sensor technology using conductive polymer nanofibers.
- Collaborated with *the US Army Aviation and Missile Research, Development and Engineering Center* on the development of novel energy storage devices.
- Actively participated in collaborative research activities in *Berkeley Sensor and Actuator Center (National Science Foundation Industry/University Cooperative Research Center)*

Research Assistant, Xiaohong Wang Group, Dept. of Microelectronics, Tsinghua Univ. (Mar. 2010-July 2013)

- Focused on solutions for micro-scale on-chip energy storage which was significant for the realization of self-powering systems for wireless sensor network.
- Developed wafer-scale patterned micro-supercapacitors using photoresist-derived nanoporous carbon
- Demonstrated 3D MEMS-based on-chip micro supercapacitors with highest reported areal capacitance
- Packaged and tested micro-direct methanol fuel cells
- Participated in research programs funded by Tsinghua National Laboratory for Information Science and Technology and National Natural Science Foundation of China.

Research Assistant, Zewen Liu Group, Dept. of Microelectronics, Tsinghua Univ. (June 2009-Oct. 2009)

- Performed theoretical calculation and simulation on floating-gate-based MEMS switch

Teaching and Mentoring Experience

Instructor:

- UMASS Dartmouth (Fall 2018)
 - *Materials Science* (ME 231)

Teaching assistant (TA):

- UC Berkeley (Spring 2017)
 - *Introduction to Nanotechnology and Nanosciences* (ME 118) (Instructor: Prof. Liwei Lin)
- UC Berkeley (Spring 2018)
 - *Micro/Nano Mechanical Systems Laboratory* (ME 138/238) (Instructor: Prof. Liwei Lin)
- Tsinghua University, China (Fall 2012)
 - *Introduction to MEMS* (Instructor: Prof. Xiaohong Wang)

Research mentoring:

- Mentoring 1 master student and a senior design project in UMASS Dartmouth (2018 to present).
- Mentored 5 undergraduate students in the National Tsing Hua University, Taiwan – UC Berkeley summer research internship program (2015 – 2017).
- Mentored 4 students in the Tsinghua University, Beijing, China– UC Berkeley exchange student program (2015 – 2016).

Publications and Patents (Up to Nov. 2018)

Journal Articles:

- [1] **Caiwei Shen**, Y Xie, B Zhu, M Sanghadasa, Y Tang, L Lin, "Wearable woven supercapacitor fabrics with high energy density and load-bearing capability", *Scientific Reports*, Vol. 7, pp. 14324, 2017.
- [2] **Caiwei Shen**, Y Xie, M Sanghadasa, Y Tang, L Lin, "Ultra-thin coaxial fiber supercapacitors achieving high energy and power densities", *ACS Applied Materials & Interfaces*, Vol. 9, pp. 39391, 2017.
- [3] **Caiwei Shen**, CP Wang, M Sanghadasa, L Lin, "Flexible micro-supercapacitors prepared using direct-write nanofibers", *RSC Advances*, Vol. 7, pp. 11724, 2017.
- [4] **Caiwei Shen**, S Xu, Y Xie, M Sanghadasa, X Wang, L Lin, "A Review of On-Chip Micro Supercapacitors for Integrated Self-powering Systems", *Journal of Microelectromechanical Systems*, Vol. 99, pp. 1 - 17, 2017.
- [5] **Caiwei Shen**, X Wang, W Zhang, F Kang, "Direct Prototyping of Patterned Nanoporous Carbon: A Route from Materials to On-chip Devices", *Scientific Reports*, Vol. 3, pp. 2294, 2013.
- [6] **Caiwei Shen**, X Wang, S Li, W Zhang, F Kang, "A High-energy-density Micro Supercapacitor of Asymmetric MnO₂-Carbon Configuration by Using Micro-fabrication Technologies", *Journal of Power Sources*, Vol. 234, pp. 302, 2013.
- [7] **Caiwei Shen**, X Wang, W Zhang, F Kang, "A high-performance three-dimensional micro supercapacitor based on self-supporting composite materials", *Journal of Power Sources*, Vol. 196, pp. 10465, 2011.
- [8] X. Zang*, **Caiwei Shen*** (*equal contribution), L. Lin, et al., "Laser induced molybdenum carbide-graphene composites for 3D foldable paper electronics", *Advanced Materials*, 1800062, 2018.
- [9] X. Zang*, **Caiwei Shen*** (*equal contribution), L. Lin, et al., "High - voltage supercapacitors based on aqueous electrolytes", *ChemElectroChem*, 10.1002/celec.201801225, 2018.
- [10] D. Shin, **Caiwei Shen**, L. Lin, et al., "Breathable 3D Supercapacitors Based on Activated Carbon Fiber Veil", *Advanced Materials Technologies*, 1800209, 2018.
- [11] X. Zang, **Caiwei Shen**, L. Lin, et al., "Titanium Disulfide Coated Carbon Nanotube Hybrid Electrodes Enable High Energy Density Symmetric Pseudocapacitors", *Advanced Materials*, 1704754, 2017.
- [12] R. Xu, A. Zverev, A. Hung, **Caiwei Shen**, L. Lin, et al., "Highly Stretchable Micro-Supercapacitor Patches Fabricated by Laser Conversion and Cutting", *Microsystems & Nanoengineering*, Accepted, 2018.
- [13] Y Xie, L Lu, Y Tang, F Zhang, **Caiwei Shen**, L Lin, et al., "Hierarchically nanostructured carbon fiber-nickel-carbon nanotubes for high-performance supercapacitor electrodes", *Materials Letters* 186, 70-73, 2017.

- [14] F. Teng, X. Wang, **Caiwei Shen**, et al., "A micro glucose sensor based on direct prototyping mesoporous carbon electrode", *Microsystem Technologies*, Vol. 21, pp. 1337, 2015.
- [15] S Li, X Wang, H Xing, **Caiwei Shen**, "Micro supercapacitors based on a 3D structure with symmetric graphene or activated carbon electrodes", *Journal of Micromechanics and Microengineering*, 23 (11), 114013, 2013.
- [16] X. Wang, Y. Zhu, **Caiwei Shen**, et al., "A novel assembly method using multi-layer bonding technique for micro direct methanol fuel cells and their stack", *Sensors and Actuators A: Physical*, 188, 246-254, 2012.
- [17] S. Li, X. Wang, **Caiwei Shen**, et al., "Nano-structured Manganese Dioxides as Active Materials for Micro Supercapacitors", *Micro & Nano Letters*, Vol. 7, pp. 744, 2012.
- [18] H. Xing, X. Wang, **Caiwei Shen**, et al., "Fabrication and Tests of a 3-D Micro Supercapacitor Using SU-8 Photoresist as the Separator", *Micro & Nano Letters*, Vol. 7, pp. 1166, 2012.

International Conferences:

- [19] **Caiwei Shen**, CP Wang, M Sanghadasa, L Lin, "Direct-write polymeric strain sensors with arbitrary contours on flexible substrates", *29th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2016)*, Shanghai, China, January 24 - 28, 2016.
- [20] **Caiwei Shen**, Y Xie, M Sanghadasa, Y Tang, L Lin, "A coaxial carbon fiber micro supercapacitor", *29th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2016)*, Shanghai, China, January 24 - 28, 2016.
- [21] **Caiwei Shen**, G Luo, A Kozinda, M Sanghadasa, L Lin, "Solid-state flexible micro supercapacitors by direct-write porous nanofibers", *28th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2015)*, Estoril, Portugal, Jan. 18-22, 2015.
- [22] **Caiwei Shen**, X Wang, S Li, X Wu, "Direct Prototyping of 3D Micro Supercapacitors Based on In Situ Fabricated Nanoporous Carbon Electrodes", *26th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2013)*, Taipei, Taiwan, Jan. 20-24, 2013.
- [23] **Caiwei Shen**, X Wang, W Zhang, F Kang, C Du, "A Novel Three-Dimensional Micro Supercapacitor Using Self-Support Nano Composite Materials", *24th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2011)*, Cancún, Mexico, Jan. 23-27, 2011.
- [24] D. Shin, **Caiwei Shen**, L. Lin, et al., "Semi-transparent foldable supercapacitor for 3d structured energy storage devices", *31th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2018)*, Belfast, UK, January 21 - 25, 2018.
- [25] S. Li, X. Wang, **Caiwei Shen**, et al., "A Study of Nano-structured Manganese Dioxides and Their Composites as Electrode Materials for Micro Supercapacitors", *7th IEEE International Conference on Nano/Micro Engineered and Molecular Systems (NEMS 2012)*, Kyoto, Japan, March 5 - 8, 2012.

Patents:

- [26] L. Lin, **Caiwei Shen**, Y. Xie, "Supercapacitors by solid electrolyte-coated, fiber-based electrodes", U.S. provisional application (No. B17-045-1).

- [27] X. Wang, **Caiwei Shen**, "Nanoporous film patterned by direct photolithography and method for preparing the same", US 9046784 B2.
- [28] X. Wang, **Caiwei Shen**, "A fabrication method of three-dimensional electrodes for micro supercapacitors based on nanoporous composites", Chinese Patent, Application Number: 201010623583.5 (CN 102074371A).
- [29] X. Wang, **Caiwei Shen**, S.W. Li, "A fabrication method of MEMS-based asymmetric micro supercapacitors ", Chinese Patent, Application Number: 201110359444.0 (CN102496470A).
- [30] X. Wang, H. Xing, **Caiwei Shen**, "Micro supercapacitors using photoresist as separator and the fabrication method", Chinese Patent, Application Number: 201210098119.8 (CN 102623184A).

Jun Li

Assistant Professor
Department of Mechanical Engineering
University of Massachusetts Dartmouth
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Webpage: <http://junli.blogs.umassd.edu/>

HIGHER EDUCATION

A. Degrees

University of Illinois at Urbana-Champaign, Urbana, IL

Ph.D. in Mechanical Engineering

Dec. 2012

M.S. in Mathematics

Aug. 2012

M.S. in Theoretical and Applied Mechanics

Dec. 2009

Shanghai Jiao Tong University, Shanghai, China

B.S. in Mechanical Engineering

Jun. 2005

B.S. in Mathematics (minor)

Jun. 2005

B. Additional Education

California Institute of Technology, Pasadena, CA

Sep. 2012—Dec. 2014

Postdoctoral Scholar in Aerospace

RESEARCH INTEREST

Composite materials, hierarchical materials and lightweight structures

Soft and multifunctional materials, flexible and deployable structures

Computational thermo-elasto-plasticity and fracture mechanics

Image-based (CT, MRI) multiscale modeling of biological materials

Continuum thermomechanics and applications in additive manufacturing

EXPERIENCE

A. Teaching Experience

University of Massachusetts, Dartmouth, MA

Sep. 2016—Present

Assistant Professor, Department of Mechanical Engineering

California Institute of Technology, Pasadena, CA

Jan. 2014—May 2014

Teaching Assistant, Graduate Aerospace Laboratories

B. Other Experience

Dassault Systemes Simulia Corp, Providence, RI

Jan. 2015—Aug. 2016

Quality Assurance Manager, Abaqus Solver Group

Shanghai Jiao Tong University, Shanghai, China

Sep. 2005—Jun. 2007

Lab Assistant, State Key Laboratory of Mechanical Systems and Vibration

C. Courses taught at UMass Dartmouth

MNE 381: Design of Machine Elements	Spring 2017
MNE 503: Continuum Mechanics	Fall 2017
MNE 381: Design of Machine Elements	Spring 2018
MNE 380-01H: Honors Enrichment (FEA in Machine Design)	Spring 2018

ACADEMIC AND PROFESSIONAL HONORS

NASA RHG Exceptional Achievement for Engineering Award, *NASA*, 2016

NSF-PACAM Early Career Researcher Travel Fellowship, *13th Pan-American Congress of Applied Mechanics (PACAM)*, 2013

First Place Award, “Emerging Researchers in Biomedical Engineering” session, *ASME International Mechanical Engineering Congress and Exposition (IMECE)*, 2011

Travel Scholarship, *16th US National Congress on Theoretical and Applied Mechanics*, 2010

George A. Costello Fellowship, *University of Illinois at Urbana-Champaign*, 2009

Thomas J. and Virginia F. Dolan Fellowship, *University of Illinois at Urbana-Champaign*, 2007

Graduation in University’s Honors, *Shanghai Jiao Tong University*, 2005

PUBLICATIONS

A. Peer-reviewed Journal Articles

1. **J. Li** and M. Ostoja-Starzewski, “Fractal solids, product measures and fractional wave equations”, *Proceedings of Royal Society A*, **465**, 2521-2536, 2009. Invited as a reprint in *Formamente*, **VI**, 93-113, 2011.
2. M. Ostoja-Starzewski and **J. Li**, “Fractal materials, beams and fracture mechanics”, *Journal of Applied Mathematics and Physics (ZAMP)*, **60**, 1194-1205, 2009.
3. **J. Li** and M. Ostoja-Starzewski, “Fractal pattern formation at elastic-plastic transition in random heterogeneous materials”, *ASME Journal of Applied Mechanics*, **77**, 021005-1-7, 2010.
4. **J. Li** and M. Ostoja-Starzewski, “Fractals in elastic-hardening plastic materials”, *Proceedings of Royal Society A*, **466**, 603-621, 2010.
5. **J. Li** and M. Ostoja-Starzewski, “Fractals in thermoelastoplastic materials”, *Journal of Mechanics of Materials and Structures*, **6**, 351-359, 2011.
6. **J. Li** and M. Ostoja-Starzewski, “Micropolar continuum mechanics of fractal media”, *International Journal of Engineering Science*, **49**, 1302-1310, 2011.
7. E. Novitskaya, P.-Y. Chen, E. Hamed, **J. Li**, V.A. Lubarda, I. Jasiuk and J. McKittrick, “Recent advances on the measurement and calculation of the elastic moduli of cortical and trabecular bone: a review”, *Theoretical and Applied Mechanics*, **38(3)**, 209-303, 2011.
8. E. Hamed, E. Novitskaya, **J. Li**, P.-Y. Chen, I. Jasiuk and J. McKittrick, “Elastic moduli of untreated, demineralized, and deproteinized cortical bone: Validation of a theoretical model of bone as an interpenetrating composite material”, *Acta Biomaterialia*, **8**, 1080-1092, 2012.
9. **J. Li**, A. Saharan, S. Koric and M. Ostoja-Starzewski, “Elastic-plastic transition in 3D random materials: Massively parallel simulations, fractal morphogenesis and scaling functions”,

Philosophical Magazine, **92(22)**, 2733-2758, 2012.

10. M. Ostoja-Starzewski, **J. Li**, H. Joumaa and P.N. Demmie, “From fractal media to continuum mechanics”, *Journal of Applied Mathematics and Mechanics (ZAMM)*, **93**, 1-29, 2013.
11. **J. Li** and M. Ostoja-Starzewski, Comment on “Hydrodynamics of fractal continuum flow” and “Map of fluid flow in fractal porous medium into fractal continuum flow”, *Physical Review E*, **88**, 057001, 2013.
12. **J. Li** and M. Ostoja-Starzewski, “Fractal shear bands at elastic-plastic transitions in random Mohr-Coulomb materials”, *ASCE Journal of Engineering Mechanics*, **140(9)**, 04014072, 2014.
13. E. Hamed, E. Novitskaya, **J. Li**, I. Jasiuk and J. McKittrick, “Experimentally-based multiscale model of the elastic moduli of bovine trabecular bone and its constituents”, *Materials Science and Engineering C*, **54**, 207-216, 2015.
14. M. Chittenden, A. Najafi, **J. Li** and I. Jasiuk, “Nanoindentation and Ash Content Study of Age Dependent Changes in Porcine Cortical Bone”, *Journal of Mechanics in Medicine and Biology*, **15(5)**, 1550074, 2015.
15. **J. Li** and M. Ostoja-Starzewski, “Edges of Saturn's Rings are Fractal”, *SpringerPlus*, **4**: 158, 2015.
16. **J. Li**, K. Kwok and S. Pellegrino, “Thermoviscoelastic models for polyethylene thin films”, *Mechanics of Time-Dependent Materials*, **20(1)**, 13-43, 2016.

B. Book Chapters and Refereed Conference Proceedings

1. **J. Li** and M. Ostoja-Starzewski, “Fractal solids, product measures and continuum mechanics”, *Mechanics of Generalized Continua: One Hundred Years after the Cosserats*, Edited by G.A. Maugin and A.V. Metrikine, 315-323, Springer, 2010.
2. E. Novitskaya, E. Hamed, **J. Li**, Z. Manilay, I. Jasiuk and J. McKittrick, “Hierarchical Structure of Porosity in Cortical and Trabecular Bones”, *MRS Proceedings*, **1420**, mrsf11-1420-oo10-09, 2012.
3. E. Novitskaya, E. Hamed, **J. Li**, I. Jasiuk and J. McKittrick, “Correlation of multi-scale modeling and experimental results for the elastic modulus of trabecular bone”, *Mechanics of Biological Systems and Materials*, **4**, 59-65, 2013.
4. E. Novitskaya, E. Hamed, **J. Li**, I. Jasiuk and J. McKittrick, “Correlation of multi-scale modeling and experimental results for the elastic moduli of cortical and trabecular bone”, *Mechanics of Biological Systems and Materials*, **5**, 99-107, 2013.
5. **J. Li**, K. Kwok and S. Pellegrino, “Large-Strain Viscoelastic Constitutive Models for Thin Polyethylene Films”, *56th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, AIAA SciTech Forum*, AIAA-2015-0194.
6. M. Ostoja-Starzewski, **J. Li**, and P.N. Demmie, “Continuum Homogenization of Fractal Media”, *Handbook of Nonlocal Continuum Mechanics for Materials and Structures*, Edited by G. Voyiadjis, Springer, 1-31, 2017.
7. **J. Li** and M. Ostoja-Starzewski, “Application of fractional calculus to fractal media”, *Handbook of Fractional Calculus with Applications*, Edited by J.T. Machado, Springer, in press, 2018.

C. Conference Presentations and Invited Seminars

1. **J. Li** and M. Ostoja-Starzewski, “Fractal pattern formation at elastic-plastic transition in random materials”, *45th Annual Technical Conference of Society of Engineering Science*, Urbana, IL, Oct. 12–15, 2008.
2. **J. Li**, “Fractals in elastic-plastic transitions of random heterogeneous materials”, *Materials Interest Group Seminar*, Department of Mechanical Science and Engineering, University of Illinois, Urbana, IL, Apr. 23, 2009.
3. **J. Li** and M. Ostoja-Starzewski, “Fractal pattern formation in thermoelastoplastic random heterogeneous materials”, *8th International Congress on Thermal Stresses*, Urbana, IL, June 1–4, 2009.
4. **J. Li** and M. Ostoja-Starzewski, “Why are fractals observed in elastic-plastic materials?” **Keynote presentation**, *10th US National Congress on Computational Mechanics*, Columbus, OH, July 16–19, 2009.
5. **J. Li**, “Fractal solids, product measures and fractional wave equations”, *Materials Interest Group Seminar*, Department of Mechanical Science and Engineering, University of Illinois, Urbana, IL, Nov. 19, 2009.
6. **J. Li** and M. Ostoja-Starzewski, “Generalized continuum mechanics of fractal microstructures”, *16th US National Congress on Theoretical and Applied Mechanics*, State College, PA, June 27–July 2, 2010.
7. **J. Li** and M. Ostoja-Starzewski, “Fractals in elastic-hardening plastic materials”, *16th US National Congress on Theoretical and Applied Mechanics*, State College, PA, June 27–July 2, 2010.
8. **J. Li**, S. Koric and M. Ostoja-Starzewski, “Fractal patterns at elastic-plastic transitions”, *ASME 2011 Applied Mechanics and Materials Division Conference (McMAT)*, Chicago, IL, May 30– June 1, 2011.
9. **J. Li** and M. Ostoja-Starzewski, “Fractal patterns in Mohr-Coulomb media”, *48th Annual Technical Conference of Society of Engineering Science*, Chicago, IL, Oct. 12–14, 2011.
10. **J. Li**, “Fractals in mechanics of materials”, *Civil Infrastructure Seminar*, School of Civil and Environmental Engineering, Cornell University, Ithaca, NY, Apr. 10, 2012.
11. **J. Li** and M. Ostoja-Starzewski, “Fractal shear bands at elastic-plastic transitions in Mohr-Coulomb materials”, *13th Pan-American Congress of Applied Mechanics (PACAM)*, Houston, TX, May 22–24, 2013.
12. **J. Li**, K. Kwok and S. Pellegrino, “Nonlinear viscoelastic modeling of polymeric balloon films”, *13th Pan-American Congress of Applied Mechanics (PACAM)*, Houston, TX, May 22–24, 2013.
13. **J. Li**, “A large deformation viscoelastic model of NASA superpressure balloon film”, *James K. Knowles Caltech Solid Mechanics Symposium*, California Institute of Technology, Pasadena, CA, Jan. 24, 2014.
14. **J. Li**, “Time and Temperature Dependent Large Deformation of Membranes for Sustainable Technology Applications”, *Astani CEE Department Seminar*, Sonny Astani Department of Civil and Environmental Engineering, University of Southern California, Los Angeles, CA, Mar. 31, 2014.
15. **J. Li**, “Characterization and Modeling of Time and Temperature Dependent Large Deformation of Polymer Membranes”, *Structural Engineering and Mechanics Seminar*, Department of Civil and

Environmental Engineering, University of California, Los Angeles, CA, Apr. 4, 2014.

16. **J. Li**, “Characterization and Modeling of Time and Temperature Dependent Polymer Membranes”, *Invited Seminar*, Teledyne Scientific & Imaging, Thousand Oaks, CA, Dec. 4, 2014.
17. **J. Li**, K. Kwok and S. Pellegrino, “Characterization and Modeling of Time and Temperature Dependent Polyethylene Films”, *53rd Annual Technical Conference of Society of Engineering Science*, College Park, MD, Oct. 3-5, 2016.
18. **J. Li**, “Multiscale Materials Modeling and Application in Aerospace, Biomedical Engineering and 3D Printing”, *Joint Mechanical Engineering (MNE) & Engineering Applied Science (EAS) Seminar*, University of Massachusetts, Dartmouth, MA, Mar. 20, 2017.
19. **J. Li**, “Multiscale Materials Modeling and Application in Aerospace, Biomedical Engineering and 3D Printing”, *Electro-Mechanical Engineering Seminar*, Guangdong University of Technology, Guangzhou, Guangdong, China, May 26, 2017.
20. **J. Li** and M. Ostoj-Starzewski, “Continuum mechanics of fractal materials”, *Joint Society of Engineering Science (SES) & ASME Applied Mechanics Division (AMD) Conference*, Boston, MA, Jul. 25-28, 2017.
21. **J. Li**, “Multiscale Materials Modeling and Application in Aerospace, Biomedical Engineering and 3D Printing”, *Mechanical Engineering Seminar*, University of Rhode Island, Kingston, RI, Oct. 6, 2017.

ACADEMIC SERVICE

Reviewed manuscripts submitted for journal publication in:

ASME Journal of Applied Mechanics
Journal of Mechanics of Materials and Structures
Mathematics and Mechanics of Solids
Archive of Applied Mechanics
Computational Mechanics
Zeitschrift für Angewandte Mathematik und Mechanik (ZAMM)
Microfluidics and Nanofluidics
Geothermal Energy
Advances in Numerical Analysis
Journal of Applied Mathematics
Journal of Stochastics
Mathematical Problems in Engineering
International Journal of Physical Science
Continuum Mechanics and Thermodynamics
International Journal of Non-Linear Mechanics
Automation in Construction
Applied Mathematical Modelling
IEEE Transactions on Electron Devices

Advising the following graduate students:

Rojin Ghandriz (EAS-PhD; expected completion in August 2020)
Asia Haque (BMEBT-PhD; expected completion in August 2021)

Prosenjit Biswas (ME-MS; expected completion in August 2019)
Jason Galary (EAS-PhD; co-advising with Prof. Huang; expected completion in Spring 2019)
Sen Yang (EAS-PhD; co-advising with Prof. Chalivendra; expected completion in Spring 2020)
Nicholas Bach (BS/MS; co-advising with Prof. Chalivendra; expected completion in August 2018)

Serving in thesis committee of the following graduate students:

Abhishek Pathri (ME-MS; completed in Spring 2017)
Bolong Shi (ME-MS; completed in Spring 2017)
Karoly Fodor (ME-MS; completed in August 2017)
Richard Bellizzi (ISE-MS; completed in December 2017)
Md. Fazlay Rabbi (MSME; completed in December 2017)
Wen Jin (EAS-PhD; expected completion in Spring 2019)

Advising the following undergraduate students in senior projects:

Jacob Barone, Andrew Oglesby, Blaise Silipa, Lynden Mills, James Hickey, *Vertical Axis Wind Turbine Sail and Structure* (2016-2017) – *Won the 1st Place*
Sean Herlihy, Corey Matos, Jordan Frey, Jamie Thornton, Cameron Christo, *Vertical Axis Wind Turbine Infrastructure Sub-System* (2016-2017)
Matthew Darling, Kareem Arja, Eric Rodrigues, *Robotic Hand* (2017-2018) – *Won the 2nd Place*

PROFESSIONAL MEMBERSHIPS

Member, American Institute of Aeronautics and Astronautics (AIAA)
Member, American Society of Mechanical Engineers (ASME)
Member, American Physical Society (APS)
Member, International Society for the Interaction of Mathematics and Mechanics (ISIMM)
Member, Sigma Xi the Scientific Research Society

Dr. Wenzhen Huang

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EDUCATION

- Ph.D** 2004 Department of Industrial Engineering, University of Wisconsin-Madison, USA
- Ph.D** 1987 Department of Mechanical Engineering, Shanghai Jiaotong University, Shanghai, China
- M.S.** 1984 Department of Mechanical Engineering, Shanghai Jiaotong University, Shanghai, China
- B.S.** 1982 Department of Mechanical Engineering, Jilin University, Changchun, China

RESEARCH INTERESTS

Quality Control and Reliability in Micro/Nano Manufacturing: fusion of engineering knowledge, physical model, and sensing information for inspection, monitoring, and quality and reliability improvement; functional and geometric tolerancing in micro/nano system design and manufacturing; micro-metrology and topography characterization.

Modeling and Control of Complex Manufacturing Systems: modeling and analysis of geometric variation propagation in complex manufacturing systems, especially in multistage processes and micro/nano manufacturing, quality fault diagnosis, process variation reduction, throughput analysis, statistical GD&T modeling and analysis, quality improvement.

Quality Engineering and Applied Statistics: multivariate statistics, multivariate process control, reliability, design of experiments, Bayesian model and Bayesian computation, stochastic simulation, optimization and surrogate model in design and manufacturing.

WORK EXPERIENCES

- 09/2011- Associate Professor ME Dept. University of Massachusetts, Dartmouth, MA
- 09/2005-08/2011 Assistant Professor ME Dept. University of Massachusetts, Dartmouth, MA
- 08/2004-08/2005 Postdoctoral Research Fellow IE Dept., UW-Madison, WI
- 02/2001-07/2004 Research/Teaching Assistant IE Dept., UW-Madison, WI
- 01/2000-12/2000 Visiting Scholar University of Michigan, Ann Arbor, MI
- 08/1995-01/2000 Professor ME Dept. and National Lab for Vibration, Shock & Noise Control, Jiaotong University, Shanghai, China
- 06/1991-07/1995 Associate Professor National Lab for Mechanical Transmission, Chongqing University, Chongqing, China
- 01/1988-09/1991 Lecturer (equivalent to Assistant Professor in the U.S.) Dynamic Testing Center, Chongqing University, China

A. ACOMPLISHMENTS AFTER TENURED (SINCE 2011):

GRANTS AND SPONSORED PROJECTS (2011~2017)

- *Statistical Modeling and Contact Analysis of Fractal Topography for Radio-Frequency (RF)-MEMS*, (PI, (Collaborated with Dr. Chalivendra) NSF, CMMI#1129741, \$269,383, 09/01/2011-08/31/2016).

- *GOALI: Collaborative Research: A Math-based Model for Geometric Variation and Tolerance Control in Design and Manufacturing*, (PI, NSF, CMMI#0928609, total: \$170,000 after 2011: **\$113,333**, Period: 09/01/2009-08/31/2015)

PUBLICATIONS

Recent Journal & Proceeding Papers:

1. J. Liu, V. Chalivendra, W. Huang, 2017, "Contact Analysis of Radio Frequency MEMs Switch Surface", accepted, *Journal of Micromechanics and Microengineering*.
2. Liu, J., Chalivendra, V., Goldsmith, C., Huang, W. (2016). Contact Analysis of Radio Frequency MEMS Switch Contact Surfaces. *Proceedings of 2016 SEM Annual Conference & Exposition on Experimental & Applied Mechanics*.
3. Kavel Bastani, Sunwook Kim, Zhenyu Kong, Maury A. Nussbaum, Wenzhen Huang, 2016, "Online Classification and Sensor Selection Optimization with Application to Human Material Handling Tasks Using Wearable Sensing Technologies", *IEEE, Trans. On Human Machine Systems* (Vol: PP, Issue: 99), DOI: 10.1109/THMS.2016.2537747.
4. K. Bastani, Z. Kong, W. Huang, Y. Zhou, 2015, "Compressive Sensing Based Optimal Sensor Placement for Multi-station Assembly Processes," (published online 30th Sept. 2015), *IEEE Trans. Automation Science and Engineering*, **48**(5):pp464-474.
5. Huang, W., 2014, "A statistical GD&T tolerance model for design and manufacturing", *J. China Jiliang University*, **25**(3): pp1-11.
6. Jinya Liu, Vijaya Chalivendra, Charles L Goldsmith, Wenzhen Huang, 2014, Multi-Scale Regular- Fractal Topography Characterization and Modeling, *Proceedings of ASME 2014 IMECE*, V010T13A032-V010T13A032, ASME.
7. Huang, W., Liu, J., Chalivendra, V., Ceglarek, D., Kong, Z, and Zhou, Y., 2014 "Statistical Modal Analysis (SMA) for Variation Characterization and Application in Manufacturing Quality Control," *IIE Trans. Special Issue: Quality and Reliability Engineering*, **46**(5): 497-511, DOI: 10.1080/0740817X.2013. 814928.
8. W. Huang, 2014, "Sample Size Determination in Quasi-Monte Carlo Simulation for Tolerance Design", *ASME Trans. Journal of Computing & Information Science in Engineering (JCISE)*, *J. Comput. Inf. Sci. Eng.* **13**(3), 034501.
9. Huang, S., Kong, Z., and Huang, W., 2014, "High-dimensional Process Monitoring and Change Point Detection using Embedding Distribution in Reproducing Kernel Hilbert Space (RKHS)," *IIE Trans. , J. Quality & Reliability*, **46**(10): 999-1016.
10. Jiya Liu, Wenzhen Huang, Zhenyu, Kong, Yingqing Zhou, Process Capability Analysis with GD&T specifications, *Proc. ASME56185*; Vol. 2A: Advanced Manufacturing, V02AT02A063, Nov. 2013 IMECE2013-62940, doi: 10.1115/IMECE2013-62940.
11. Kaveh Bastani, Zhenyu (James) Kong, Wenzhen Huang, Xiaoming Huo, Qingying Zhou, 2013, Fault Diagnosis Using an Enhanced Relevance Vector Machine (RVM) for Partially Diagnosable Multi-station Assembly Processes, *Trans. IEEE, Journal of Automation Science and Engineering*, Vol. 10, No. 1, pp. 124-136.

12. Huang, W., Pahwa, A., Kong, Z., 2012 "Kernel Density Estimation And Metropolis-Hastings Sampling In Process Capability Analysis Of Unknown Distributions", Proceedings of MSEC (ASME 2012), MSEC2012-7299, June 4-8, 2012, Notre Dame, IN.
13. W. Huang, Z. Kong, A. Chennamaraju, "Fixture Robust Design by Sequential Space Filling Methods in Multi-Station Manufacturing Systems", *ASME Trans. Journal of Computing & Information Science in Engineering* (JCISE): 10(4), 041001. (This paper was published after the tenure dossier was submitted).

Recent Conference Publications:

1. Liu, J., Chalivendra, V., Goldsmith, C., Huang, W. (2016). Finite Element Modeling of Contact Analysis of RF-MEMS Switch. *COMSOL Conference 2016*. Boston.
2. Jinya Liu, V Chalivendra, W Huang (2015). Statistical Modeling and Contact Analysis of RF MEMS Surface. *COMSOL Conference 2015* Boston.
3. S. Huang, Z. Kong, W. Huang, (2013), "High-dimensional Process Monitoring and Change Point Detection Using Embedding Distributions in Preproducing Kernel Hilbert Space (RKHS)", *Workshop on System Informatics and Control, 2013 IEEE International Conference on Automation Science and Engineering (CASE)*, August 17-21, Madison, WI, USA.
4. J. Liu, V. Chalivendra, C. Goldsmith, W. Huang, 2013, "RF-Switch MEMS Surface Regular-Fractal Characterization and Modeling", *2013 IEEE International Conference on Automation Science and Engineering (CASE)*, August 17-21, Madison, WI, USA.

Invited Talks/Presentations:

1. *Stream of Variation Modeling & Tolerance Control in Design & Manufacturing--Today & Tomorrow*, June 29th, 2017, Department of Mechanical Engineering, Southern University of Science & Technology, Shenzhen, China.
2. *Stream of Variation Modeling (SOVA) & Tolerance Control in Design & Manufacturing*, June 30th, 2017, Mechanical Engineering Department, Shenzhen University.
3. *A SMA Model for Variation & Tolerance Control in Design & Manufacturing*, Dec. 2013, Mechanical Engineering Department, China Jiliao University, Hangzhou, China.
4. *Stream of variation analysis in assembly systems: modeling and applications*, 2013, WPI, Mechanical Engineering, Worcester, MA, USA.
5. *A Math-based Model for Geometric Variation & Tolerance Control in Design & Manufacturing*, at Industrial Engineering Department, Oklahoma State University, OK, USA, 2012.

STUDENT ADVISING

Ph.D Students:

- Aljarrah, Osama M, Ph.D. student in EAS program at UMASSD (started since Fall, 2016).
- Jason Galary, Ph.D. candidate in EAS program at UMASSD (started since Spring 2016).
- Jinya Liu, research assistant, Ph.D. candidate at UMASSD, expected to graduate in Summer 2017.
- Yabo Han, Ph.D. research assistant, EAS/ISE program, UMASSD.

MS/ISE students:

- Bharath Reddy Konda, graduated in 2011, Mechanical Engineering Department, Uni. Massachusetts Dartmouth, MA, USA.

- Jinya Liu, graduated with thesis: "Process Capability Evaluation Method for Manufacturing with GD&T Specifications" in summer 2012, Mechanical Engineering Department, Uni. Massachusetts Dartmouth, MA, USA.
- Niloofar Jalali, graduated with thesis: "Statistical Mode-Based Simulation Model for GD&T Design Synthesis and Multi-Scale Roughness Analysis of Cylindrical Feature", 2012, Mechanical Engineering Department, Uni. Massachusetts Dartmouth, MA, USA.
- John Jacobsen, (ISE) graduated with an industrial project (report), 2013, "Optimal Cleaning System Improvement--Reduction of Parts needing Rewashing and Updating Machine Performance", Mechanical Engineering Department, Uni. Massachusetts Dartmouth, 2013, MA, USA.
- Jason T. Galary, (ISE) graduated from ISE MS program with industrial project report, 2016, "A Response Surface Methodology and Central Composite Design for the Optimization of a Fluorocarbon Gel Manufacturing Process", Mechanical Engineering Department, Uni. Massachusetts Dartmouth, 2016, MA, USA.
- Eugene A. Manzone, (ISE) graduated from ISE MS program with industrial project report, 2016, "A Study of the Trace Metals in Lubricating Greases", Mechanical Engineering Department, Uni. Massachusetts Dartmouth, 2016, MA, USA.
- Yabo Han, graduated with MS thesis, 2016, "Construction of Multivariate Control Chart Based on Kernel Density Estimation and Metropolis-Hastings Sampling", Mechanical Engineering Department, Uni. Massachusetts Dartmouth, 2016, MA, USA.
- Abhishek Pathri, (ISE) graduated in Jan. 2017, with ISE project report. Mechanical Engineering Department, Uni. Massachusetts Dartmouth, MA, USA.
- Xuyang Wang, graduated in Dec. 2016, "Topography sample size compression by Cantor set concept", Mechanical Engineering Department, Uni. Massachusetts Dartmouth, 2016, MA, USA.
- Bolong Shi, graduated in Mar. 2017, "Statistical GD&T Tolerance Verification By Predictive Confidence Interval", Mechanical Engineering Department, Uni. Massachusetts Dartmouth, MA, USA.
- Ethan Malay, (ISE) graduated in Dec. 2016, Application of Lean Six Sigma in a Primary Care Medical Setting", Mechanical Engineering Department, Uni. Massachusetts Dartmouth, MA, USA.

TEACHING (since 2011)

- **MNE535** STATISTICAL QUALITY CONTROL (MNE/ISE graduate)
- **MNE560** STATISTICAL DESIGN OF EXPERIMENTS (MNE/ISE, graduate)
- **MNE563** FACILITY PLANNING (New ISE course, graduate)
- **MNE564** CONTINUOUS QUALITY IMPROVEMENT (New ISE course, graduate)
- **MNE591** MULTIVARIATE STATISTICS AND DATA MINING IN APPLICATION (New ISE course, graduate, special topics)
- **MNE476** MANUFACTURING QUALITY CONTROL (undergraduate)
- **EGR101** INTRODUCTION TO ENGINEERING (undergraduate)

- **MNE345** DESIGN FOR MANUFACTURING (undergraduate)
- **MNE466** CONTROL THEORY (undergraduate)
- **MNE301** APPLIED ENGINEERING MATHEMATICS (undergraduate)
- **MNE242** ENGINEERING DYNAMICS (undergraduate)

SERVICE:

- Director of MNE/ISE Graduate Program (2016-)
- Curriculum Committee
- Graduate Committee
- In charge of ISE program developments, including program design, students recruitment, advising, project defense, and curriculum development. Since 2013-14 devoted tremendous efforts in developing two new ISE courses and one more new ISE special topic course to accommodate the ISE curriculum requirements and limited/reduced ISE faculty resource. In addition, have been advising a large number of ISE+ME MS students with their projects and theses.

REVIEW FOR JOURNALS

- 1) *Transactions of ASME, Journal of Manufacturing Science and Engineering*
- 2) *Transactions of ASME, Journal of Mechanical Design*
- 3) *Transactions of ASME, Journal of Computing and Information Science*
- 4) *Transactions of IIE, Journal of Design & Manufacturing*
- 5) *IEEE Transactions on Robotics and Automation*
- 6) *Transactions of NAMRI/SME*
- 7) *SME Journal of Manufacturing Systems*

B. ACOMPLISHMENTS BEFORE TENURED (~08/2011)

GRANTS AND SPONSORED PROJECTS (Since 1997):

Grants in US (2005~2011):

- *GOALI: Collaborative Research: A Math-based Model for Geometric Variation and Tolerance Control in Design and Manufacturing*, (PI, NSF, CMMI#0928609, total \$170,000, 09/01/2009-08/31/2014)
- *SOVA: Stream-of-Variation Analysis System for MultiStage Manufacturing Processes*, supported by the Advanced Technology Program, National Institute of Standard Technology, (ATP/NIST, 10/03-01/07), (PI (12/05-01/07, subcontracted through DCS Inc., \$35,665))
- *Geometric Variation Modeling for Statistical Tolerance Design*, (PI, Chancellor's Research Grant from Healey Endowment, \$8,564, 07/2008-06/30/2010)

Grants in China (1997~2000)

- *Diagnosis and Quality Control in Automotive Assembly* (PI, ¥100,000, 1997-2000, the Ministry of Education, China)
- *Development of the Curriculums and Facilities for 21st Century Mechanical Engineering Design Education*, (PI, ¥1,000, 000, 1997-2000, the Ministry of Education, China)
- *Diagnosis and Control of Vibration and Noise in Shanghai-Volkswagen 2000 Suspension Systems* (PI, ¥100,000, 1998-2000, Shanghai Huizhong Automotive Inc.)
- *Dimensional Variation Analysis and Diagnosis for Automotive Body Assemblies* (Co-PI, ¥50,000, 1998-2000, Shanghai Volkswagen Automotive Inc.)

Selected Publications Before Tenure Evaluation (until tenure dossier submitted, Oct. 2010):

Publications after joining UMASSD:

1. W. Huang, Z. Kong, 2010, "Process Capability Sensitivity Analysis for Design Evaluation of Multi- Station Assembly Systems", *IEEE Trans., Special Issue on Advances in Automation Science and Engineering for Automotive Manufacturing*.
2. W. Huang, B. R. Konda, Z. Kong, 2010, "Geometric Tolerance Simulation Model for Rectangular and Circular Planar Features", *Trans. NAMRI/SME* 38.
3. Z. Kong, W. Huang, Oztekin, A., 2009, "Stream of Variation Analysis for Multiple Station Assembly Process with Consideration of GD&T Factors", *ASME Trans., Journal of Manufacturing Science and Engineering*, Vol.131, Oct. 2009, URL: <http://link.aip.org/link/?MAE/131/051010>, DOI: 10.1115/ 1.4000094.
4. A. Pahwa, W. Huang, 2009, "Multivariate Process Capability Analysis Using Non-parametric Model and Bootstrap Sampling", *Trans. of NAMRI/SME* 37.
5. W. Huang, T. Phoomboplab and D. Ceglarek, 2009, "Process Capability Surrogate Model Based Tolerance Synthesis of Multi Station Manufacturing Systems (MMS)", *IIE Transactions, Quality & Reliability Engineering*, 41: 309-322.
6. W. Huang, Z. Kong, 2008, "Simulation and integration of geometric and rigid body kinematics errors for assembly variation analysis", *Journal of Manufacturing Systems*, 27(2008), 36-44, doi: 10.1016/j.jmsy.2008.06.004.
7. W. Huang, Z. Kong, 2008, "Process Capability Sensitivity for Design Evaluation of Multi-Station Assembly Systems", *Proceedings of the The 4th Annual IEEE Conference on Automation Science and Engineering* (CASE 2008), pp 400-405, August 23-26, 2008, Key Bridge Marriott, Washington DC, USA.
8. W. Huang, Z. Kong, 2008, "Model Simplification in Compliant Assembly Analysis", *Trans. of NAMRI/SME* Vol.36.
9. Z. Kong, D. Ceglarek, and W. Huang, 2008, "Multiple Fault Diagnosis Method in Multi-Station Assembly Processes using Orthogonal Diagonalization Analysis", *ASME Trans., Journal of Manufacturing Science and Engineering*, 130(1): 145-154.
10. W. Huang, Z. Kong, 2007, "Integration of Part Geometric Errors and Rigid Assembly Stack-Up Errors in Assembly Modeling", *Trans. of NAMRI/SME* Vol. 35.
11. W. Huang, J. Lin, Z. Kong, D. Ceglarek, 2007, "Stream-of-Variation (SOVA) Modeling II: A Generic 3D Variation Model for Rigid Body Assembly in Multi Station Assembly Processes", *Trans. of ASME, Journal of Manufacturing Science and Engineering*, 129(4):832-842.

12. W. Huang, J. Lin, M. R. Bezdecny, Z. Kong, D. Ceglarek, 2007, "Stream-of-Variation Modeling I: A Generic 3D Variation Model for Rigid Body Assembly in Single Station Assembly Processes", *Trans. of ASME Journal of Manufacturing Science and Engineering*, **129**(4):821-831.
13. Z. Kong, W. Huang, D. Ceglarek, 2005, "Visibility Analysis for Assembly Fixture Calibration Using Screen Space Transformation", *ASME Trans., Journal of Manufacturing Science and Engineering*, **127**(3): 622-634.
14. W. Huang, D. Ceglarek, 2005, "Model Complexity Reduction in Stream of Variation for Compliant Sheet Metal Assembly", *Proc. of 9th CIRP International Seminar on Computer Aided Tolerancing*, Arizona State University, April 11-12, 2005.

Publications before Joining UMASSD:

1. W. Huang, Z. Y. Kong, D. Ceglarek, E. Brahmst, 2004, "The Analysis of Feature-based Measurement Error in Coordinate Metrology", *IIE Trans., Design & Manufacturing*, **36**:237-251.
2. W. Huang, D. Ceglarek, Z. G. Zhou, 2004, "Using Number-Theoretical Net Method (NT-net) in Tolerance Analysis", *International Journal of Flexible Manufacturing Systems*, **6**(1): 65-90.
3. D. Ceglarek, W. Huang, S. Zhou, Y. Ding, K. Ramesh, Y. Zhou, 2004, "Time-based Competition in Multistage Manufacturing: Stream-of-Variation Analysis (SOVA) Methodology – Review", *International Journal of Flexible Manufacturing System*, **6**(1):11-44.
4. W. Huang and D. Ceglarek, 2002, "Mode-based Decomposition of Part Form Error by Discrete-Cosine-Transform with Implementation to Assembly and Stamping System with Compliant Parts", *Annals of the CIRP*, **51**(1):21-26.
5. Z. G. Zhou, W. Huang, L. Zhang, 2001, "Sequential Algorithm Based on Number Theoretic Method for Tolerance Analysis and Synthesis", *ASME Trans., Journal of Manufacturing Science and Engineering*, **123**(3): 490-493.

Refereed Conference Papers (Selected):

1. W. Huang, Z. Kong, D. Ceglarek, 2007, "Stream Of Variation Analysis In Assembly Systems: Modeling And Its Applications" *INFORMS Annual Meeting*, November 4-7, 2007, Seattle, WA, USA.
2. W. Huang, T. Phoomboplab, D. Ceglarek, 2006, "Explicit Yield Model (EYM) based Tolerance Synthesis Methodology for Large Scale Complex Assemblies", *Proceedings (CD-ROM) of 2006 ASME International Conference on Manufacturing Science & Engineering (MESC)*, Oct. 8-11, Ypsilanti, MI.
3. W. Huang, D. Ceglarek, 2005, "Model Complexity Reduction in Stream of Variation for Compliant Sheet Metal Assembly" (CD-ROM) *9th CIRP International Seminar on Computer Aided Tolerancing*, Arizona State University, 11-12 April, USA.
4. Z. Kong, K. Ramesh, Y. Q. Zhou, B. G. Surendra, J. Lin, W. Huang, D. Ceglarek, 2005, "Multi Faults Diagnosis Method in Multi-Station Assembly Processes Using State Space Model and Orthogonal Diagonalization Analysis", *2005 ASME International Mechanical Engineering Congress and Exposition*.
5. D. Ceglarek, W. Huang, 2003, "Process-oriented Tolerancing for Quality Improvement in Multi-station Assembly Systems", *Quality & Productivity Research Conference* May 21-23, 2003, IBM T. J. Watson Research Ctr., Yorktown Heights, NY, USA.
6. W. Huang, D. Ceglarek, 2002, "Mode-Based Decomposition of Part Form Error by Discrete-Cosine-Transform with Implementation to Assembly and Stamping System with Compliant Parts", *INFORMS Annual Meeting*, Nov. 17-20 2002, San Jose, CA, USA.

7. Carla A. Vivacqua, Andre L. S. de Pinho, and W. Huang, 2002, "Achieving Process Improvement Through Strip Block Design: An Industrial Application to Reduce Defective Rate", *2002 Spring Research Conference on Statistics in Industry and Technology*, May 20-22, 2002, Ann Arbor, MI.
8. Carla A. Vivacqua, Andre L. S. de Pinho, W. Huang, 2002, "Strip-Block Designs in Multistage Processes: An Industrial Application", *Design and Analysis Experiments 1, DAE1 (Design and Analysis of Experiments 1)*, July 14-18, 2002, Vancouver, B.C. Canada.

REVIEWER FOR JOURNALS

- 8) *Transactions of ASME, Journal of Manufacturing Science and Engineering*
- 9) *Transactions of ASME, Journal of Mechanical Design*
- 10) *Transactions of ASME, Journal of Computing and Information Science*
- 11) *Transactions of IIE, Journal of Design & Manufacturing*
- 12) *IEEE Transactions on Robotics and Automation*
- 13) *Transactions of NAMRI/SME*
- 14) *SME Journal of Manufacturing Systems*
- 15) *International Journal of Flexible Manufacturing Systems*

ACADEMIC AWARDS

- The Best Student Paper Award of the *Quality Statistics & Reliability Section of INFORMS*, November, 2002, San Jose, CA, USA
- Outstanding Young Faculty Award, *Shanghai Municipal Government, China*, 1997
- Excellence in Teaching Award, *Shanghai Jiaotong University*, 1997
- Research Award from *Education Ministry of China*, 1997
- The Outstanding Young Faculty Award (Early Career Award), *Ministry of Education, China*, 1993
- Chinese Government Young Faculty Fellowship, *Ministry of Education, China*, 1989

STUDENT ADVISING

Ph.D Students:

- Zhi Ge Zhou, "Modeling, Diagnosis and Control of Geometric Errors for Autobody Assembly Through Statistical Method", 1999, Ph.D in Mechanical Engineering, Shanghai Jiaotong University, Shanghai, China.
- Yu Jun Xue, "Mechanical Analysis and Experimental investigation of Impact-Fatigue/Wear Caused Failure of Automobile Absorber Connecting Rod", 2001, Ph.D in Mechanical Engineering, Shanghai Jiaotong University, Shanghai, China (Co-Chaired with Prof. Xian-Hua Cheng).
- Li Zhang, "Dynamics Analysis and Experiment for Noise Reduction on Suspension Systems of Shanghai-Santana 2000", 2001, Ph.D in Mechanical Engineering, Shanghai Jiaotong University, Shanghai, China (Co-Chaired with Prof. Jianwu Zhang).
- Hai-jiang Liu, 1994, "Modal Analysis and Noise Control of Mechanical Transmission Systems", 1994, Ph.D in Mechanical Engineering, Chongqing University, China (Co-Chaired with Prof. Guanghui Zhang).

- Li Zheng, “Modeling and Dynamical Analysis of the Three-Ring (Plate) Planetary Transmission System”, 1995, Ph.D in Mechanical Engineering, Chongqing University, China (Co-Chaired with Prof. Xichang Lian)

MS Students:

- Chennamaraju Abishek, graduated in spring 2008 with the thesis: “Integrated Tolerance Allocation and Fixture Layout Optimization by Number Theoretic Methods in Multi-station Assembly Systems”, Mechanical Engineering Department, Uni. Massachusetts Dartmouth, MA, USA.
- Ankit Pahwa, graduated in Fall 2008 with the thesis: “A Bootstrap-yield Simulation Approach for Multivariate Process Capability Estimation and Evaluation”, Mechanical Engineering Department, Uni. Massachusetts Dartmouth, MA, USA.
- Bharath Reddy Konda, graduated in 2011, Mechanical Engineering Department, Uni. Massachusetts Dartmouth, MA, USA.
- Haihong Zhu, 1998, graduated with the thesis: “Design, Experiment, and Kinematics Analysis of a Snake-Type Robot”, Mechanical Engineering, Shanghai Jiaotong University, Shanghai, China.
- Xiao Zhang, 1998, graduated with the thesis: 1998, “Vibration Simulation Analysis and Experiments on the Earthquake Response of the Rotor-Structure System of a High Speed Fan”, M.S. in Mechanical Engineering, Shanghai Jiaotong University, Shanghai, China.
- Shuanghu Wang, 1999, graduated with the thesis: “Dimensional Variation Control for Automotive Body-in-White Assembly Process”, M.S. in Mechanical Engineering, Shanghai Jiaotong University, Shanghai, China.

TEACHING EXPERIENCE

- **MNE535 STATISTICAL QUALITY CONTROL (graduate)**
- **MNE560 STATISTICAL DESIGN OF EXPERIMENTS (graduate)**
- **MNE530 SIMULATION MODELING (graduate)**
- **MNE301 APPLIED ENGINEERING MATHEMATICS (undergraduate)**
- **MNE476 MANUFACTURING QUALITY CONTROL (undergraduate)**
- **EGR101 INTRODUCTION TO ENGINEERING (undergraduate)**
- **EGR131 INTRODUCTION TO DESIGN (undergraduate)**
- **MNE345 DESIGN FOR MANUFACTURING (undergraduate)**
- **MNE466 CONTROL THEORY (undergraduate)**
- **MNE 490 OPERATIONS RESEARCH (undergraduate)**

PROFESSIONAL MEMBERSHIPS

- American Society of Mechanical Engineers
- INFORMs

- Society of Manufacturing Engineers

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Newport RI 02840
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Education:

Duke University, Durham, NC, Ph.D. in Mechanical Engineering, December, 1993.

Advisor: Professor Adrian Bejan.

Dissertation: *Fundamental Topics in Heat Transfer through Deformable Two-Phase Media*.

Wesleyan University, Middletown, CT, B.A. in Philosophy, June, 1987.

Honors Thesis: *St. Anselm's Proslogion in the Context of his works and beliefs*.

Current Positions:

Professor, Mechanical Engineering Department, University of Massachusetts Dartmouth, 1994-present
(tenured and promoted to Associate Professor in 2000, promoted to Professor in 2007).

Experience Summary:

Education Administration:

Interim Provost and Vice Chancellor for Academic and Student Affairs, University of Massachusetts
Dartmouth, December 2012-July 2013.

Associate Provost for Graduate Studies and Research Development, University of Massachusetts
Dartmouth, May 2012- November 2012.

Interim Director of the Advanced Manufacturing and Technology Center, University of
Massachusetts Dartmouth, September 2012 – November 2012.

Associate Provost for Graduate Studies, University of Massachusetts Dartmouth, 2009-2012

Chairperson, Mechanical Engineering Department, University of Massachusetts Dartmouth, 2007-2009.

Engineering Director, Biomedical Engineering and Biotechnology PhD Program, UMass
Dartmouth, 2003-2007 (except 2003-2004 sabbatical)

Director of Graduate Studies, Mechanical Engineering, UMass Dartmouth, 1998-2003.

Research Appointments:

Faculty Affiliate, Center for Engineering in Medicine, Massachusetts General Hospital, 1998-2012.

Research Fellow, Bioengineering, Department of Surgery, Harvard Medical School,
Massachusetts General Hospital, summer 1995, 1996-2008.

Research Fellow, Department of Surgery, Shriners's Burns Institute, Boston, MA, 1995-2008.

Core Faculty member, Biomedical Engineering Research Education Program, Shriners's Research
Center, Cambridge, MA, 1995-2000.

Adjunct Investigator, The Laboratory of Surgical Science and Engineering, Massachusetts
General Hospital, 1996 - 2000.

Visiting Faculty Fellow, Center for Engineering in Medicine, Harvard Medical School, 1997

Visiting Student, Conservatoire National des Arts et Metiers, Paris, summer 1991.

Employment History:

Associate Professor, Mechanical Engineering Department, UMass Dartmouth, 2000-2007.

Assistant Professor, Mechanical Engineering, UMass Dartmouth, 1994-2000.

Postdoctoral Researcher, Duke University, Spring 1994.

Medical Technologist, Massachusetts General Hospital, 1987-1989.

Honors and Awards:

Whitaker Foundation Investigator, 1997-2000.

Faculty Development Award, Center for Engineering in Medicine, Harvard Medical School, 1997.

President of Sigma Xi Research Society, UMass Dartmouth Chapter, 1997-1998.

Honors in Philosophy, Wesleyan University, 1987.

Co-Captain of Varsity Crew, Wesleyan University, 1985-86

Leadership Training:

Institute for Management and Leadership in Education, Harvard Graduate School of Education
June 1-19, 2011.

CFOs and COAs Solving Problems Together: Effective Campus Leadership, National Association of College and University Business Officers, August 8-9, 2011.

Research Facilities, Tradeline, May 8-9, 2011

Administrative Experience

Interim Provost and Vice Chancellor for Academic and Student Affairs, December 2012-July 2013
Chief Academic Officer who managed a budget of about \$120M per year and a unit of more than 1100 employees. Direct reports included the Vice Provost for Academic Affairs, Associate Provost of Graduate Studies and Research Development, Associate Vice Chancellor of Enrollment Management, Associate Vice Chancellor for Student Affairs, Dean of the Library and the Deans of 8 schools and colleges: College of Arts and Sciences, College of Business, School of Education-Public Policy and Civic Engagement, College of Engineering, School of Law, School of Marine Science and Technology, College of Nursing, and College of Visual and Performing Arts.

My primary task as Interim Provost was to close a major budget gap and to begin design of a budgeting process that would allow UMass Dartmouth to operate within its means while investing in strategic areas of growth. This involved the development of metrics for program evaluation, new budget reports and significant administrative streamlining.

I was also the senior administrator on campus during the initial 10 day period of the Marathon Bombing Crisis. I worked with the emergency response team to coordinate and oversee an emergency evacuation of the entire campus, provide food and housing for evacuated students for 2 days, worked with federal law enforcement to establish timing and procedures for campus re-opening, responded to information requests by law enforcement during and after the manhunt for Dzhokhar Tsarnaev, planned social activities to build campus morale, responded to media requests and worked with public relations to control media access to students.

Major actions undertaken as Provost include:

- Reduced the Academic Affairs budget by more than \$3M: a reduction of more than 4% in total costs at both the college level and in the upper administration.
- Worked with Administration and Finance and the Associate Vice Chancellor for Enrollment Management to correct a perennial \$3-4M budget shortfall in financial aid while maintaining the same percentage of need met in the student population.
- Established an on-line data base in which many different metrics for departments were disseminated to all faculty and staff along with national benchmarks to increase transparency and encourage informed debate about resource allocation.
- Worked with the Vice Provost and Human Resources to restructure our Professional and Continuing Education division into a division of University studies that was integrated with the

colleges. We also developed new business models for continuing, summer and on-line education to incentivize colleges and departments to more actively pursue on-line initiatives.

- Reconfigured the School of Education, Public Policy and Civic Engagement to increase efficiency and program effectiveness by eliminating the Dean's office and integrating the school within the College of Arts and Sciences. Also encouraged departmental restructuring and merger to improve the quality of the Teacher Preparation program and a tighter focus on education for the school.
- Worked with the Associate Provost for Graduate Studies and Research Development to perform a comprehensive review of all research centers on campus. We closed ineffective centers, reduced overall expenditures to underperforming centers by more than \$700k and generated increased support for high performing centers.

Associate Provost for Graduate Studies and Research Development, May 2012 to November 2012
Served as Chief Research Officer.

- Oversaw the Office of Research Administration (annual expenditures of about \$22M per year).
- Created a cluster hiring process and initiated the first cluster hire in UMass Dartmouth history in the area of Computational Biology and Data Science.
- Took the first steps in establishing a research development program by providing grant writing support and administrative support to faculty with high levels of research expenditure.
- Initiated a new strategic push to promote computational science and marine technology as areas for increased funding.

Interim Director of the Advanced Technology and Manufacturing Center, September 2012-November 2012. The Advanced Technology and Manufacturing Center is an incubator whose mission also includes the creation and support of University-Industry partnerships. As Interim Director I inherited a center that was losing more than \$1M per year in spite of a \$1.7M annual state appropriation, and was experiencing significant personnel problems. I eliminated two leadership positions, transitioned a third employee to main campus, changed office assignments and altered the reporting structure and job descriptions for numerous employees in order to break the internal divisions within the unit. Moral improved, costs were down and an increased sense of responsibility seemed to be developing by the time I left.

Associate Provost for Graduate Studies, 2009-2012

Directly responsible for supervision of recruitment, admissions, assistantships, academic policies, curriculum and program development for PhD, JD, EdD, DNP, MS, MA, MBA, MFA, MPP and MAT degree programs as well as numerous certificate programs. As part of the Provost's team, I was active in research development, personnel actions, labor relations, budget analysis, regulatory compliance, NEASC accreditation, hiring procedures, enrollment management and university governance.

- Supervised all graduate programs in 5 colleges and 3 graduate schools: the Colleges of Arts and Sciences, Business, Engineering, Nursing and Visual and Performing Arts; and the Graduate Schools of Education, Public Policy and Civic Engagement (SEPPCE), Law and Marine Sciences. These programs enrolled more than 1600 students in more than 40 different degree programs.
- Doctoral enrollments increased by more than 100% to 210 students (excluding law). Total graduate enrollment increased by 33%.
- Served on Senior Leadership Team, Senior Enrollment Management Team, Supervisory Committee for On-line Education, Deans Council, Strategic Planning Preparation Committee,

Out of Cycle Pay Increase Committee, Graduate Council.

- Actively involved in numerous personnel actions including post-tenure review, sabbatical applications and assigning university director positions.
- Administered a \$1.5M annual fellowship and waiver budget for graduate students.
- Supervised offices of graduate admissions, graduate studies and law admissions.
- Supervised and controlled the marketing budget for graduate student recruitment.
- Responsible for a \$15M lab renovation project to increase research capacity.
- Worked with the Dean of engineering and eight departments in three colleges to develop and get approval for a new interdisciplinary PhD program in Engineering and Applied Science.
- Worked with the Dean and faculty from the college of Nursing to get approval for a DNP degree program.
- Played a central role in transitioning the Southern New England School of Law into the UMass School of Law Dartmouth. Was responsible for creating the academic structure, formulating job descriptions, supervising the admissions office and assisted with faculty evaluations for tenure, budget analyses, law school hiring and preparation for the ABA site visit.
- Helped to develop new International collaborations with the Indian Institutes Technology Bhubensewar and Kharagpur and Sao Paulo University in Brazil. Negotiated and established student internship programs and IITs Kharagpur and Bhubeneswar, a faculty exchange program with IIT Bhubeneswar; and assisted in the development of an MOU for a dual degree program in Marine Science with University of Sao Paulo.
- Assisted with the development of an all sources budget reporting and productivity tool for academic affairs.
- Created the Distinguished Art Fellows program to recruit outstanding artists into the MFA and conceived and sponsored the first MFA student art show in Boston occurring in Spring 2012.
- Supported numerous initiatives to improve graduate student life including creation of the Graduate Student Senate, drafting and enforcing equitable work rules for graduate student assistants, supporting social events, establishing a grad studies social media presence and sponsoring a three minute thesis competition.
- Worked extensively with Human Resources and the Office of Affirmative Action to develop and improve hiring and appointment processes to make them more efficient and equitable.
- Served on the collective bargaining team to negotiate a contract for Post-Doc unionization.
- Actively involved in improving safety and regulatory compliance for all research laboratories including our Biosafety Level 3 select agents laboratory.
- Worked with the Dean of Engineering and the faculty in Materials Science to create a new Bioengineering department.

Chairperson of Mechanical Engineering, 2007-2009.

Continued the transition of our department from an undergraduate teaching department to a research and teaching department – while growing both the undergraduate and graduate enrollments.

Improved the efficiency of course and laboratory delivery to bring departmental policy more in line with policies at established research universities.

- Changed laboratory instruction to use teaching assistants as laboratory supervisors while retaining professors as recitation instructors.
- Increased section sizes in order to decrease teaching loads for faculty who were research active.
- Renovated laboratory space to allow flexible delivery of lab sections in shared space thereby freeing up space for dedicated research use.
- Eliminated redundant course offerings to further decrease load.

- Made changes to our open house and web pages that helped to increase our freshman student yield from 25% on Fall 2007 to 35% in Fall of 2008. Mechanical Engineering had the third largest Freshman class of any department on campus in 2009.

Conflict of Interest Committee, 2006-2009.

The sole faculty representative from UMass Dartmouth on the UMass system's conflict of interest committee. This committee oversees and manages conflict of interest cases from all five UMass campuses. As the faculty representative, I also worked with UMD faculty in reporting and managing their conflicts.

Co-Founder of the Biomedical Engineering and Biotechnology PhD Program, 2002-2003.

Served as the lead faculty representative on a four campus committee to design and implement a cross-campus interdisciplinary PhD program in Biomedical Engineering and Biotechnology.

One of the unique features of the program is that it not only introduces engineers to the life sciences, but also provides pathways for life scientists to get involved in engineering. Core elements of the Bioengineering Research Education Program that was developed at Massachusetts General Hospital were incorporated into the new program including the *Mathematics for Life Sciences Course* and an introduction to Biomedical Engineering class that could be taken by both engineers and life scientists.

- Worked on the cross campus committee to develop the curriculum with faculty and administrators from UMass Boston, UMass Lowell and UMass Worcester Medical School.
- Proposed and incorporated the *Mathematics for Life Scientists* course that provides a high level of mathematical literacy to students who have not progressed beyond calculus.
- Developed the on-line *Mathematics for Life Science* course.
- Sought and gained approval for the program at UMD from eight different departments and curriculum committees at all levels.
- Served on the committee which sought and gained approval for the program from the Massachusetts Board of Higher Education.

Engineering Director of the Biomedical Engineering and Biotechnology PhD program at UMD, 2003-2007 (except for 2003-2004 sabbatical).

Served as one of two co-directors for the PhD program on UMass Dartmouth's campus. The main challenge was student supervision and getting course offerings for a program that involved eight different departments but had no faculty wholly dedicated to it.

- Supervised the program as it grew to be the second largest PhD program on campus within its first three years.
- Performed all admissions and recruitment activities for the program.
- Orchestrated course offerings from eight different departments in support of the program.
- Served as student advisor to all the students.
- Supervised and evaluated the interdisciplinary team based capstone projects required at the completion of coursework.

Director of Graduate Studies in Mechanical Engineering, 1998-2003.

Served as the director of graduate studies for the new Masters in mechanical engineering that started in 1997. The main challenge was evaluating, recruiting and advising students from all over the world.

Faculty Member for the Biomedical Engineering Research Education Program, 1995-2000.

This was a Whitaker Foundation program run at the Shriner's Research Center in Cambridge, MA by faculty from Harvard Medical School. The goal of the program was to provide a highly accelerated engineering education to MDs interested in pursuing interdisciplinary research careers. One of the main challenges was to provide mathematical training to MDs who had not taken math since their freshman year in college and who were often somewhat math-phobic.

- Developed and taught *Advanced Mathematical Literacy*. This course taught MDs to read mathematics up through the level of partial differential equations, without teaching them how to perform the actual mathematical operations. The basic analogy is that one doesn't need to be able to write a novel in order to read and understand one: So too with math. Concepts were reinforced by the use of MathCad software. This course was very well received by MDs and biologists who found they could read many heretofore unapproachable technical papers in the areas of quantitative science and engineering. This course was developed further into a required on-line course for life-scientists in the UMass BMEBT PhD program.
- Co-wrote the text used to teach *Bioengineering Fundamentals*. This text formed the basis for a course of the same name currently taught at UMass Dartmouth as part of the Mechanical Engineering Masters program and the Biomedical Engineering and Biotechnology PhD program.

Journal Publications:

1. Fowler AJ and Bejan A, 1991, "The effect of shrinkage on the cooking of meat," International Journal of Heat and Fluid Flow, v. 12, pp. 375-383.
2. Fowler AJ and Bejan A, 1993, "Contact melting during sliding on ice," International Journal of Heat and Mass transfer, v. 36, no. 5, pp. 1171-1179.
3. Lim JS, Fowler AJ and Bejan A, 1993, "Porous medium model for a space filled with a fluid and fibers coated with a phase change material," Journal of Heat Transfer, v. 115, pp. 1044-1050.
4. Fowler AJ and Bejan A, 1994, "Correlation of optimal sizes of bodies with external forced convection heat transfer," International Communications in Heat and Mass Transfer, v. 21, pp. 17-27.
5. Fowler AJ and Bejan A, 1994, "Forced convection in banks of inclined cylinders at low Reynolds numbers," International Journal of Heat and Fluid Flow, v. 15, pp. 90-99.
6. Fowler AJ and Bejan A, 1995, "Forced convection from a surface covered with flexible fibers," International Journal of Heat and Mass Transfer, v. 38, pp. 767-777.
7. Bejan A, Fowler AJ and Stenescu G, 1995, "The optimal spacing between horizontal cylinders in a fixed volume cooled by natural convection," International Journal of Heat and Mass Transfer, v. 38, pp. 2047-2055.
8. Stenescu G, Fowler AJ and Bejan A, 1996, "The optimal spacing of cylinders in free-stream cross-flow forced convection," International Journal of Heat and Mass Transfer, v. 39, pp. 311-317.
9. Fowler AJ, Ledezma GA and Bejan A, 1997, "Optimal geometric arrangement of staggered plates in forced convection," International Journal of Heat and Mass Transfer, v. 40, pp. 1795-1805.
10. Bieganski RM, Fowler A, Morgan JR and Toner M, 1998, "Stabilization of active recombinant retro-viruses in amorphous dry state with trehalose," Biotechnology Progress, v. 14, pp. 615-620.
11. Fowler AJ and Toner M, 1998, "Prevention of hemolysis in rapidly frozen erythrocytes by using a laser pulse," Annals of the New York Academy of Science, v. 858, pp. 245-252.
12. Eroglu A., Russo MJ, Bieganski R, Fowler AJ, Cheley S, Bayley H and Toner M, 2000, "Intracellular trehalose improves the survival of cryopreserved mammalian cells," Nature Biotechnology, v. 18, pp. 163-167.
13. Fowler AJ and Menguc MP, 2000, "Propagation of focused and multi-beam laser energy in biological tissue," Journal of Biomechanical Engineering, v. 122, pp. 534-540.
14. Fowler AJ, 2000, "Selective photothermolysis in skin using subcutaneous optical fibers," Lasers in Surgery and Medicine, v. 27, pp. 10-17.
15. Chen T, Acker JP, Eroglu A. Cheley S, Bayley H, Fowler AJ And Toner M, 2001, "Beneficial effect of intracellular trehalose on the membrane integrity of dried mammalian cells," Cryobiology, v. 43, pp. 168-181.

16. Affonce DA and Fowler AJ, 2002, "The effect of thermal lensing during selective photothermolysis," Journal of Quantitative Spectroscopy and Radiative Transfer, v. 73, pp. 473-479.
17. Reuss JD, Fowler AJ, Kim YK and Lewis A., 2002, "Manufacture of thick cross-section composites using a pre-catalyzed fabric technique," Journal of Composite Materials, v. 36, pp. 1367-1379.
18. Acker JP, Fowler AJ, Lauman B, Cheley S And Toner M, 2002, "Survival of desiccated mammalian cells: beneficial effects of isotonic media," Cell Preservation Technology, v.1, pp. 129-140.
19. Acker JP, Lu XM, Young V, Cheley S, Bayley H, Fowler A, Toner M, 2003, "Measurement of trehalose loading of mammalian cells porated with a metal-actuated switchable pore," Biotechnol Bioeng, v. 82; pp. 525-32.
20. Sugimachi K, Sosef MN, Baust JM, Fowler A, Tompkins RG, Toner M, 2004, "Long-term function of cryopreserved rat hepatocytes in a coculture system," Cell Transplantation, v. 13, pp. 187-195.
21. Sosef MN, Baust JM, Sugimachi K, Fowler A, Tompkins RG, Toner M., 2005, Cryopreservation of isolated primary rat hepatocytes: enhanced survival and long-term hepatospecific function," Ann. Surg, v. 241, pp. 125-133.
22. Fowler A and Toner M, 2005, "Cryo-injury and biopreservation," (review) Annals of NY Acad of Sci, v. 1066, pp. 119-135.
23. Chen B, Fowler AJ and Bhowmick S, 2006, "Forced and natural convective drying of trehalose/water thin films: implication in the desiccation preservation of mammalian cells," Journal of Biomechanical Engineering, v. 128, pp. 335-345.
24. Stacy R, Eroglu A, Fowler AJ, Biggers J and Toner M, 2006, "Thermal characterization of Nakagata's mouse sperm freezing protocol," Cryobiology, v. 52, pp. 99-107.
25. He X, Fowler AJ and Toner M, 2006, "Water Activity and Mobility in Solutions of Glycerol and Small Molecular Weight Sugars: Implication for Cryo- and Lyo- Preservation," Journal of Applied Physics, v. 100, 074702
26. He X, Amin AA, Fowler AJ and Toner M, 2006, "Thermally induced introduction of trehalose into primary rat hepatocytes," Cell Preservation Technology, v. 4, pp. 178-187.
27. Coskuntuna E, Fowler AJ, and Warner S, 2007, "Fibrous Structures with designed wicking properties," Text. Res. J., v. 77, pp. 256-264
28. Green JE, Sitaula R, Fowler A, Toner M and Bhowmick S, 2007, "Enthalpic relaxation of convectively desiccated trehalose-water glasses," Thermochemica Acta., v. 453, pp.1-8.
29. Reategui E. and Fowler AJ, 2008, "Desiccation of nucleated mammalian cells in nano-liter droplets," Chemical Engineering Research and Design, v. 86, pp. 1187-1195.
30. He X., Fowler AJ, Menze M, Hand S and Toner M, 2008, "Desiccation kinetics and biothermodynamics of glass forming trehalose solutions in thin films," Annals of Biomedical

Engineering, v. 36, pp. 1428-1439.

31. He X, Park EY, Fowler A, Yarmush ML and Toner M, 2008, "Vitrification by ultra-fast cooling at low concentrations of cryoprotectants in a quartz micro-capillary: a study using murine embryonic stem cells," Cryobiology, v. 56, pp. 223-232.
32. Sitaula, R, Fowler, A, Toner, M and Bhowmick, S, 2010, "A study of the effect of sorbitol on osmotic tolerance during partial desiccation of bovine sperm," Cryobiology, v. 60, pp. 331-336.

Patent

"Ultra Rapid Freezing for Cell Cryopreservation", M. Toner and AJ Fowler, US. Patent # 6,300,130 B1. Issued Oct. 9, 2001.

Grants and Awards (PI):

<i>Bioengineering Fellowship (PI)</i>		
Combined Jewish Philanthropies		1/15/00-
\$225,000		
<i>STEM Outreach Program</i>		
Combined Jewish Philanthropies		12/1/2014
\$20,000		
<i>Fuel Cell Installation and Training(PI)</i>		
Massachusetts Renewable Energy Trust Fund		6/9/2009
\$30,800		
<i>UMD Bioengineering Initiative (Co-PI with P. Calvert)</i>		
UMass President's Science and Technology Fund		8/1/06-8/31/08
\$150,000		
<i>Ultra-rapid freezing and Warming for the Preservation,Transport and Storage of Living Cells (PI)</i>		
Massachusetts Technology Transfer Council		6/1/07-12/31/08
\$30,000		
<i>Cellular Engineering for Suspended Animation(Subcontract PI)</i>		
DARPA through ONR, MGH Subcontract		8/1/01-7/31/06
\$76,991		
<i>Development of Bio-active Fabrics(PI)</i>		
National Textile Center		5/1/00-4/31/03
\$658,000		
<i>Treatment of hypertrophic burn scars using a multi-beam pulsed dye laser (PI)</i>		
The Whitaker Foundation		9/1/97-2/28/01
\$195,587		
<i>Idealized model for evaluation of cooling characteristics of modified footwear(PI)</i>		
Engineered Yarns Corporation		12/1/00-5/31/01
\$8,975		
<i>Design of a vacuum insulated cryostage (PI)</i>		
Healey Endowment Research Award		1/1/97-6/1/98
\$4,070		
<i>Faculty development award(PI)</i>		
Center for Engineering in Medicine, Massachusetts General Hospital		1997
\$15,000		
<i>Equipment Grant-Cryo Pump(PI)</i>		
CTI Cryogenics		1997
\$7,760.26		

Grants and Awards as Co-I that Supported UMass Graduate Students

<i>Transport in 3-D Nanofab Geometries(Co-I)</i>		
National Textile Center, Sankha Bhowmick PI		5/1/06-6/1/09
\$124,356		
<i>Bio-active Bandages(Co-I)</i>		
National Textile Center, Sankha Bhowmick PI		5/1/03-8/15/08
\$284,000		
<i>Cost effective nanofiber formation – melt electrospinning (Co-I)</i>		
National Textile Center, Steve Warner PI		5/1/05-8/15/08
\$231,962		
<i>Ultra-thick cross section fiber reinforced composites(Co-I)</i>		

National Textile Center, Yong Kim PI \$300,000	5/1/98-6/1/01
<i>Trehalose as a novel cryoprotectant for the long term storage of hepatocytes(Co-I)</i> NIH, Mehmet Toner PI \$125,188 direct annual cost per year	1/1/99-12/31/03
<i>Ground-source heat pump research and development center (Co-I)</i> Advanced Technology Center-STEP, Ron DiPippo PI \$124,700	7/1/97-6/31/00
<i>Optimal control of recirculating fish tanks (Co-I)</i> Advanced Technology Center-STEP, Tesfay Meressi PI \$64,600	7/1/98-6/31/01
<i>Urban aquaculture development (Co-I)</i> Massachusetts Office of Business Development, Tesfay Meressi PI \$25,782	1997

Invited Talks

Development of Bio-active Fabrics, The Intelligent Textiles 2000 Conference, Providence, RI, June 2000.
Bacterial function in fabric based bioreactors, Tessile e Salute Conference, Biella, Italy, January 2002.
Laser Treatment of Hypertrophic Scars, Louisiana State University, Mechanical Engineering Seminar, Spring 2002.

Selected Conference Papers and Other Peer Reviewed Non-Journal Publications:

- Fowler, A.J. and Toner, M., 1997, "Cryopreservation of cells using ultra-rapid freezing," ASME HTD, v. 355, pp. 179-183.
- Fowler, A.J. and Toner, M., 1998, "X-ray diffraction studies of laser created amorphous ice," ASME HTD, v. 362, pp. 155-158.
- Fowler, A.J., 1999, "Investigation of two-beam selective photothermolysis," ASME BED, v. 42, pp. 609-610.
- Fowler, A.J., 1999, "Numerical Methods for Industrial Applications," in Industrial Engineering Applications and Practice: Users' Encyclopedia, ed. Mital, A., International Journal of Industrial Engineering, USA.
- DaPonte, P, DiPippo, R., Fowler, A.J., Meressi, T. and Welch, J.R., 1999, "Determination of thermal conductivity and thermal diffusivity of soils," Geothermal Resources Council Transactions, v. 23, pp. 119-122.
- Sojka, E.S., Balis, U., Sheridan, R. and Fowler, A., 1999, "Exploration of an animal model for hypertrophic scar formation," ASME HTD, v. 363, pp. 51-55.
- Chen, T., Fowler, A, and Toner, M., 2000, "Literature review: supplemented phase diagram of the trehalose-water binary mixture," Cryobiology, v. 40, pp. 277-282.
- Eroglu, A., Chen, T., Fowler, A., Cheley, S., Bayley, H. and Toner, M., 2000, "Protective effect of intracellular trehalose on survival of cryopreserved mammalian cells," Cryobiology, v. 41, pp. 328-329.
- Chen, T, Eroglu, A, Fowler, A, Chelev, S, Bayley, H and Toner, M., 2000, "Beneficial effect of intracellular trehalose during mammalian cell storage," Annals of Biomedical Engineering, v. 28, p. S-124.
- Acker, J., Chen, T., Eroglu, A., Cheley, S., Bayley, H., Fowler, A., and Toner, M., 2001, "Effect of intracellular trehalose on the viability of dried mammalian cells," Cryobiology, v.43, p. 319-320.
- Chen, T., Acker, J., Fowler, A., Bayley, H., and Toner, M., 2001, "Sugars as intracellular protectants for dehydrated mammalian cells," Amorphous State: a critical review, Churchill College, Cambridge, England.

- Chen T, Bhowmick S, Sputtek A, Fowler AJ and Toner M., 2002, "The glass transition temperature of mixtures of trehalose and hydroxyethyl starch," Cryobiology, v. 44, pp. 301-306.
- Affonce DA and Fowler AJ, 2002, "The effect of thermal lensing during selective photothermolysis," International Centre for Heat and Mass Transfer – Radiation Conference, Antalya, Turkey.
- Acker J, Fowler A and Toner M, 2002, "Media composition affects the survival of desiccated Mammalian cells," International Conference of the IEEE Engineering in Medicine and Biology-proceedings.
- Zhao Z, Cusick J, Fowler A, Bhowmick S and Toner M, 2003, "Optimization and Storage Of Micro-Fabricated Skin Substitutes," ASME Summer Bioengineering Conference, Miami, FL.
- Wang W, Bhowmick S, Ellis D, Warner S and Fowler A, 2003 "Loading of Genetically Engineered Bacteria into Hollow Milkweed Fibers," ASME Summer Bioengineering Conference, Miami, FL.
- Green J, Fowler A, Toner M and Bhowmick S, 2004, "A study of enthalpic relaxation of trehalose-water glasses," Advances in Bioengineering – 2004, pp. 77-78.
- Fowler A, 2017, "Geometric optimization of a tube bank heat exchanger in a slow moving free stream," Constructal Law and Second Law Conference, Bucharest, Romania.

Teaching and Advising

Undergraduate Courses Taught

Introduction to Engineering, Programming and Computer Usage, Physics II, Thermodynamics I, Thermodynamics for non-Mechanical Engineers, Thermodynamics II, Ordinary Differential Equations, Applied Engineering Mathematics, Heat Transfer, Robotics, Energy Conversion, Compressible Fluid Mechanics, Numerical Methods, Rocket and Jet Propulsion, Thermodynamics Laboratories (I & II) and Fluid Mechanics Laboratory.

Graduate Courses Taught

Thermodynamics, Convection Heat Transfer, Numerical Methods, Bioengineering Fundamentals, Advanced Fluid Mechanics

Graduate Advisees (M.S. Recipients)

Erik Sojka, Jonathan Reuss, Derek Affonce, Daniel Vieira, David Pinault, Jerry Legere, Wenjian Wang, Zhonglin Zhao, Damien Boudreau, Eduardo Reategui, Brent Collins and Matthew Oliveira.

Post-Doctoral Student

Jorge Jimenez-Rios

Selected Academic Service

STEM Outreach Coordinator, College of Engineering, UMass Dartmouth, 2014-2016

Chairperson of Mechanical Engineering, 2007-2009, elected by the department.

UMass System Conflict of Interest Committee, 2006-2009, appointed by the Provost.

Engineering Director of the Biomedical Engineering and Biotechnology PhD Program, 2003-2007.

Search and Screen committee for Dean of the College of Engineering, 2007, elected by the college.

Search and Screen committee for University Provost, 2006, appointed by the Chancellor.

College Academic Council, makes recommendations on promotion and tenure, 2005-2007, appointed by the chair.

NEASC Task Force for Research, 2002-2003.

College of Engineering Research task Force, 2000-2003.

Chairperson of Faculty Senate Library Committee, 1999-2000.

Secretary of UMass Dartmouth Sigma Xi Chapter, 1999-2003.

Director of Graduate Studies in Mechanical Engineering, 1998-2003, appointed by the chair.

Chairperson of the University Curriculum Committee, 1998, elected by the faculty.

President of UMass Dartmouth Sigma Xi, 1997-1998.

Selected Professional Service

Conference Organizer for the Italian Trade Commission. Served as the conference organizer and master of ceremonies for a trade dinner given by the Italian Trade Commission and the Italian Consulate in Boston at the BIO 2007 International Conference.

- Worked with representatives from the Italian Trade Commission, the Italian Consulate and Worcester Polytechnic Institute to provide a networking dinner for 120 members of the biotech industry from Italy and the United States as well as biotechnology researchers from the region.
- Recruited the South Coast Development Partnership to help coordinate the event and arrange for the attendance of numerous state senators and representatives.
- Invited and recruited about 20 of the region's premier research faculty from Harvard, Brown and MIT to attend the dinner.
- Served as Master of Ceremonies, the highlight of which was introducing Giovanni Castellaneta, Italy's Ambassador to the United States.

Federal Demonstration Partnership, Faculty Representative for UMass Dartmouth during our application phase for full membership, 2008. Membership granted in Fall 2008.

Reviewer for Journals: Lasers in Surgery and Medicine, Biotechnology and Bioengineering, Cryobiology, Journal of Applied Physics, ASME Journal of Biomechanical Engineering, Journal of Quantitative Spectroscopy and Radiative Transfer, Interface of the Royal Society, International Journal of Heat and Mass Transfer.

Proposal Reviewer: U.S. Civilian Research and Development Foundation, NIH and NSF.

Book Reviewer for Thompson Engineering. Reviewed Hold Paramount and Engineering Fundamentals.

Professional References

Mehmet Toner

Helen Andrus Benedict Professor of Surgery
Harvard Medical School
Building 114
16th St.
Charlestown, MA 02129
mtoner@hms.harvard.edu
Tel. 617-724-5336

Relationship: Dr. Toner has been my research collaborator and colleague for more than 20 years.

Tesfay Meressi

Associate Provost for Graduate Studies
University of Massachusetts Dartmouth
285 Old Westport Rd.
North Dartmouth, MA 02747
tmeressi@umassd.edu
Tel. 508-999-8542

Relationship: Dr. Meressi and I worked with and for each other in various capacities for more than 20 years. We have both supervised and reported to each other at various times.

Marcellette Williams

Senior Vice President and Vice President for Academic Affairs, Student Affairs and International Relations
University of Massachusetts President's Office
One Beacon Street, 31st Floor
Boston, MA 02108
mwilliams@umassp.edu
Tel. 617-287-5329

Relationship: Dr. Williams is the system's chief academic officer. As such I worked closely with her when I served as Interim Provost and when I was chief research officer.

Sigal Gottlieb

Professor of Mathematics
Founding Director of the Center for Scientific Computing and Visualization Research
University of Massachusetts Dartmouth
285 Old Westport RD.
North Dartmouth, MA 02747
sgottlieb@umassd.edu
Tel. 508-999-8205

Relationship: Dr. Gottlieb and I worked closely together during the creation of the EAS Ph.D. program and during the founding of the Center for Scientific Computing.

Nancy Lenon-Robillard

Administrative Assistant for Graduate Studies
University of Massachusetts Dartmouth
285 Old Westport Rd.
North Dartmouth, MA 02747

nrobillard@umassd.edu

Tel. 508-999-8018

Relationship: Ms. Lenon-Robillard was my administrative assistant for more than three years when I was Associate Provost.

Anthony Garro

Provost (retired December 31, 2011)

University of Massachusetts Dartmouth

1 Clark's Cove Dr.

South Dartmouth, MA 02748

agarro@umassd.edu

Tel. 774-202-6088

Relationship: Dr. Garro was the Provost who hired me as Associate Provost and served as my direct supervisor for more than two years.

William Mitchell

Vice President of Administration and Chief Financial Officer

Massasoit Community College

One Massasoit Blvd.

Brockton, MA 02302

wamitchell@massasoit.mass.edu

Tel. 508-588-9100 x1510

Relationship: Mr. Mitchell was the Associate Vice Chancellor for Finance when I was Associate Provost. We worked closely together on issues related to budgeting for three years.

Robert Peck

Dean of the College of Engineering

University of Massachusetts Dartmouth

285 Old Westport Rd.

North Dartmouth, MA 02747

rpeck@umassd.edu

Tel. 508-999-8827

Relationship: Dr. Peck was my supervisor when I was chair, my colleague when I was Associate Provost and my direct report when I was Interim Provost.

Memory Holloway

Professor of Art History

Former Director of the MFA Program

University of Massachusetts Dartmouth

285 Old Westport Rd.

North Dartmouth, MA 02747

mholloway@umassd.edu

Tel. 508-999-8554

Relationship: Dr. Holloway was the graduate director for the MFA program when I was Associate Provost for Graduate Studies.

Many more references available upon request

Mehdi Raessi

Department of Mechanical Engineering
University of Massachusetts Dartmouth
285 Old Westport Road, North Dartmouth,
Massachusetts, USA 02747-2300

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Email: mraessi@umassd.edu
Webpage: www.faculty.umassd.edu/mehdi.raessi/

ACADEMIC POSITIONS

Department of Mechanical Engineering
University of Massachusetts Dartmouth

Associate Professor

September 2016 – present

Assistant Professor

September 2010 – August 2016

EDUCATION AND TRAINING

B.Sc. (University of Tehran, Department of Mechanical Engineering)	1998
M.A.Sc. (University of Toronto, Department of Mechanical and Industrial Engineering (MIE))	2003
Ph.D. (University of Toronto, Department of MIE)	2008
Postdoctoral study (Stanford University)	2008-2010
NASA-Stanford University's Center for Turbulence Research (CTR)	

TEACHING AND RESEARCH AWARDS

- *Industrial Research and Development Fellowship*, Government of Canada (2010).
- *Postdoctoral Fellowship*, NASA-Stanford University's Center for Turbulence Research (2008).
- *Early Career Teaching Award* for instructing a second-year undergraduate course on advanced engineering mathematics, University of Toronto, Dept. of MIE (2007).
- *CFD Society of Canada Graduate Scholarship* (2007).
- *Shaw Scholarship* (for top two students of the department), University of Toronto, Dept. of MIE (2006).
- *Ontario Graduate Scholarship*, Government of Ontario (2006).
- *Queen Elizabeth II Graduate Scholarship in Science and Technology* (formerly *Ontario Graduate Scholarship in Science and Technology / DuPont Canada Scholarship*), Government of Ontario, University of Toronto, DuPont Canada (2005).
- *Miller Scholarship*, University of Toronto, Dept. of MIE (2005).
- *University of Toronto Open Fellowship*, University of Toronto (2001-2006).
- *Outstanding Student Award*, University of Tehran, Faculty of Engineering (1998).

PUBLICATIONS

Book chapter

1. A. Sinkevich, S. Bhowmick, and **M. Raessi**, *Strategies for overcoming transport limitations of convective desiccation of trehalose solutions for ambient temperature preservation of biologics*, Multiscale Technologies for Cryomedicine - Implementation from Nano to Macroscale, Edited by Xiaoming He and John Bischof, World Scientific Publishing (2016).

Peer-reviewed journal papers

2. D. Markt, A. Pathak, and **M. Raessi**, *Advanced computational simulations of surface impingement of a train of ethanol drops – A pathway to developing spray-wall interaction sub-models*, Computing in Science and Engineering, (In press).
3. A. Pathak, C. Freniere, and **M. Raessi**, *Advanced computational simulations of water waves interacting with wave energy converters*, European Journal of Computational Mechanics, Vol. 26, pp. 172–204 (2017).
4. B. Amirzadeh, A. Louhghalam, **M. Raessi**, and M. Tootkaboni, *A computational framework for the analysis of rain-induced erosion in wind turbine blades, Part I: Stochastic rain texture model and drop impact simulations*, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 163, pp. 33–43 (2017).
5. B. Amirzadeh, A. Louhghalam, **M. Raessi**, and M. Tootkaboni, *A computational framework for the analysis of rain-induced erosion in wind turbine blades, Part II: Drop impact-induced stresses and blade coating fatigue life*, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 163, pp. 44–54 (2017).
6. A. Pathak and **M. Raessi**, *A three-dimensional volume-of-fluid method for reconstructing and advecting three-material interfaces forming contact lines*, Journal of Computational Physics, Vol. 307, pp. 550–573 (2016).
7. A. Pathak and **M. Raessi**, *A 3D, fully Eulerian, VOF-based solver to study the interaction between two fluids and moving rigid bodies using the fictitious domain method*, Journal of Computational Physics, Vol. 311, pp. 87–113 (2016).
8. C. Freniere, A. Pathak, **M. Raessi**, and G. Khanna, *Feasibility of Amazon's Cloud Computing Platform for Parallel GPU-Accelerated Multiphase Flow Simulations*, Computing in Science and Engineering Vol. 18, pp. 68–77 (2016).
9. A. Ghasemi, A. Pathak, and **M. Raessi**, *Computational simulation of the interactions between moving rigid bodies and incompressible two-fluid flows*, Computers and Fluids, Vol. 94, pp. 1–13 (2014).
10. L. R. Berard, **M. Raessi**, M. T. Bauer, P. D. Friedman, and S. Codyer, *An investigation on the breakup of underwater buoyant oil jets: computational simulations and experiments*, Atomization and Sprays Vol. 23, pp. 981–1000 (2013).
11. A. Amirzadeh Goghari, **M. Raessi**, and S. Chandra, *Producing molten metal droplets smaller than the nozzle diameter using a pneumatic drop-on-demand generator*, Experimental Thermal and Fluid Science Vol. 47, pp. 26–33 (2013).
12. P. D. Friedman, S. Carey and **M. Raessi**, *Influence of volatile degassing on initial flow structure and entrainment during undersea volcanic fire fountaining eruptions*, Natural Science, Vol.4, No.12, 1002–1012 (2012).
13. **M. Raessi** and H. Pitsch, *Consistent mass and momentum transport for simulating incompressible interfacial flows with large density ratios using the level set method*, Computers and Fluids, Vol. 63, pp. 70–81 (2012).
14. **M. Raessi**, J. Mostaghimi, and M. Bussmann, *A volume-of-fluid interfacial flow solver with advected normals*, Computers and Fluids, Vol. 39, pp. 1401–1410 (2010).

15. K. Shinoda, **M. Raessi**, J. Mostaghimi, T. Yoshida, and H. Murakami, *Effect of substrate concave pattern on splat formation of Yttria-stabilized Zirconia in atmospheric plasma spraying*, Journal of Thermal Spray Technology, Vol. 18, pp. 609-618 (2009).
16. **M. Raessi**, M. Bussmann, and J. Mostaghimi, *A semi-implicit finite volume implementation of the CSF method for treating surface tension in interfacial flows*, International Journal for Numerical Methods in Fluids, Vol. 59, pp. 1093-1110 (2009).
17. I.V. Roisman, L. Opfer, C. Tropea, **M. Raessi**, J. Mostaghimi, and S. Chandra, *Drop impact onto a dry surface: role of the dynamic contact angle*, Colloids and Surfaces A, Vol. 322, pp. 183-191 (2008).
18. **M. Raessi**, J. Mostaghimi, and M. Bussmann, *Advecting normal vectors: a new method for calculating interface normals and curvatures when modeling two-phase flows*, Journal of Computational Physics, Vol. 226, pp. 774-797 (2007).
19. H.R. Salimijazi, **M. Raessi**, J. Mostaghimi, and T.W. Coyle, *Study of solidification behavior and splat morphology of vacuum plasma sprayed Ti alloy by computational modeling and experimental observations*, Surface and Coatings Technology, Vol. 201, pp. 7924-7931 (2007).
20. **M. Raessi**, J. Mostaghimi, and M. Bussmann, *Effect of surface roughness on splat shapes in the plasma spray coating process*, Thin Solid Films, Vol. 506-507, pp. 133-135 (2006).
21. **M. Raessi** and J. Mostaghimi, *Three-dimensional modeling of density variation due to phase change in complex free surface flows*, Numerical Heat Transfer, Part B: Fundamentals, Vol. 47, pp. 507-531 (2005).
22. N.Z. Mehdizadeh, **M. Raessi**, S. Chandra, and J. Mostaghimi, *Effect of substrate temperature on splashing of molten tin droplets*, ASME Journal of Heat Transfer, Vol. 126, pp. 445-452 (2004).

Peer-reviewed technical/conference papers:

23. D. Markt, R. Torelli, A. Pathak, **M. Raessi**, S. Som, R. Scarcelli, S.-Y. Lee, and J. Naber, *Using a DNS framework to test a splashed mass sub-model for Lagrangian spray simulations*, SAE Technical Paper 2018-01-0297, doi:10.4271/2018-01-0297 (2018).
24. L. Zhao, R. Torelli, X. Zhu, J. Naber, S.-Y. Lee, S. Som, R. Scarcelli, and **M. Raessi**, *Evaluation of diesel spray-wall interaction and morphology around impingement location*, SAE Technical Paper 2018-01-0276, doi:10.4271/2018-01-0276 (2018).
25. D. Markt, L. Zhao, X. Zhu, A. Pathak, R. Torelli, S.-Y. Lee, and **M. Raessi**, *An Experimental and Computational Study of a Single Diesel Droplet Impinging on a Dry Surface*, International Conference on Liquid Atomization and Spray Systems, Chicago, Illinois (2018; Accepted).
26. X. Zhu, R. Torelli, L. Zhao, J. Naber, S.-Y. Lee, S. Som, R. Scarcelli, and **M. Raessi**, *Film Formation Characteristics of N-heptane Spray-wall Impingement at Engine-like Conditions*, International Conference on Liquid Atomization and Spray Systems, Chicago, Illinois (2018; Accepted).
27. **M. Raessi**, M. Thiele, and B. Amirzadeh, *Computational simulation of the impact and freezing of micron-size water droplets on super-hydrophobic surfaces*, Proceedings of the ASME 2013 Summer Heat Transfer Conference, Minneapolis, USA, July 14-19, 2013 (HT2013-17749).
28. S. Codyer, **M. Raessi**, G. Khanna, *Using Graphics Processing Units to accelerate numerical simulations of interfacial incompressible flows*, Proceedings of the ASME 2012 Fluids Engineering Summer Meeting, Rio Grande, Puerto Rico, July 8-12, 2012 (FEDSM2012-72176).
29. **M. Raessi** and R. Sendha, *Effects of heat transfer on the spreading and freezing of molten droplets impinging onto textured surfaces-A computational study*, Proceedings of the ASME 2012 Summer Heat Transfer Conference, Puerto Rico, USA, July 8-12, 2012 (HT2012-58166).

Peer-reviewed technical reports

30. **M. Raessi** and H. Pitsch, *Modeling interfacial flows characterized by large density ratios with the level set method*, Annual Research Briefs, Center for Turbulence Research, Stanford, CA, 2009.
31. **M. Raessi**, *A level set based method for calculating flux densities in two-phase flows*, Annual Research Briefs, Center for Turbulence Research, Stanford, CA, 2008.
32. M. Herrmann, J.M. Lopez, P. Brady, and **M. Raessi**, *Thermocapillary motion of deformable drops and bubbles*, Proceedings of the 2008 Summer Program, Center for Turbulence Research, Stanford, CA, 2008.

Conference papers & presentations (* indicates the presenter)

1. D. Markt*, R. Torelli, A. Pathak, **M. Raessi**, S. Som, R. Scarcelli, S.-Y. Lee, and J. Naber, *Using a DNS Framework to Test a Splashed Mass Sub-Model for Lagrangian Spray Simulations*, WCXTM18: SAE World Congress Experience, Detroit, MI, 2018.
2. L. Zhao*, R. Torelli, X. Zhu, J. Naber, S.-Y. Lee*, S. Som, R. Scarcelli and **M. Raessi**, *Evaluation of Diesel Spray-Wall Interaction and Morphology around Impingement Location*, WCXTM18: SAE World Congress Experience, Detroit, MI, 2018.
3. V. B. Palma*, D. G. MacDonald, and **M. Raessi**, *Initializing DNS turbulence models to represent naturally occurring turbulence*, Ocean Sciences Meeting, Portland, OR, 2018.
4. D. G. MacDonald*, **M. Raessi**, and A. K. Schmidt, *Does scale matter? Bridging the gap between field and laboratory observations of turbulence*, Ocean Sciences Meeting, Portland, OR, 2018.
5. C. Hoi* and **M. Raessi**, *3D CFD simulation of plug dynamics and splitting through a bifurcating airway model*, 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Denver, CO, 2017.
6. A. Pathak* and **M. Raessi**, *Towards a sharp-interface volume-of-fluid methodology for modeling evaporation*, 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Denver, CO, 2017.
7. D. Markt*, A. Pathak, **M. Raessi**, S.-Y. Lee, and L. Zhao, *Computational study of droplet trains impacting a smooth solid surface*, 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Denver, CO, 2017.
8. A. Pathak, C. Freniere, and **M. Raessi***, *3D computational simulations of bottom-hinged pitching ocean wave energy converters*, Proceedings of the ASME 2017 Fluids Engineering Summer Meeting, Waikoloa, HI, 2017.
9. A. Pathak* and **M. Raessi**, *A fully Eulerian fictitious domain method to study interaction between moving structures and two-phase fluid flows*, 2017 SIAM Southeastern Atlantic Section Conference (SIAM-SEAS), Tallahassee, FL 2017.
10. A. Pathak* and **M. Raessi**, *Computational simulations of the interaction of water waves with pitching flap-type ocean wave energy converters*, 69th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Portland, OR, 2016.
11. C. Freniere*, A. Pathak and **M. Raessi**, *Computational modeling of pitching cylinder-type ocean wave energy converters using 3D MPI-parallel simulations*, 69th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Portland, OR, 2016.
12. **M. Raessi*** and A. Pathak, *3D, GPU-accelerated and MPI-parallel simulations of two-fluid flows interacting with moving rigid bodies – application in renewable energy systems*, International Conference of Multiphase Flow, Firenze, Italy, 2016.
13. A. Pathak* and **M. Raessi**, *A 3D MPI-Parallel GPU-accelerated framework for simulating ocean wave energy converters*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.
14. W. Jin*, B. Amirzadeh, M. Tootkaboni, and **M. Raessi**, *A computational study of the impingement of water droplets onto freezing superhydrophobic surfaces*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.

15. D. Brown*, L. Goodman, and **M. Raessi**, *Large Eddy Simulations of Kelvin Helmholtz instabilities at high Reynolds number stratified flows*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.
16. C. Freniere*, A. Pathak and **M. Raessi**, *Feasibility of Amazon Cloud Computing Platform for Parallel Multi-phase Flow Simulations*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.
17. H. Jebeli Aqdam*, B. Ahmadi, **M. Raessi**, and M. Tootkaboni, *Aiding Design of Wave Energy Converters via Computational Simulations*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.
18. A. Pathak and **M. Raessi***, *An Advanced Computational Framework For Analysis Of Ocean Wave Energy Converters*, ASME 2015 9th International Conference on Energy Sustainability, San Diego, CA, 2015.
19. A. Pathak* and **M. Raessi**, *A 3D GPU-accelerated MPI-parallel computational tool for simulating interaction of moving rigid bodies with two-fluid flows*, 67th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Francisco, CA, 2014.
20. L. Berard* and **M. Raessi**, *Computational investigation of negatively buoyant jets*, 67th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Francisco, CA, 2014.
21. A. Pathak* and **M. Raessi**, *Towards an advanced computational framework for 3D simulations of Ocean Wave Energy Converters*, ASME 2014 8th International Conference on Energy Sustainability, Boston, MA, 2014.
22. A. Ghasemi, A. Pathak, R. Chiodi, and **M. Raessi***, *Computational simulation of the interactions between water waves and two-dimensional wave energy converters*, 66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Pittsburg, PA, 2013.
23. A. Pathak* and **M. Raessi**, *Three-dimensional advected normals method for calculating interfacial normals and curvatures in two-phase flows*, 66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Pittsburg, PA, 2013.
24. L. Berard*, **M. Raessi**, M. Bauer, P. Friedman, and S. Codyer, *Experimental and computational investigation of underwater buoyant oil jets*, 66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Pittsburg, PA, 2013.
25. A. Ghasemi, A. Pathak, and **M. Raessi***, *Numerical modeling of the interaction between moving solid structures and two-phase fluid flows: application in ocean wave energy converters*, SIAM Conference on Computational Science and Engineering, Boston, MA, 2013.
26. A. Ghasemi*, A. Pathak, and **M. Raessi**, *Computational simulations of wave energy converters by solving the Navier-Stokes equations*, 4th Annual Marine Renewable Energy Technical Conference, Providence, RI, 2013.
27. A. Pathak* and **M. Raessi**, *A GPU-accelerated interfacial flow solver with advected normals: Application to contact line problems*, 65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Diego, CA, 2012.
28. A. Ghasemi*, A. Pathak, **M. Raessi**, *Computational simulation of ocean wave energy converters using the fast fictitious domain method*, 65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Diego, CA, 2012.
29. D. Brown*, L. Goodman, **M. Raessi**, *Large Eddy Simulations of Kelvin-Helmholtz instabilities in ocean flows*, 65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Diego, CA, 2012.
30. S. Codyer, **M. Raessi***, and G. Khanna, *Using Graphics Processing Units to accelerate numerical simulations of interfacial incompressible flows*, Proceedings of the ASME 2012 Fluids Engineering Summer Meeting, Rio Grande, PR, 2012.
31. **M. Raessi*** and R. Sendha, *Effects of heat transfer on the spreading and freezing of molten droplets impinging onto textured surfaces-A computational study*, Proceedings of the ASME Summer Heat Transfer Conference, Rio Grande, PR, 2012.

32. S. Codyer*, **M. Raessi**, G. Khanna, *Accelerated computational simulations of incompressible multi-phase flows in a parallel, heterogenous multi-GPU/CPU computing framework*, International Conference on Numerical Methods in Multiphase Flows, University Park, PA, 2012.
33. **M. Raessi***, A. Pathak, J. Mostaghimi, and M. Bussmann, *On the accuracy and performance of the advected normals approach in simulating interfacial flows*, International Conference on Numerical Methods in Multiphase Flows, University Park, PA, 2012.
34. S. Codyer*, **M. Raessi**, G. Khanna, *A GPU-accelerated flow solver for incompressible two-phase fluid flows*, 64th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Baltimore, MD, 2011.
35. **M. Raessi*** and R. Sendha, *A computational study of the impact of molten drops onto textured surfaces*, 64th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Baltimore, MD, 2011.
36. S. Codyer*, **M. Raessi**, G. Khanna, *A GPU-accelerated flow solver for incompressible two-phase fluid flows*, Advances in GPU Computing Conference, Northeastern University, Boston, MA, October 27, 2011.
37. **M. Raessi***, M. Bussmann, and J. Mostaghimi, *A volume-of-fluid interfacial flow solver with advected normals*, 63rd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Long Beach, CA, 2010.
38. **M. Raessi*** and H. Pitsch, *A level-set based methodology for modeling interfacial flows characterized by large density ratios*, Proceedings of the 22nd Annual ILASS-Americas Conference, Cincinnati, OH, May 16-19, 2010.
39. **M. Raessi*** and H. Pitsch, *A level set based method for modeling large density ratio, interfacial flows*, 62nd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Minneapolis, MN, 2009.
40. **M. Raessi***, M. Bussmann, and J. Mostaghimi, *An implicit implementation of surface tension in finite volume models for two-phase flows*, Proceedings of the 20th Annual ILASS-Americas Conference, Chicago, IL, May 15-18, 2007.
41. **M. Raessi***, M. Bussmann, and J. Mostaghimi, *Advecting normal vectors: A novel method for accurate interface curvature calculation*, Euromech Colloquium 479, Numerical Simulation of Multiphase Flow with Deformable Interfaces, Scheveningen, The Netherlands, 2006.
42. **M. Raessi***, J. Mostaghimi, and M. Bussmann, *A new method in calculating interface normal vectors and curvatures in modeling free-surface flows*, Proceedings of the 19th Annual ILASS-Americas Conference, Toronto, ON, May 23-26, 2006.
43. **M. Raessi***, J. Mostaghimi, and M. Bussmann, *Impact and solidification of droplets onto rough substrates*, in: E. Lugscheider (Ed.), International Thermal Spray Conference, Basel, Switzerland May 2-4, 2005.
44. **M. Raessi***, J. Mostaghimi, and M. Bussmann, *Droplet impact during the plasma spray process - Effect of surface roughness on splat shapes*, in: J. Mostaghimi, T.W. Coyle, V. Pershin, and H.R. Salimijazi (Eds.), 17th International Symposium on Plasma Chemistry, Plasma Spray and Thermal Plasma Materials Processing, Toronto, ON, August 7-12, 2005.
45. **M. Raessi*** and J. Mostaghimi, *Three-dimensional modeling of solidification shrinkage*, Proceedings of the 11th Annual Conference of the CFD Society of Canada, Vancouver, BC, May 28-30, 2003, pp.74-79.
46. A. McDonald, **M. Raessi**, S. Chandra*, J. Mostaghimi, C. Moreau, *Fragmentation of plasma-sprayed molybdenum particles on glass surfaces*, in: B. Marple, M. Hyland, Y. Lau, R. Lima, and J. Voyer (Eds.), International Thermal Spray Conference, Seattle, WA, May 15-17, 2006.
47. H.R. Salimijazi*, **M. Raessi**, T.W. Coyle, and J. Mostaghimi, *Numerical simulation and experimental evaluation of solidification behavior of vacuum plasma sprayed Ti-6Al-4V alloy*, in: J. Mostaghimi, T.W. Coyle, V. Pershin, and H.R. Salimijazi (Eds.), 17th International Symposium on Plasma Chemistry, Plasma Spray and Thermal Plasma Materials Processing, Toronto, ON, August 7-12, 2005.

48. J. Mostaghimi* and **M. Raessi**, *Heat transfer in thermal spray coatings*, in: G. Vaidyanathan, B.V.S.S.S. Prasad, C. Balaji, Y. Joshi (Eds.), XVII National and VI ISHMT/ASME Heat and Mass Transfer Conference, IGCAR, Kalpakkam, India, Jan. 5-7, 2004, pp. 8-17.
49. N.Z. Mehdizadeh, **M. Raessi**, S. Chandra*, and J. Mostaghimi, *Effect of substrate temperature on splashing of molten tin droplets*, in: G. Vaidyanathan, B.V.S.S.S. Prasad, C. Balaji, Y. Joshi (Eds.), XVII National and VI ISHMT/ASME Heat and Mass Transfer Conference, IGCAR, Kalpakkam, India, Jan. 5-7, 2004, pp. 244-249.

INVITED TALKS

1. Arnie Talk at University of Massachusetts – Dartmouth, November 30, 2017.
2. University of Massachusetts-Amherst, Mechanical & Industrial Engineering Department, November 9, 2015.
3. Woods Hole Oceanographic Institution (WHOI), Woods Hole, MA, November 6, 2013.
4. Naval Underwater Warfare Center, Newport, RI, August 17, 2013 (UMD-NUWC Discussion series).
5. United Technologies Research Center, Hartford, Connecticut, March 8, 2013.
6. Naval Underwater Warfare Center, Newport, RI, August 31, 2012.
7. University of Rhode Island, Mechanical Engineering Department, October 14, 2011.
8. Massachusetts Institute of Technology, Department of Mechanical Engineering, Dr. Kripa Varanasi's research lab, August 19, 2011.
9. University of Massachusetts-Dartmouth, Scientific Computing Group, March 14, 2011.
10. University of Rhode Island, Graduate School of Oceanography, January 14, 2011.
11. Southeastern Regional Planning & Economic Development District, Taunton, MA, December 1, 2010.
12. School for Marine Science and Technology, UMass Dartmouth, October 20, 2010.
13. Rutgers University, Department of Mechanical & Aerospace Engineering, March 2010.
14. University of Maryland (College Park), Department of Mechanical Engineering, October 2009.

RESEARCH GRANTS

Secured **\$936,966** in external research funding as the lead PI to date; Total for all grants: **\$1,924,548**.

Principal Investigator Grants

- 1) *Evaporation Sub-Model Development for Volume of Fluid (eVOF) Method Applicable to Spray-Wall Interaction Including Film Characteristics with Validation at High Pressure/Temperature Conditions* (Collaborative project with Michigan Technological Univ. (L) & Argonne National Lab), **US Department of Energy, \$240,000**: UMASS-D budget out of \$740,000 (01/01/2017 – 12/31/2018).
- 2) *Evaporation Sub-Model Development for Volume of Fluid (eVOF) Method Applicable to Spray-Wall Interaction*, **Massachusetts Clean Energy Center, \$35,154** (01/01/2017 – 12/31/2018).
- 3) *Development of a reduced-basis, physics-driven model for fuel spray-wall interaction in internal combustion engines*, **UMASSD Multidisciplinary Seed Funding, \$34,497** (03/01/2017 – 08/31/2017).
- 4) *Graduate Research Support*, **Center for Scientific Computing and Visualization Research Seed Funding, \$4,058** (04/01/2018 – 06/30/2018).
- 5) *Funding to purchase Intel Parallel Studio XE Professional Edition*, **Center for Scientific Computing and Visualization Research Seed Funding, \$3,449** (06/01/2017 – 08/31/2017).
- 6) *Graduate Research Support*, **Center for Scientific Computing and Visualization Research Seed Funding, \$4,058** (06/01/2017 – 08/31/2017).
- 7) *Advanced computational simulations of ocean wave energy converter devices - Investigation of the limit of Froude scaling method and the impact of fluid-structure interaction in multi-body devices*, **NSF Program of Extreme Science and Engineering Discovery Environment (XSEDE)**, 480,000 Service Units of compute time on LSU (superMIC) Supercomputing Cluster, **\$32,217.60** (07/01/2017 – 06/30/2018).
- 8) *An advanced 3D computational framework for simulating multiphase flows with fluid-structure interaction - Application in ocean wave energy conversion*, **NSF XSEDE Program** (Allocation No. TG-ENG170004), **50,000 Core-hour** of compute time on TACC Stampede Supercomputing Cluster, **\$1,739** (03/10/2017 – 03/09/2018).
- 9) *Collaborative Research: Analysis and design of textured super-hydrophobic surfaces capable of preventing ice formation on wind turbine blades*, **National Science Foundation (NSF) Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET) - Energy for Sustainability program, \$214,583** (09/01/2013 - 08/31/2017).
- 10) *A comprehensive computational framework for analysis and optimization of wave energy converters*, **NSF CBET, Energy for Sustainability Program \$368,221** (09/01/2012 - 08/31/2017).
- 11) *Numerical simulations and analysis of the refrigeration system developed by Sunwell*, **Sunwell Technologies Inc., \$41,250** (2011).
- 12) *GPU-accelerated numerical simulations of interfacial flows with applications in energy systems, material processing and bio-engineering*, **Nvidia's Academic Partnership Program, \$3,800** (in kind) (2011).
- 13) *Performing fast numerical simulations of interfacial flows using GPUs - Application in energy systems and material processing*, the UMass Dartmouth Chancellor's Research Fund and the Joseph Healey Endowment, **\$6,500** (2011).
- 14) *Deposition of micro-particles and coating formation during the thermal spray coating process*, **RISE Program of German Academic Exchange Service (DAAD-RISE)**, **one RA** for summer (2012).
- 15) *Designing super ice-phobic surfaces for wind turbine blades to prevent ice accretions*, **DAAD-RISE, one RA** for summer (2012).

Co-Principal Investigator Grant

- 16) *A Heterogeneous Terascale Computing Cluster for the Development and Efficient Implementation of High-Order Numerical Methods*, **Office of Naval Research**, \$643,899, (06/01/2018 – 05/31/2019)
- 17) *University of Massachusetts Center for Advanced Coatings*, **UMass President's Office Science & Technology Initiative Fund**, \$136,000 (07/01/2014 - 06/30/2015).
- 18) *The role of scale in the development and evolution of stratified shear turbulence, entrainment and mixing*, **Office of Naval Research**, \$155,121 (09/01/2015 - 08/31/2017).

TEACHING ASSIGNMENTS

University of Massachusetts-Dartmouth, Department of Mechanical Engineering

Course Instructor

EGR 102 – Introduction to Applied Science and Engineering II
MNE 421 – Thermal Systems Design
MNE 435 – Ocean Wave Energy Conversion
MNE 504 – Advanced Mechanics of Fluids
MNE 542 – Convective Heat Transfer
MNE 545 – Heat Transfer with Phase Change
MNE 552 – Computational Fluid Mechanics

ACADEMIC SERVICE

Served as a **panelist** and an ad-hoc proposal **reviewer** for the **National Science Foundation**.

Reviewed a research proposal for the **American Chemical Society Petroleum Research Fund**.

Reviewed a grant proposal submitted to the Natural Sciences and Engineering Research Council of Canada (Canadian equivalent of NSF).

Chaired the Renewable Energy session at the 65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Diego, CA, 2012.

Reviewed manuscripts submitted for publication in:

- Journal of Fluid Mechanics
- Physics of Fluids (multiple papers)
- Journal of Computational Physics (multiple papers)
- International Journal for Numerical Methods in Fluids (multiple papers)
- Applied Numerical Mathematics
- Atomization and Sprays (multiple papers)
- Theoretical and Computational Fluid Dynamics
- Journal of Visualization
- Journal of Thermal Spray
- Advances in Water Resources Journal
- Chemical Engineering Science Journal
- Computers and Fluids (multiple papers)
- International Journal of Thermal Sciences
- Proceedings of the 2012 ASME Summer Heat Transfer Conference
- Proceedings of the 2010 International Conference on Liquid Atomization and Spray Systems
- CTR Annual Research Brief, Stanford University (multiple papers)

Advising the following graduate and undergraduate research assistants (* indicates expected thesis completion date):

- Stephen Codyer (MS; Completed August 2012)
- Amirmahdi Ghasemi (MS; Completed August 2013)
- Leandre Berard (MS; Completed May 2015)
- Ashish Pathak (EAS-PhD; Completed May 2017)
- Wen Jin (EAS-PhD; Spring 2019*)
- Koray Senol (MS; Completed July 2016)
- Cole Freniere (BS/MS; Completed May 2018)
- Cory Hoi (BS/MS; Fall 2018*)
- David Markt (BS/MS; Fall 2018*)
- Aaron Mak (BS/MS; Summer 2019*)
- Alexander Sinkevich (MS; co-advised with Prof. Bhowmick; Completed July 2015)
- Vashkar Bernard Palma (MS; co-advised with Dan MacDonald; Completed May 2018)
- Hejar Jebeli (MS; co-advised with Prof. Tootkaboni; Completed November 2015)
- Lucas Pimentel (Undergraduate)
- Jonathan Hammel (Undergraduate)
- Cole Freniere (Undergraduate)
- Robert Chiodi (Undergraduate)
- Miranda Thiele (Visiting German undergraduate student)
- Stefan Apfelbeck (Visiting German undergraduate student)
- Rajkamal Sendha (Visiting IIT undergraduate student)
- Michael Bauer (Undergraduate)

Advising the following teams of students in their senior design projects:

- Jocelyn Bourgeois, Carvens Marcellus, Olivier Wikina, Corey Wynott (2010-2011)
- Robert Chiodi, Evan Crocker, Brandon Malaguti, Robert Reis (2013-2014)
- Kipp Standley, Timothy Camilleri, Omar Elbanna, and Michael Graham (2014-2015) - *Won the Second Prize.*
- Stephen Scolamiero, David Kelsey, Shahbaz Khan, Tanner Kisla, Irakoze Vincent (2016-2017)
- Jillian Gamblin, Christopher Donahue, Daniel Camara, Chase Ferry, Austin O'Connell (co-advised with Dr. Wenzhen Huang; 2016-2017).
- Joseph Echelmeier, Mackenzie Bernard, Curtis Dawe, Brandon Haghighi (2017-2018).

PROFESSIONAL AFFILIATIONS

American Society for Mechanical Engineering (ASME)

American Physical Society (APS)

CURRICULUM VITAE

Name: Raymond N. Laoulache
College: Engineering
Title: Associate Professor
Department: Mechanical Engineering Department

HIGHER EDUCATION

Brown University, 1984-1987, Ph.D. in Mechanical Engineering. May 1987.
Northeastern University, 1980-1983. M.Sc. in Mechanical Engineering. June 1983.
Northeastern University, 1976-1980. B.Sc. in Mechanical Engineering. June 1980. *High Honors*.

EXPERIENCE

- Northeastern University, 1980-1984, Instructor, Mechanical Engineering Dept.
- Brown University, 1987-1988, Postdoctoral Research Associate, The Light Wave & Optical Fiber Center.
- University of Massachusetts Dartmouth, 1988-1990, Full-Time Visiting Lecturer, Mechanical Engineering & Mechanical Engineering Technology Dept.
- University of Massachusetts Dartmouth, 1990-1996, Assistant Professor, Mechanical Engineering & Mechanical Engineering Technology Dept.
- University of Massachusetts Dartmouth, 1996-present, Associate Professor, Mechanical Engineering Dept.

SCHOLARLY CONSULTATION

- June 2015. Geocomp, Inc., Concord, MA. Eigenvalues and solution of a third-order wave equation with mixed boundary conditions for Kelvin-Voigt viscoelastic material oscillating in rotation (proprietary).
- 2007-2015. TACO-HVAC, Inc., MA. Semi-empirical correlations for liquid-to-liquid and steam-to-liquid heat exchangers for single-wall bundles and double-wall bundles with variable baffle spacing (proprietary).
- 2010-2012. Ocean Server Technology, MA. Optimization of autonomous underwater vehicle antenna and propeller design using computational fluid dynamics (proprietary).
- 2008-2012. Ocean Renewable Power Company, ME. Theoretical and numerical analysis of hydrokinetic cross-flow helical turbines.
- 2006-2007. Steam Path Solutions Co., FL. Control of droplets path in the last stage of low-pressure steam turbine using computational fluid dynamics.
- 2007. Geocomp, Inc., Concord, MA. Semi-empirical modeling of viscoelastic material. Design, testing, and implementation of a digital controller for cyclic loading of viscoelastic material independent of the process and load (proprietary).
- 2006. Geocomp, Inc., Concord, MA. Design of nonlinear controller using the Lyapunov theory for a closed-loop electrohydraulic system (proprietary).
- 2005-2006. Acushnet Company, New Bedford, MA. Eulerian and Lagrangian analysis of two-phase flow around a rotating sphere using computational fluid dynamics.
- 2005. Steam Path Solutions Co., FL. Fluid-structure interaction analysis of a high-pressure 8-stage impulse turbine using computational fluid dynamics and finite element analysis, (proprietary).
- 2005. Advanced Technology & Manufacturing Center (ATMC), UMass Dartmouth, Fall River, MA. Heat transfer analysis and design for the cooling of high performance desktop workstation using two-phase flow refrigerant, (proprietary).
- 1997. C. I. Hayes, Inc., Cranston, RI. Design, code development, and implementation for a transient blow-down, high-pressure, compressible flow system (proprietary).
- 1994-95. Albany International, Mansfield, MA. Heat transfer and fluid flow analysis of a high-power electronic cooling chip using computational fluid dynamics and finite element analysis.
- 1993. Babbitt Steam Specialty Co., New Bedford, MA. Semi-empirical dynamic characterization of steam valve sprocket wheels under large impulsive forces (proprietary).
- 1992. Tanury Industries, Lincoln, RI. Experimentation on clear coat polymers adhesion to 24 kt. gold surfaces using a large scale salt-spray system in compliance with ASTM B117 (proprietary).

- 1987. Tekton Engineering Inc., Cambridge, MA. Code development in FORTRAN 77 for reinforced concrete design (proprietary).

INDUSTRIAL EXPERIENCE

- 1980. C. D. Burnes Co., Newton, MA. Mechanical engineer. Treatment facility design for electroplating chemical waste.
- 1977-80. C. D. Burnes Co., Newton, MA. Intermittent quarterly engineering positions as part of the cooperative education program at Northeastern University. Duties included engineering design graphics, product development, quality control, and on-the-job training of new coop students.
- 1977. Polaroid Corp., Norwood, MA. Quality Control (coop program).

PEER REVIEW

Choice

1998-present. Professional reviewer for CHOICE, a publication of the association of college and research libraries.

PROFESSIONAL MEETINGS

- Chaired a webinar session: Modeling of Ocean Energy Resources, 4th Annual Marine Renewable Energy Center (MREC) Technical Conference, Providence, RI, Jan. 7, 2013.
- Chaired a technical session: Modeling of Ocean Energy Resources, 4th Annual Marine Renewable Energy Center MREC Technical Conference, Providence, RI, Jan. 10, 2013.
- Chaired a technical session: The 3rd Ocean Energy Technical Conference, Nov. 7-8, 2011 in Cambridge, MA, Nov. 2011.
- Co-chaired a technical session: Tidal Energy Conversion Session, Marine Energy Renewable Center (MREC). Annual Technical Conference, Oct. 15, 2009, Fall River, MA.

PUBLICATIONS/CREATIVE WORKS

Textbook

Advanced Engineering Mathematics: Applications Guide, by Raymond Laoulache (lead author), and John Rice. John Wiley & Sons, Inc., Hoboken, NJ, ISBN 9781118989296, 2015.

Journal Refereed Papers

1. B. Smith¹, R. Laoulache, and A. Heryudono. 2015. "Implementation of Neumann Boundary Condition with Influence Matrix Method for Viscous Annular Flow using Pseudospectral Collocation." *Journal of Computational and Applied Mathematics*, Elsevier, doi: 10.1016/j.cam.2015.02.012.
2. Prasun Chatterjee², and Raymond N. Laoulache. 2013. "Performance Modeling of Ducted Vertical Axis Turbine Using Computational Fluid Dynamics." *Marine Technology Society Journal (MTS) Special Issue on Marine Renewable Energy*, Volume 47, Number 4, July/August 2013, pp. 36-44(9).
3. Esin H. Yesilalan³, Steven B. Warner, and Raymond Laoulache⁴, June 30, 2010, "Penetration of Blade-Applied Viscous Coatings into Yarns in a Woven Fabric." *Textile Research Journal*, 80, 19, 1930-1941.
4. Hoeg⁵, D. P., Wang⁶, Z., Friedman, P. D., and Laoulache, R. N. 2008. "Investigation of a coaxial airblast atomizer using particle image velocimetry and computational fluid mechanics." *Atomization and Sprays*, Vol. 18, 8, pp. 739-759.

¹ R. Laoulache's advisee.

² R. Laoulache's advisee.

³ S. Warner's advisee.

⁴ Developed fluid mechanics model in porous medium.

⁵ P. Friedman's advisee.

⁶ R. Laoulache's advisee.

5. Farboodmanesh, S., Chen, J., Mead, J. L., White, K. D., Yesilalan³, H. E., Laoulache⁷ R., Warner, S. B. 2005. "Effect of Coating Thickness & Penetration on Shear Behavior of Coated Fabric." *Journal of Elastomers & Plastics*, Vol. 37, 3, 197-227.
6. Pendergrass, N. A., Kowalczyk, R. E., Dowd, J. P., Laoulache, R. N., Nelles, W., Golen, J. A., and Fowler, E.. (2001). "Improving First Year Engineering Education." *Journal of Engineering Education*, 90, 33-41.

Proceedings

7. Y. K. Kim, P. K. Sarda, R. N. Laoulache. 2008. "Compact Fiber-based Bioconversion/Biofiltration Systems." Proceedings of AUTEX2008 Conference, June 24-26 2008 Biella, Italy.
8. Paul J. Fortier, Emily Fowler, Raymond N. Laoulache, Nixon A. Pendergrass, Judith Sims-Knight and Richard Upchurch. 2002. "Technology Supported Learning Applied to an Innovative, Integrated Curriculum for First-year Engineering Majors," Hawaii International Conference on System Sciences, January 7-10, Big Island, Hawaii.
9. Laoulache, R. N., Pendergrass, N. A., Crawford, R. J., and Kowalczyk, R. E. 2001. "Integrating Engineering Courses With Calculus And Physics To Motivate Learning of Fundamental Concepts." 31st ASEE/IEEE Frontiers in Education Conference, Oct.10-13, Reno, NV.
10. N. A. Pendergrass, Raymond N. Laoulache and Paul J. Fortier. 2000. "Mainstreaming An Innovative 31-Credit Curriculum For First-Year Engineering Majors." Proceedings of the 30th ASEE/IEEE Frontiers In Education Conference, October 18-21, Kansas City, MO.
11. Pendergrass, N. A., Laoulache, R. N., and Fowler Emily. 2001. "Can An Integrated First-Year Program Continue To Work As Well After The Novelty Has Worn Off?" Proceedings of the 2001 American Society for Engineering Education Annual Conference & Exposition, Albuquerque, New Mexico.
12. Laoulache, R. N., and El Wakil, S. D. 2001. "On The Grinding of Fiber-Reinforced Polymeric Composites." Sixth International Conference on Production Engineering and Design for Development, Feb. 12-14, Cairo, Egypt.
13. N.A. Pendergrass, Robert E. Kowalczyk, John P. Dowd, Raymond N. Laoulache, William Nelles, James A. Golen, and Emily Fowler. 1999. "Improving First Year Engineering Education." Proceedings of the Frontiers in Education Conference, November 10-13, San Juan, Puerto Rico.
14. J. Dowd, R. Laoulache and N. Pendergrass. 1999. "Project IMPULSE: Teaching Physics In An Integrated Studio Based Curriculum For Freshman Engineering Majors." Proceedings of the ASEE National Conference, June 20-23, Charlotte NC.
15. N.A. Pendergrass, Raymond N. Laoulache, John P. Dowd, Robert E. Kowalczyk. 1998. "Efficient Development and Implementation of An Integrated First Year Engineering Curriculum." Proceedings of the Frontiers In Education Conference, Tempe AZ.
16. Bell, T., Laoulache, R. N., and Clapp, C. 1996. "The Design and Manufacturing of Composite Fiber Semidisplacement Hull Powered by Solar Energy." *Solar Engineering*, ed. by J. H. Davidson, J. and Chavez, 1996.
17. J. Rice, R. Laoulache, D. Maass, and D. Rose. 1995. "Thermal Analysis of a Graphite Epoxy Plate-Fin Heat Exchanger Using Finite Element Analysis." *Advances in Electronic Packaging*, ASME Proceedings of the International Intersociety Electronic Packaging Conference-INTERpack '95, ed. by T. R. Hsu, A. Bar-Cohen, and W. Nakayama.

18. R. Laoulache, B. Mikolajczak. 1994. "Parallelization Techniques for One-Dimensional Stratified Two-Phase Fluid Flow Simulation." ASME International Symposium on Parallel Computing in Multiphase Flow Systems Simulations, ASME WAM94, November 6-11, Chicago, IL.
19. R. Laoulache, and R. DiPippo. 1990. "Simulating Well Flow of High-Noncondensable-Gas Geofluids Using Laboratory Measurements on Secondary Fluids." Proceedings of the Sixteenth Geothermal Reservoir Engineering Workshop, Stanford Geothermal Program, Stanford University.
20. R. N. Laoulache (Brown University), P. F. Maeder, and R. DiPippo. 1988. "Turbulent Liquid Film Behavior in Upward Two-Phase Flow Subject to an Effective Adverse Pressure Gradient." Fundamentals of Gas-Liquid Flows, edited by E. E. Michaelides, and M. P. Sharma, FED-Vol. 72, pp. 39-48.
21. R. Laoulache (Brown University), T. F. Morse, P. Charilaou, J.W. Cipolla, Jr. 1988. "Aerosol Delivery of Non-Volatile Dopants in the Modified Chemical Vapor Deposition System." Annual Meeting of the American Institute of Chemical Engineers, Washington, DC.

CONFERENCE PRESENTATIONS

1. Prasun Chatterjee, Raymond N. Laoulache. 2013. "Analysis of a Diffuser-Shrouded High-Solidity Vertical Axis Turbine Using Computational Fluid Dynamics." The 4th Annual MREC Technical Conference, January 7-10, 2013.
2. Raymond N. Laoulache, Che-Wei Liu, and Jeevan Sattoor. 2011. "Analysis of a vertical axis turbine using computational fluid dynamics at low and high solidities." Third Ocean Energy Technical Conference, Nov. 7-8, 2011, Cambridge, MA.
3. Raymond N. Laoulache, and Gurudutt Venkatesh. 2009. "Analysis of A Vertical Axis Turbine Using Computational Fluid Dynamics Combined With The Blade Element Theory." Marine Energy Renewable Center Annual Technical Conference, October 15, 2009, Fall River, MA.
4. Raymond N. Laoulache. 2001. "Motivating Learning of Engineering Fundamentals By Using Technology And Subject Integration," Conference on the Use of Information Technology in Higher Education in Arab Universities, Mar. 12-14, Lebanon.
5. Raymond N. Laoulache, and Nixon A. Pendergrass. 2000. "The IMPULSE Program at the University of Massachusetts Dartmouth," International Conference on The First-Year Experience, Jul. 24-28, Reading, England.
6. Raymond N. Laoulache, and Nixon A. Pendergrass. 2000. "Improving First-Year Engineering Education: The IMPULSE Program," ASEE Conference on Education, Apr. 29, UMass Lowell.
7. John M. Rice, Raymond N. Laoulache, David Maass, and Donald Rose. 1995. "Thermal Analysis of a Graphite Epoxy Plate-Fin Heat Exchanger Using Finite Element Analysis." International Intersociety Electronic Packaging Conference-INTERpack '95.

OTHER PROFESSIONAL ACTIVITIES

Department Service: 2011-present

- ABET Coordinator
- Curriculum Committee
- Coordinator of ME Computing
- Faculty Evaluation Committee
- Laboratory Committee
- Computer Committee
- Thesis Committees

College Service: present

- Navitas Coordinator
- Chair of the College of Engineering Curriculum Committee
- Grade Appeal Facilitator

University Service: present

- UMass Dartmouth Faculty Representative of the System-Wide Conflict of Interest Committee
- Faculty Senate
- Student-Faculty Academic Affairs Committee

MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Society of Mechanical Engineers.

NOMINATIONS AND AWARDS

- Recipient of the Leo M. Sullivan Teacher of The Year Award, 2011.
- UMass Dartmouth nominee to US Professor of The Year, sponsored by The Carnegie Foundation for The Advancement of Teaching, 2008-2009.

COURSES TAUGHT 2011-present

- EGR 242 Eng Mechanic II: Dynamics
- MNE 220 Engineering Thermodynamics
- MNE 332 Fluid Mechanics
- MNE 400 Engineering Internship
- MNE 490 Special Topics-Turbomachinery
- MNE 495 Independent Study
- MNE 496 Directed Study
- MNE 502/EAS 502 Applied Numerical Methods
- MNE 501/EAS 501 Advanced Mathematical Methods
- MNE 570 Reading and Research

Curriculum Vitae

SHEIKH FAHAD FERDOUS, Ph.D.

LinkedIn: <https://www.linkedin.com/in/sheikh-fahad-ferdous-phd-1045742a>

3 LedgeWood Blvd, Apt-B44
Dartmouth, MA-02747

Phone: (817) 404-8271

Email: fahad.me.02@gmail.com

SUMMARY

- Working as a **full-time lecturer** and teaching **senior capstone/design project**.
- Research experience is based structural design and analysis from nano to continuum scale using simulation in the field of **solid mechanics, ceramic materials, materials science, and composites**.
- Involved in current research collaboration to seek for external and internal grant..
- Experienced in teaching in **three(3) state universities** in three different states and apt to maintain from small to very large classes including **online** teaching.
- Involved in **student advising, ABET committee, ASME**, and other service activities of the University.

APPOINTMENTS

▪ Full-Time Lecturer , University of Massachusetts Dartmouth (UMassD), USA	<i>Sep 2017- Present</i>
▪ Visiting Assistant Professor , Binghamton University-SUNY (BU), USA	<i>Sep 2016- Aug 2017</i>
▪ Adjunct Faculty , University of Texas at Arlington (UTA), USA	<i>Sep 2015- Aug 2016</i>
▪ Postdoctoral Researcher , University of Texas at Arlington, (UTA), USA	<i>Feb 2016- Aug 2016</i>
▪ Summer Instructor , Upward Bound Math & Science (UBMS), TRIO program	<i>Jun 2016- Jul 2016</i>
▪ Graduate Teaching Assistant , University of Texas at Arlington (UTA), USA	<i>Sep 2010- May 2015</i>

RESEARCH AREAS AND INTERESTS

- **Scientific:**
 - ✓ Computational materials science, coarse grain modeling, atomistic simulation of advanced nanomaterials deformation and failure mechanism, kinetic processes in dislocations and grain boundaries, visco-elastic materials, bio-mechanics, statistical mechanics, high-performance scientific computing,
- **Applications:**
 - ✓ Resilient ceramic materials for future spacecraft, osteoporotic disease, bone degradation in diabetics, epoxy-CNT composites for aircraft health monitoring, tailoring mechanical properties of nanocomposites as needed.
- **Techniques:**
 - ✓ Molecular dynamics (MD) simulation, finite element method (FEM), multi-scale modeling.

HIGHLIGHTS

- **Programming Language:** FORTRAN 90, C/C++, R, MATLAB, and JavaScript
- ✓ **Modeling:**
 - Molecular Dynamics Simulations: DLPOLY-2.18, 2.2, and 4.08, LAMMPS
 - Finite Element Simulations: ANSYS-15.0 APDL and Workbench, ABAQUS-6.14, COMSOL
- **CAD Software:** CREO 3.0, Catia v5, SOLIDWORKS 2017
- **Molecular Visualization:** OVITO, VMD-1.9.1, Atomeye, DLPOLY Java GUI
- **Others:** HTML, SVG, CSS, Tableau, Vega-Lite,

EDUCATION

- **Ph.D.**, Mechanical Engineering, University of Texas at Arlington, USA *Aug 2015*
 - ✓ Supervisor: Dr. Ashfaq Adnan, Associate professor
- **B.Sc.**, Mechanical Engineering, Bangladesh University of Eng. & Tech.(BUET) *Jan 2008*

AWARDS AND ACHIEVEMENTS

- Prestigious Dissertation Fellowship offered by the Office of Graduate Studies at UT Arlington.
- Best Research Presentation Award offered by the MAE brown bag seminar, UT Arlington.
- Competitive Graduate Doctoral Teaching Fellowship
- Enhanced Graduate Teaching Assistantship which is awarded to few students for excellent credentials

TEACHING EXPERIENCES

- **Full-Time Lecturer, UMassD** *Sep 2017-Present*
 - ✓ MNE 101- Intro to Mechanical Engineering (Spring 2018) – **69** students in class
 - ✓ - **Lab section** to teach SOLIDWORKS 2018
 - ✓ MNE 498- Senior Design Project (Spring 2018) – **15 projects - 58** students in class
 - ✓ MNE 497- Senior Design Project (Fall 2017) – **15 projects - 58** students in class
 - ✓ EGR 303- Engineering Economics (Fall 2017) – **69** students in class
- **Visiting Assistant Professor, BU** *Sep 2017- Aug 2016*
 - ✓ ME 211- Solid Mechanics (Summer 2017) (**ONLINE TEACHING**)– **30** students
 - ✓ ME 392- Mechanical Engineering Design (Spring 2017) – **102** students in class
 - ✓ ME 211- Solid Mechanics (Spring 2017) – **87** students in class
 - ✓ ME 412- Structural Mechanics (Fall 2016) – **12** students in class
 - ✓ ME 581- Computer Aided Engineering (CAE) (Fall 2016) – **9** students in class
 - ✓ - **Lab section** to teach CREO 3.0
- **Adjunct Faculty, UTA** *Sep 2015-Aug 2016*
 - ✓ MAE 3242- Mechanical Design (Summer 2016) – **22** students in class
 - ✓ MAE 2312- Solid Mechanics (Spring 2016 & Fall 2015) – Average **62** students in class
 - ✓ MAE 1312- Engineering Statics (Spring 2016) – **71** students in class
- **Summer Instructor, UBMS** *Jun 2016-Jul 2016*
 - ✓ The program is arranged to teach and motivate the high school students in the STEM field
 - ✓ This program targets students from low-income family, those with parents who didn't attend college, and those living in rural area
- **Graduate Teaching Assistant, UTA** *Sep 2010-May 2015*
 - ✓ Worked as Enhanced Graduate Teaching Assistant (EGTA) in the mechanical engineering department
 - ✓ Duties include preparing & conducting lectures and mentoring undergraduate students

MENTORING EXPERIENCES

- **Advisor, Senior Capstone Project, UMassD**
 - ✓ Robotic Arm for a chess playing robot.
- **Advisor, Senior Capstone Project, BU**
 - ✓ Mechanical system for a telecine device for 35mm films
 - ✓ Universal Ratcheting Socket Wrench
 - ✓ Constant Torque Spring Powered 3 KW Electric Generator
- **Advisor, Junior Design Project, BU**
 - ✓ Supervised 101 junior design projects of junior level students.

RESEARCH EXPERIENCES

- **Ongoing Research Collaboration, UMassD** *Sep 2017-Present*
 - ✓ C
 - ✓ Computational design and analysis of epoxy CNT composites for health monitoring in aerospace application.
- **Postdoctoral Researcher, MMPL, UTA** *Feb 2016-Aug 2016*
 - ✓ Fracture analysis of bi-material cracked structure
 - ✓ Nano-indentation technique analysis for ceramic materials
- **Research Assistant, MMPL, UTA** *Aug 2010-May 2015*
 - ✓ **Computational Experience**
 - **Deformation and fracture mechanics of ceramic materials**
 - Constructed new ceramic based composite models computationally which intensified the fracture toughness and estimated by using classical analytical theories, MD simulation, and FEA
 - Contributed to fracture toughness prediction of brittle material in a multi-scale analysis
 - **Mechanical behavior of polymer nanocomposite**
 - Developed an idea from the manufacturing point of view to enhance the failure strength of 7.8% and bulk stiffness of 16% in a C₆₀ reinforced polymer nanocomposites
 - Computational Design and Mechanical Behavior of Carbon Nanotube Reinforced in pure LDPE and hybrid system of LDPE/Nylon 6 Nanocomposites
 - **Effect of surface defect**
 - Pinpointed the role of surface point defect on premature failure in various conditions (dimension, high temperature, etc.) of a metal nanowire
 - **Biomechanics**
 - Interpreted pH-dependent bone fracture mechanism showing the favorable condition in atomistic level
 - Higher pH (base condition) is better for collagen and Hydroxyapatite interfacial interaction
 - **Composite material analysis**
 - Analyzed progressive failure of composite structures using ANSYS, which predicted the effect of single, multiple holes in the plate in different orientations
 - Evaluated fracture analysis using ANSYS to comprehend the effect of crack size, initiated from a hole in a plate
 - ✓ **Experimental Experience**
 - Material characterization (mechanical properties) using tensile testing machine at elevated temperature
 - Fabrication of epoxy/nano-composite structures to evaluate strength of materials
 - Building cellular structures using an additive manufacturing process using a 3D printer
 - Installation and maintenance of Shimadzu AGS-X STM machine

PROFESSIONAL INVOLVEMENTS AND SERVICES

- **Involvement in UMassD**
 - ✓ Advising Students
 - ✓ ABET Committee
 - ✓ Curriculum Development
 - ✓ ASME Advisor
- **Reviewer**
 - ✓ Contributed as a reviewer in the International Mechanical Engineering Congress & Exposition (ASME-IMECE) Conference, Phoenix, Arizona 2016
 - ✓ Worked as a reviewer in the Annual Celebration of Excellence by Students symposium (ACES) poster/oral presentation, 2016 arranged by UTA
- **Judge/Speaker**

- ✓ Invited as a keynote speaker to talk about “Infrastructure and Industrialization” arranged by Division of Student Affairs of the University of Texas at Arlington, February 2016
- ✓ Worked as a judge in the multi-disciplinary poster presentation in March 2016, arranged by UT Arlington
- ✓ Invited as a judge in a recycle contest on Earth Day arranged by Great West Casualty Company, Arlington, TX, April 2016
- **Services at Conference**
 - ✓ Organized two sessions as a chair in the American Society for Composites conference in September 2015 at the Michigan State University
 - ✓ Participated as a volunteer in SAMPE TECH conference in 2011 and ASC conference in 2012

PUBLICATIONS

▪ **Book Chapters**

1. Ashfaq Adnan, Farzad Sarker, and **Sheikh F. Ferdous**, “Biomechanics of Mineralized Collagens”, in *Multiscale Simulations and Mechanics of Biological Materials*, First Edition. Edited by Shaofan Li and Dong Qian. © 2013 John Wiley & Sons, Ltd. Published 2013 by John Wiley & Sons, Ltd.

▪ **Journals**

1. **Sheikh F Ferdous**, Ashfaq Adnan “Mode-I Fracture Toughness Prediction of Diamond at Nanoscale”, *Journal of Nanomechanics and Micromechanics*, Volume 7 (3), June 2016, Pages 04017010.
2. Ashfaq Adnan, **Sheikh F Ferdous** “Mechanical Properties of Computationally Designed Novel Carbon Enriched Si_{1-x}C_x Ceramics: A Molecular Dynamics Simulation Study”, *Computational Materials Science*, Volume 110, December 2015, Pages 331–339.
3. Ashfaq Adnan, **Sheikh F Ferdous** “Computational Design of Novel Carbon Enriched Si_{1-x}C_x Ceramics: A Molecular Dynamics Simulation Study”, *Computational Materials Science*, Volume 96, January 2015, Pages 354–359.
4. **Sheikh F Ferdous**, Ashfaq Adnan “Role of a Single Surface Vacancy on the Tensile Stress-strain Relations of Single Crystal Ni Nanowire”, *Computational Materials Science*, Volume 90, July 2014, Pages 221–231.
5. **Sheikh F Ferdous**, Md. Farzad Sarker, Ashfaq Adnan " Role of Nanoparticle Dispersion and Filler- Matrix Interface on the Matrix Dominated Failure of Rigid C₆₀-PE Nanocomposites: A molecular dynamics simulation study", *Polymer*, Volume 54, Issue 10, 26 April 2013, Pages 2565–2576.

▪ **Conference Proceedings**

1. **Sheikh F Ferdous**, Ashfaq Adnan, “Computational Design of Carbon Enriched Ceramics for Improved Strength and Toughness” American Society for Composites Conference, September 28-30, 2015, East Lansing, MI
2. Ashfaq Adnan, **Sheikh F Ferdous**, Mujibur R. Khan, “Computational Design and Mechanical Behavior of Carbon Nanotube Reinforced LDPE/Nylon 6 Hybrid Polymer Nanocomposites” American Society for Composites Conference, September 28-30, 2015, East Lansing, MI
3. **Sheikh F Ferdous**, Ashfaq Adnan, “Tailoring Fracture Toughness of Silicon Carbide Ceramics Film via Nanoscale Multilayering with Diamond” American Society for Composites Conference, September 08-10, 2014, San Diego, CA
4. **Sheikh F Ferdous**, Ashfaq Adnan, Muhammad Huda, “Improving Fracture Toughness of Silicon Carbide Ceramics with Nanodiamond Reinforcements” American Society for Composites Conference, September 9-11, 2013, Pennsylvania, USA
5. **Sheikh F Ferdous**, Ashfaq Adnan, “The Effects of Filler-Matrix Interface Strength, Filler Shape And Filler Dispersion On The Mechanical Properties of Polymer Nanocomposites.” American Society for Composites Conference, October 01-03, 2012, Arlington, TX
6. **Sheikh F Ferdous**, ARN Sakib, Ashfaq Adnan, “pH-Dependent Interfacial Adhesion between Collagen and Hydroxyapatite in the Mineralized Collagen Fibril” 2011 SAMPE TECH, October 18-19, Fort Worth, TX

▪ **Technical Presentations (presenter underlined)**

1. **Sheikh F Ferdous**, Md Riaz Kayser, Ashfaq Adnan, "Enhanced Mechanical Properties of SiC-Diamond Composites via Nanoengineered Interfaces" 12th DURACOSYS 2016, Arlington, TX. **(POSTER)**.
2. **Sheikh F Ferdous**, "Nanoceramics for Reliable Space Shuttle Thermal Protection System" in Annual Celebration of Excellence by Students (ACES) Symposium at UT Arlington, TX, 2015.
3. Ashfaq Adnan, **Sheikh F Ferdous**, Mujibur R. Khan, "Mechanical Behavior of Carbon Nanotube Reinforced LDPE/Nylon 6 Hybrid Polymer Nanocomposites: A Molecular Dynamics Simulation Study" ASME IMECE 2014, Montreal, Canada, 2014.
4. **Sheikh F Ferdous**, Ashfaq Adnan "Improving Fracture Toughness of Silicon Carbide Ceramics by Microstructure Tailoring", **IMECE 2013-65645**, ASME IMECE 2013, San Diego, 2013.
5. **Sheikh F Ferdous**, Farzad Sarker, Ashfaq Adnan "pH-Dependent Failure Analysis of Mineralized Collagen Fibril." **IMECE 2012-88323**, ASME IMECE 2012, Houston, TX, Nov 09-15.
6. **Sheikh F Ferdous**, "The effect of filler shape, dispersion and interface with matrix on the mechanical properties of polymer nanocomposites." **IMECE 2012-88784**, ASME IMECE 2012, Houston, TX, Nov 9-15.
7. **Sheikh F Ferdous**, "The Effects of Filler-Matrix Interface and Filler Dispersion On The Mechanical Properties Of Polymer Nanocomposites." Presented in Annual Celebration of Excellence by Students (ACES) Symposium at UT Arlington, TX, 2012.

INTERNSHIP (UNDERGRADUATE PROGRAM)

- Three weeks' industrial attachment to Energy Pac Engineering Ltd., Bangladesh. The main focus of the training was to accustom with the industrial environment and to enrich knowledge in manufacturing of Power Transformer and Instrument Transformer
- Studied manufacturing details and circuit breaker of 220V, 11 KV, and 33 KV power transformers

LEADERSHIP AND COMMUNICATIONS

- Cooperated as college captain to high school students for a hands-on competition sponsored by General Motors Corporation
- Managed fourteen senior design projects.
- Lead as New Student Involvement Coordinator and General Secretary of Bangladesh Student Organization
- Planned, organized and participated in various cultural events at UTA

PROFESSIONAL AFFILIATIONS

- American Society of Mechanical Engineers (ASME)
- American Society for Composites (ASC)

SHERIF D. ELWAKIL

Telephone: (508) 999-8594
Cell: (508) 542-4757
Email: selwakil@umassd.edu

PERSONAL DATA

- United States Citizen
- Married with three children
- Languages: English, German, and Arabic

EDUCATION

- Birmingham University (1972)** Birmingham, England
Doctor of Philosophy in Mechanical Engineering.
- Al-Azhar University (1969)** Cairo, Egypt
Master of Science in Mechanical Engineering.
- Cairo University (1965)** Cairo, Egypt
Bachelor of Science in Mechanical Engineering.

ADMINISTRATIVE EXPERIENCE

- University of Massachusetts Dartmouth (1999-2000)** Dartmouth, MA
Interim Dean of the College of Engineering.
Provided the highest-level of managerial leadership required to organize and efficiently operate the College of Engineering. Duties and achievements include:
- Evaluating faculty for contract renewal, tenure, and promotion.
 - Representing the College of Engineering in the Council of Academic Deans as well as in the UMass-System Engineering Deans meetings.
 - Promotion and implementation of affirmative action initiative within the College.
 - Balancing the budget and strategically allocating monies in order to meet prioritized objectives agreed upon by the College's Departments.
 - Daily problem-solving and tending to specific, specialized faculty needs.
 - Overseeing and helping improve various specialized Academic Centers and Programs.
 - Recruiting and mentoring a number of newly-hired faculty in various Departments.
- University of Massachusetts Dartmouth (1995-1999)** Dartmouth, MA
Chairman of the Department of Mechanical Engineering.
Administered the daily routine of the Department and provided the required faculty leadership and mentoring, thus resulting in the following achievements:
- Directed the efforts of the department to prepare for the visit of the ABET Accreditation Team in October 1998. This included attending the relevant ABET Conferences in Washington D.C. and San Diego and providing detailed guidance and instruction to the Department faculty, technicians, and secretary regarding what should be implemented.
 - With the help of the Department faculty, responded to the Self-Study Questionnaire (Volume II) for review of Engineering programs for ABET. The visit was a great success, and the Department received the best Program Deficiency Report (PDR) of all programs in the entire College of Engineering as well as a letter of praise from the visitor.
 - Prepared consolidated stages I and II proposal for establishing a Masters Program in Mechanical Engineering. Defended the proposal at all levels, including the College Curriculum Committee, Campus Curriculum Committee, Provost's and Chancellor's Offices, the President's Office, the Academic Affairs Committee, a Committee of Off-campus Consultants, the Board of Trustees, and the Board of Higher Education. The program was successfully launched and it is now in its fifth year.
 - Prepared the Self-Study Report of the Mechanical Engineering Program as a part of the University Program Review. The Department's views were accepted by campus administration.
 - Administered the phase-out process of the Mechanical Engineering Technology Program and ensured that the program would be accredited until graduation of the final student.

**ACADEMIC
EXPERIENCE**

University of Massachusetts Dartmouth (1995-Present)
Chancellor Professor of Mechanical Engineering.

Dartmouth, MA

University of Massachusetts Dartmouth (1987-1995)
Professor of Mechanical Engineering.

Dartmouth, MA

Undergraduate courses taught: Design for Manufacturing, Manufacturing Process Lab, Dynamics, Mechanics of Materials, Computer-Aided Manufacturing, Materials Science, Materials Science Lab, and the Capstone Senior Design Project. Also taught the following graduate-level courses: Manufacturing Processes (at the University of Massachusetts Lowell), Plasticity & Metal Forming Theory, and Continuum Mechanics. Also served on the following

Committees at the Departmental Level:

- Chairman – Curriculum Committee, Department of Mechanical Engineering
- Laboratory Committee, Department of Mechanical Engineering
- Faculty Evaluation Committee, Department of Mechanical Engineering
- Graduate Program Committee, Department of Mechanical Engineering
- Faculty Search Committee, Department of Mechanical Engineering

And at the College Level:

- Chairman - College of Engineering Academic Council
- College of Engineering Outreach Committee
- College of Engineering Curriculum Committee
- Co-Chairman – Engineering/Business Programs Development Committee
- College of Engineering Strategic-Planning Committee
- Advanced Technology & Manufacturing Center Strategic-Planning Committee
- Dean of Engineering Industrial Council

And at the University Level:

- UMass Dartmouth Affirmative Action Committee
- UMass Dartmouth Council for Diversity & Pluralism
- Faculty Senate Library Committee
- Division of Continuing Education Advisory Board
- Chairman – Search & Screen Committee for the Dean of the College of Engineering (1993-1994)
- Chairman (appointed by the previous Chancellor) – Faculty Senate Committee for Evaluating the Provost (1997-1998).

Al-Azhar University

Assistant/Associate Professor of Mechanical Engineering.

Elasticity and Plasticity, and the Capstone Senior Design Project. Also supervised five Masters theses and acquired \$1,000,000 of government funding to equip and develop the Mechanical Engineering laboratories.

Birmingham University (1970-1973)

Birmingham, England

Graduate Teaching Assistant of Mechanical Engineering.

Taught Materials-Testing Lab and tutored Mechanics of Materials.

Al-Azhar University (1969-1970)

Cairo, Egypt

Graduate Teaching Assistant of Mechanical Engineering.

Taught Machine Shop Technology, Engineering Design Graphics, and Metallurgy Lab.

**PROFESSIONAL
EXPERIENCE**

Wright-Paterson Air Force Base (1990)

Dayton, OH

USAF Summer Faculty Fellowship.

Carried out research on extrusion of metallic composites in their semi-solid state.as well as the rolling and stamping shops.

Mercedes Benz Motor car company, design office.

Stuttgart, Germany

Metal currency factory
Cairo, Egypt

Expert witness in courts (Five cases) Massachusetts.

Editor for Metals journal in Basel, Switzerland (issue on Powder Metallurgy)

**CONSULTING
WORK FOR**

- Resolute Racing Shells, Bristol, RI
- Composites Development Corporation, Wareham, MA
- Acushnet Rubber Company, New Bedford, MA
- Aerovox Company, New Bedford, MA
- Digital Interface Systems, Inc., MI
- Caterpillar Tractor Company, Peoria, IL
- MASCO Corporation, MI
- Morton Metal Craft Company, IL
- Molten Metal, Fall River, MA
- Ministry of Electricity and Energy, Cairo, Egypt

**GRANTS
AWARDED**

	Research
▪ Internal Grant(2009).....	\$50,000
▪ Society of Manufacturing Engineers Lab Department Grant (1995)	\$54,560
▪ National Science Foundation Equipment Grant (1994)	\$107,560
▪ TRP Grant (member of a team) (1993).....	\$2,850,000
▪ Society of Manufacturing Engineers Lab-Development Grant (1990)	\$14,000
▪ Society of Manufacturing Engineers Lab-Development Grant (1988)	\$26,000
▪ Society of Manufacturing Engineers Lab-Development Grant (1986)	\$8,350

**BOOKS
AUTHORED**

- EL WAKIL, S.D. "Processes and Design for Manufacturing." 3rd edition, CRC Press, to be published 2019
- Machining Technology for Composite Materials. Woodhead publishing company Cambridge, U.K, 2011. Chapter 3, Grinding Processes for Polymer Matrix Composites, by Sherif D. El Wakil.
- EL WAKIL, S.D..." Process and Design for Manufacturing.", in Korean, Thomson, Singapore2008.
- EL WAKIL, S.D. "Processes and Design for Manufacturing." 2nd edition, 2nd Printing, Waveland Press, 2001.
- EL WAKIL, S.D. "Processes and Design for Manufacturing." 2nd edition, PWS-Kent, 1998.
- EL WAKIL, S.D. "Laboratory Manual for Materials Science and Engineering." PWS-Kent, 1993.
- EL WAKIL, S.D. "Processes and Design for Manufacturing." Prentice Hall, 1989.

- S. D. El Wakil, and Matt Pladsen, "Minimizing the Drilling Damage in Graphite-Epoxy Composites", 19th Int. Conf. on composite Science and Engineering, Rome, December 2017.
- S. D. El Wakil, "The Frontiers in Materials Processing, Keynote Speech, 19th International Conference on Materials and Materials Processing, Boston, MA 2017.
- S. D. El Wakil, "Metallurgy of Friction Welding of Porous Stainless Steel-Solid Iron Billets", 18th International Conference on Metallurgical and Materials Engineering, Barcelona, Spain, Dec. 2016.
- El Wakil, S.D., Rice, J., "Computation and Validation of the Stress Distribution around a Circular Hole in a Slab Undergoing Plastic Deformation" 17th International Conference on Applied Mechanics AND Materials Engineering, London, September 2015.
- El Wakil, S.D., "Friction Welding of Sintered-Iron Compacts to Wrought Iron", International Journal of Powder Metallurgy 50/4 Fall 2014, p.55- 59.
- Bender, S., Chaliventra, V.B., Rahbar, N., El Wakil, S.D., "Mechanical Characterization and Modeling of Graded Porous Stainless Steel Specimens for Possible bone Implant Applications", International Journal of Engineering Science 53, p. 67-73, 2012.
- Bender, S., El Wakil, S.D., Chaliventra, V.B., "Fabrication and Characterization of Powder Metallurgy Parts Having Porosity Gradient", Powder Metallurgy, 54(5), p 599-603, 2011.
- Bender, S., El Wakil, S.D., Chaliventra, V.B., Rahbar, N., Bhowmick S., "Fabrication and Characterization of Novel Graded Implant Material", Proceedings of SEM Annual Conference on Experimental and Applied Mechanics, Indianapolis, June 7-10, 2010.
- S. Bender, S. El Wakil, V Chalivendra., "Fabrication and Characterization of Powder Metallurgy Parts Having Porous gradient, Powder Metallurgy (in the press).
- ELWAKIL, S.D., Srinagesh K., "Effect of the physical and mechanical properties of composites on their grinding characteristics", High Performance Structures and Materials, vol. IV, p.149-155, 2008.
- EL WAKIL, S.D., Azzab, N., "Effect of process parameters on the grinding of polymeric composites ", 13th European Conference on Composite Materials, June 2008, Stockholm, Sweden, (www.swereasicomp.se).
- EL WAKIL, S.D., Fares, G. "The Grinding of Epoxy-Graphite Composites." *the 9th International AVK Conference*, Essen, Germany, p.A10,1-6, September 2006.
- LAOULACHE, R.N., EL WAKIL, S.D. "The Grinding of FRP Composites." *Proceedings of the 6th MDCP International Conference*, Cairo, Egypt, vol. I, p. 134-142, February 2002.
- EL WAKIL, S.D. "Permanent Joining of Ceramic Parts." *International Conference of Non-metallic Materials*, Zenica, Bosnia, April 2000.
- EL WAKIL, S.D. "Extrusion of P/M Metallic Composites in their Semi-Solid State." *International Journal of Powder Metallurgy*, p 175-182, April 1992.
- EL WAKIL, S.D. "An Upper-Bound Analysis for the Extrusion of Sintered Billets." *Advanced Technology of Plasticity*, Vol. II, p.927-932, 1990.
- EL WAKIL, S.D. "A Modified Slip-Line Field Theory for Sintered Porous Metals." *Advanced Technology of Plasticity*, Vol. II, p.977-983, 1987.
- EL WAKIL, S.D. "Analytical Predictions of the Deformation and Densification Behavior of Sintered Porous Materials." *Proceedings of the 25th International Machine Tool Design and Research Conference*, Birmingham, p.443-447, 1985.
- EL WAKIL, S.D. "Determination of the Mean Coefficient of Friction in Forward Extrusion." *Western Michigan University Conference Proceedings*, p.200, October 1984.
- EL WAKIL, S.D. "A Model Study for Metal Forming in the Mushy State." *Advanced Technology of Plasticity*, Vol. I, p.45, 1984 .
- EL WAKIL, S.D. "On the Work-Hardening of Sintered Porous Materials." *The XII NAMRC*, Houghton, Michigan, p.86-89, May 1984.
- EL WAKIL, S.D., T. BARTON, "The Production of Foamed Metals by Powder Metallurgy." *Proceedings of the PEDAC International Conference*, Alexandria, Egypt, p. 1, December 1983.
- EL WAKIL, S.D. "A Yield Criterion and Its Associated Flow Rule for Sintered Porous Materials." *XI NAMRC*, Madison, Wisconsin, p.166-171, May 1983.

- EL WAKIL, S.D., H. KHALIFA, "The Cold Formability of Billets Prepared by Loose Sintering." *International Journal of Powder Metallurgy and Powder Technology*, January 1983, p. 21.
- EL WAKIL, S.D. "The Production of High Quality Billets by Cropping." *X NAMRC*, McMaster University, May 1982, p. 186.
- EL WAKIL, S.D. et. al. "The Mechanics of the Square Box Drawing Operation of Aluminum Blanks." *Society of Manufacturing Engineering Conference*, Cleveland, Ohio, April 1980.
- EL WAKIL, S.D. "A Plane-Strain Analogue for the Extrusion of Sintered Billets." *Proceedings of the 20th International Machine Tool Design and Research Conference*, Birmingham, England, 1979, p. 229.
- EL WAKIL, S.D., EL SABBAGH. "Properties of Extruded Composite Al-Cu Mixtures." *Proceedings of the 18th Conference*, London, England, 1977, p. 69.
- EL WAKIL, S.D. "Deformation in Bar Cropping," *Mechanical Working Technology*, Vol. I, No. 1, July 1977, p. 85.
- DAVIES, EL WAKIL, S.D. "A Comparison of Slow Speed, High Speed and Multi-Blow Compaction of Ferrous Powders." *Proceedings of the 17th International Machine Tool Design and Research Conference*, Birmingham, England, 1976, p. 483.
- ABD EL LATIF, EL WAKIL, S.D. "The Effect of Molybdenum on the Mechanical Properties of Sintered and Heat Treated Steel Compacts." *Powder Metallurgy International*, Vol. 8, No. 2, May 1976, p. 88.
- EL WAKIL, S.D., R. DAVIES, "Lubrication Effects in the Compaction of Sponge-Iron Powder at Low and High Speeds." *Powder Metallurgy*, spring 1973, No. 31, Vol. 16, p. 72.
- EL WAKIL, S.D., R. DAVIES, "Speed Effects in the Compaction of Copper Powders." *International Conference on the Use of High Energy Rate Methods for Forming, Welding, and Compaction*, Leeds, England, 1973, p. 161.
- EL WAKIL, S.D., R. DAVIES, "High Speed Compaction of Metal Powders." *Proceedings of the 13th International Machine Tool Design and Research Conference*, Birmingham, England, 1972, p. 435.

PRESENTATIONS

- EL WAKIL, S.D. "Extrusion of Porous Metals." *WPI Seminars*, 1999.
- EL WAKIL, S.D. "Plastic Behavior of Porous Metals." *URI Seminars*, 1998.
- EL WAKIL, S.D. "The Semi-Sold Forming of Alloys." *Northeastern University Seminars*, 1997.
- EL WAKIL, S.D. "Semi-Sold Forming of Metallic Composites." *Wright-Patterson Air Force Base Materials Laboratory*, 1990.
- Over one-hundred other presentations at various Universities, Colleges, and Institutions.

AWARDS

- SME President's Award for Professional Excellence, 1986 and 2006. § Outstanding Recognition Award- Division of Continuing Education and Summer Programs, UMass Dartmouth, 1995. § Life membership of SME In 2014.
- United States Air Force (USAF) Summer Faculty Fellowship, 1990 § Elected Senior Member of the North American Manufacturing Research Institute (NAMRI).

PROFESSIONAL SOCIETIES

- Senior Member – North American Manufacturing Research Institution (NAMRI)
- Senior Member – Society of Manufacturing Engineers (SME) § Member – Japan Society for Technology of Plasticity (JSTP) § Member – American Society for Engineering Education (ASEE) § Chairman (1986) – Scientific Program Committee, Local SME Chapter § Member of the Board (1986) – Local SME Chapter.
- Representing the SME in the Energy Assessment Center (DOC) of the Northeast 2014

Table of Faculty Qualifications.
UMass Dartmouth Mechanical Engineering Department

Faculty Name	Highest Degree Earned- Field and Year	Rank ¹	Type of Academic Appointment ² T, TT, NTT	FT or PT ³	Years of Experience			Professional Registration/ Certification	Level of Activity ⁴ H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Amirzadeh Goghari, Afsoon	Ph.D. ME 2010	FTVL	NTT	FT	3	8	8	none	none	none	None
Azadivar Farhad	Ph.D. IE 1980 (retired in 2016)	P	T	FT	3	36	17	PE	M	M	L
Bhowmick Sankha	Ph.D. ME 2000	P	T	FT	2	16	16	none	H	H	L
Caiwei Shen	Ph.D. ME 2018	AST	TT	FT	0	1	1	none	H	H	L
Chalivendra Vijaya	Ph.D. ME 2003	P	T	FT	3	15	15	none	H	H	L
El Wakil Sherif (Chancellor Professor)	Ph.D. ME 1972 (retired in 2018)	P	T	FT	4	42	31	none	SME APMINamri	H	L
Foster Donald	MA PW 2003 MS GE	I	NTT	PT	28	18	18	ASME	none	none	None

	1992 MBA 1985										
Fowler Alex	Ph.D. ME 1993	P	T	FT	0	25	25	none	none	M	none
Huang Wenzhen	Ph.D. ME (1987) & IE (2004)	P	T	FT	0	25	14	none	ASME-H INFORMS L	M	L
Jun Li	Ph.D. ME 2012	AST	TT	FT	4	3	3	none	ASME-H	M	L
Laoulache Raymond	Ph.D. ME 1987	P	T	FT	4	38	30	ASME	none	M	M
Raessi Mehdi	Ph.D. ME 2008	ASC	T	FT	0	8	8	none	ASME-H, APS-H	H	none
Sheikh Ferdous	Ph.D. ME 2015	FTVL	NTT	FT	0	3	2	none	ASME-M	M	L
Tandon Amit	Ph. D. ME 1992	P	T	FT	0	23	19	none	AGU-H, TOS-M, AMS-M	OFD	none

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other
2. Code: TT = Tenure Track T = Tenured NTT = Non Tenure Track
3. At the institution
4. The level of activity, high, medium or low, should reflect an average over the year prior to the visit plus the two previous years.

MECHANICAL ENGINEERING ADVISORY BOARD (MEAB)

As of 3/6/18

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774-553-6201

Joshua.m.borsari@lmco.com

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401-832-7878 / Fax

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bclark@precixinc.com

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781-810-5046 / Office
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Alumni

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781-981-3040

tony@ll.mit.edu

Mr. Mark Stolyar

Mechanical Engineering Manager

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mstolyar@kvh.com

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Director R&D

Philips Lightolier

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508-646-3140

508-646-3163 / Fax

bob.wedekind@philips.com

Mr. James Zisson

GE-3000 Program

General Electric

1000 Western Avenue, Lynn MA 01910

781-594-8812

Jim.Zisson@ge.com

Alumni

Please E-mail updates to: Sue Cunha, Administrative Assistant, scunha@umassd.edu

Appendix C Curriculum

First Semester

UNIVERSITY OF MASSACHUSETTS DARTMOUTH
5-YEAR COMBINED BSMS – THESIS OPTION

FIRST YEAR

	R	L	C		R	L	C
CHM 153 Princ. of Modern Chemistry I	3	0	3	CHM 152 Princ. of Modern Chemistry II	3	0	3
EGR 105 Intro to Engr thru App Sci I	1.5	1.5	2	CHM 162 Intro. to Appl. Chemistry II	0	3	1
EGR 131 Introduction to Design	0.5	1.5	1	EGR 108 Intro to Engr thru App Sci II	4	0	2
ENL 101 Critical Writing & Reading I	3	0	3	ENL 102 Critical Writing & Reading II	3	0	3
MTH 113 Calculus for Appl Sci. & Engr I	4	0	4	MTH 114 Calculus for Appl Sci & Engr II	4	0	4
PHY 111 Physics for Sci & Engr I	4	0	4	PHY 112 Physics for Sci & Engr II	4	0	4
			17				17

SECOND YEAR

EGR 241 Engineering Mechanics I	3	0	3	EGR 242 Engineering Mechanics II	3	0	3
MNE 102 Programming & Comp Usage	3	0	3	MNE 201 Mechanical Engineering Lab I	1	3	2
MNE 231 Materials Science	3	3	4	MNE 220 Engr. Thermodynamics I	3	0	3
MTH 213 Calculus for Appl Sci. & Engr III	4	0	4	MNE 252 Mechanics of Materials	3	0	3
General Education Elective	3	0	3	MNE 292 Intro. to Mech. Engr. Design	1	2	1
			17	MNE 212 Math Approaches to Engr. Systems	3	0	3
							15

THIRD YEAR

EGR 301 Applied Engineering Math	3	0	3	ECE 211 Elements of Elec. Engr. I	3	0	3
MNE 305 Mech. Engineering Lab II	0	3	0.5	ECE 251 Electrical Engr. Lab I	0	3	1
MNE 321 Engr. Thermodynamics II	3	0	3	ENL 266 Technical Communications	3	0	3
MNE 345 Design for Manufacturing	3	0	3	MNE 306 Mech. Engineering Lab III	0	3	0.5
MNE 355 Mfg. Processes Lab	0	3	1	MNE 332 Fluid Mechanics	3	0	3
MNE 381 Design of Machine Elements	3	0	3	General Education Elective	3	0	3
General Education Elective	3	0	3	General Education Elective	3	0	3
			16.5				16.5

FOURTH YEAR

ECE 212 Elements of Elec. Engr. II	3	0	3	MNE 466 Control Theory	3	0	3
MNE 411 Heat Transfer	3	0	3	MNE 498 Design Project II	0	6	2
MNE 491 Advanced Machine Design	3	2	4	MNE 502 Applied Numerical Methods	3	0	3
MNE 497 Design Project I	2	0	2	Grad Elective	3	0	3
MNE 501 Advanced Engineering Math	3	0	3	General Education Elective	3	0	3
			15				14

FIFTH YEAR

MNE 570* Reading and Research	3	0	3	Grad Elective	3	0	3
MNE 503 Continuum Mechanics	3	0	3	Grad Elective	3	0	3
Grad Elective	3	0	3	MNE 580 Masters Thesis	3	0	3
MNE 580 Masters Thesis	3	0	3				
			12				9

TOTAL CREDITS = 149

* Taken over the Summer of the fourth year

UNIVERSITY OF MASSACHUSETTS DARTMOUTH
5-YEAR COMBINED BSMS – COURSEWORK OPTION

<i>FIRST YEAR</i>							
<u>First Semester</u>				<u>Second Semester</u>			
	R	L	C		R	L	C
CHM 153 Princ. of Modern Chemistry I	3	0	3	CHM 152 Princ. of Modern Chemistry II	3	0	3
EGR 105 Intro to Engr thru App Sci I	1.5	1.5	2	CHM 162 Intro. to Appl. Chemistry II	0	3	1
EGR 131 Introduction to Design	0.5	1.5	1	EGR 108 Intro to Engr thru App Sci II	4	0	2
ENL 101 Critical Writing & Reading I	3	0	3	ENL 102 Critical Writing & Reading II	3	0	3
MTH 113 Calculus for Appl Sci. & Engr I	4	0	4	MTH 114 Calculus for Appl Sci & Engr II	4	0	4
PHY 111 Physics for Sci & Engr I	<u>4</u>	<u>0</u>	<u>4</u>	PHY 112 Physics for Sci & Engr II	<u>4</u>	<u>0</u>	<u>4</u>
			17				17
<i>SECOND YEAR</i>							
EGR 241 Engineering Mechanics I	3	0	3	EGR 242 Engineering Mechanics II	3	0	3
MNE 102 Programming & Comp Usage	3	0	3	MNE 201 Mechanical Engineering Lab I	1	3	2
MNE 231 Materials Science	3	3	4	MNE 220 Engr. Thermodynamics I	3	0	3
MTH 213 Calculus for Appl Sci. & Engr III	4	0	4	MNE 252 Mechanics of Materials	3	0	3
General Education Elective	3	0	3	MNE 292 Intro. to Mech. Engr. Design	1	2	1
				MNE 212 Math Approaches to Engr. Systems	<u>3</u>	<u>0</u>	<u>3</u>
			17				15
<i>THIRD YEAR</i>							
EGR 301 Applied Engineering Math	3	0	3	ECE 211 Elements of Elec. Engr. I	3	0	3
MNE 305 Mech. Engineering Lab II	0	3	0.5	ECE 251 Electrical Engr. Lab I	0	3	1
MNE 321 Engr. Thermodynamics II	3	0	3	ENL 266 Technical Communications	3	0	3
MNE 345 Design for Manufacturing	3	0	3	MNE 306 Mech. Engineering Lab III	0	3	0.5
MNE 355 Mfg. Processes Lab	0	3	1	MNE 332 Fluid Mechanics	3	0	3
MNE 381 Design of Machine Elements	3	0	3	General Education Elective	3	0	3
General Education Elective	<u>3</u>	<u>0</u>	<u>3</u>	General Education Elective	<u>3</u>	<u>0</u>	<u>3</u>
			16.5				16.5
<i>FOURTH YEAR</i>							
ECE 212 Elements of Elec. Engr. II	3	0	3	MNE 466 Control Theory	3	0	3
MNE 411 Heat Transfer	3	0	3	MNE 498 Design Project II	0	6	2
MNE 491 Advanced Machine Design	3	2	4	MNE 502 Applied Numerical Methods	3	0	3
MNE 497 Design Project I	2	0	2	Grad Elective	3	0	3
MNE 501 Advanced Engineering Math	<u>3</u>	<u>0</u>	<u>3</u>	General Education Elective	<u>3</u>	<u>0</u>	<u>3</u>
			15				14
<i>FIFTH YEAR</i>							
MNE 503 Continuum Mechanics	3	0	3				
Grad Elective	3	0	3	Grad Elective	3	0	3
Grad Elective	3	0	3	Grad Elective	3	0	3
Grad Elective	<u>3</u>	<u>0</u>	<u>3</u>	Grad Elective	<u>3</u>	<u>0</u>	<u>3</u>
			12				9
TOTAL CREDITS = 149							

UNIVERSITY OF MASSACHUSETTS DARTMOUTH
MASTERS-MECHANICAL ENGINEERING DEGREE REQUIREMENTS
CURRICULUM PROGRESS REPORT

Name: _____ ID: _____

CORE COURSES

MNE501 Advanced Engineering Mathematics	3 _____	MNE 503 Continuum Mechanics	3 _____
MNE502 Applied Numerical Methods	3 _____	MNE 500 Seminar	1 _____

Elective Courses (15 credits) – May be selected from any advisor-approved graduate level course. No more than 6 of these credits may be in graduate course offered outside the Mechanical Engineering Department.

MNE 504 Advanced Mechanics of Fluid	3 _____	MNE 538 Production Planning & Control	3 _____
MNE 510 Manufacturing Systems Design	3 _____	MNE 539 Engineering Optimization	3 _____
MNE 511 Theory of Elasticity	3 _____	MNE 541 Conduction Heat Transfer	3 _____
MNE 515 Finite Element Analysis	3 _____	MNE 542 Convection Heat Transfer	3 _____
MNE 517 Mechanics of Composite Materials	3 _____	MNE 543 Radiation Heat Transfer	3 _____
MNE 521 Classical Thermodynamics	3 _____	MNE 544 Combustion Fundamentals	3 _____
MNE 523 Energy Analysis	3 _____	MNE 551 Compressible Fluid Flow	3 _____
MNE 524 Energy Conservation Systems	3 _____	MNE 552 Computational Fluid Mechanics	3 _____
MNE 525 Bioengineering Fundamentals	3 _____	MNE 560 Design of Statistical Experiments	3 _____
MNE 530 Simulation Modeling	3 _____	MNE 562 Production System Planning & Control	3 _____
MNE 532 Advanced Robotics	3 _____	MNE 563 Facilities Planning	3 _____
MNE 533 Manufacturing Automation	3 _____	MNE 564 Continuous Process improvement	3 _____
MNE 534 Advanced Vibration	3 _____	MNE 565 Economic Analysis of Engr Projects	3 _____
MNE 535 Advanced Statistical Quality Control	3 _____	MNE 570 Reading and Research	3 _____
MNE 536 Advanced Control Theory	3 _____	_____	3 _____
_____	3 _____	_____	3 _____

ADDITIONAL REQUIREMENTS - THESIS, PROJECT, OR COURSE WORK TRACKS (6 OR 9 credits)

THESIS OPTION

MNE 580 Master Thesis 6 _____

COURSEWORK OPTION

Additional Elective Courses (9) 3 _____

PROJECT OPTION

MNE 590 Master Project 6 _____ 3 _____

No more than (6) credits may be transferred from another school. Total credits requirement – **31** (including all courses and thesis/project credits).

Circle one

Has student returned borrowed university property?

Yes	No
Yes	No

Has the student completed the Graduate Student Exit Survey?

Director of Graduate Studies:

Signature *date*

MNE Department Chairperson:

Signature *date*

UNIVERSITY OF MASSACHUSETTS DARTMOUTH
MASTERS-INDUSTRIAL&SYSTEM ENGINEERING DEGREE REQUIREMENTS
CURRICULUM PROGRESS REPORT

Name: _____ **ID:** _____

The total credits requirements is 30 credits. MNE courses (15 credits) – five MNE courses from below may be selected. CCB courses (9) - three courses may be selected from Charlton College of Business (also see below).

MNE 510 Manufacturing Systems Design	3 _____	POM 651 Advanced Operations Analysis	3 _____
MNE 530 Simulation Modeling	3 _____	POM 675 International Supply Chain Mgt	3 _____
MNE 533 Manufacturing Automation	3 _____	POM 677 Logistics Strategy and Mgt	3 _____
MNE 535 Advanced Statistical Quality Control	3 _____	POM 679 Mgt of Health Care Operations	3 _____
MNE 538 Production Planning & Control	3 _____	POM 681 Business Analytics and Data Mining	3 _____
MNE 539 Engineering Optimization	3 _____	MIS 672 Digital Economy & Commerce	3 _____
MNE 560 Design of Statistical Experiments	3 _____	MGT 677 Leading, Motivation & Empowering	3 _____
MNE 562 Prod. System Planning & Control	3 _____		
MNE 563 Facilities Planning	3 _____		
MNE 564 Continuous Process improvement	3 _____		
MNE 565 Economic Analysis of Engr Projects	3 _____		

ADDITIONAL REQUIREMENT – PROJECT (6 credits)

PROJECT - MNE 590 Master Project 6 _____

Total credits requirement – **30** (including all courses and thesis/project credits).

Circle one

Has the student returned borrowed university property?

Yes	No

Has the student completed the Graduate Student Exit Survey?

Yes	No

Director of Graduate Studies:

Signature

date

MNE Department Chairperson:

Signature

date

MNE MS Courses

Course Number	Course Name	Credits	Instructor(s)
MNE 501	Advanced Engineering Mathematics	3	Ray Laoulache
MNE502	Applied Numerical Methods	3	Ray Laoulache
MNE 503	Continuum Mechanics	3	Vijaya Chalivendra/Jun Li
MNE 500	Seminar	1	Jun Li
MNE 504	Advanced Mechanics of Fluid	3	Amit Tandan/Mehdi Raessi
MNE 510	Manufacturing Systems Design	3	Sherif El Wakil
MNE 511	Theory of Elasticity	3	Sherif El Wakil
MNE524	Fracture Mechanics	3	Vijaya Chalivendra
MNE 515	Finite Element Analysis	3	John Rice/Alireza Asadcpours
MNE 517	Mechanics of Composite Materials	3	Sherif El Wakil
MNE 545	Heat Transfer with Phase Change	3	Mehdi Raessi
MNE 525	Bioengineering Fundamentals	3	Alex Fowler
MNE 530	Simulation Modeling	3	Farhad Azadivar
MNE 532	Advanced Robotics	3	Alex Fowler
MNE 533	Manufacturing Automation	3	Sherif El Wakil
MNE 534	Advanced Vibration	3	John Rice
MNE 535	Advanced Statistical Quality Control	3	Wenzhen Huang
MNE 536	Advanced Control Theory	3	Tesfay Meressi
MNE 538	Production Planning & Control	3	Sherif El Wakil
MNE 539	Engineering Optimization	3	Farhad Azadivar
MNE 541	Conduction Heat Transfer	3	Peter Friedman
MNE 542	Convection Heat Transfer	3	Mehdi Raessi
MNE 543	Radiation Heat Transfer	3	Peter Friedman
MNE 544	Combustion Fundamentals	3	Peter Friedman
MNE 551	Compressible Fluid Flow	3	
MNE 552	Computational Fluid Mechanics	3	Mehdi Raessi
MNE 560	Design of Statistical Experiments	3	Wenzhen Huang
MNE 562	Production System Planning & Control	3	Farhad Azadivar
MNE 563	Facilities Planning	3	Wenzhen Huang
MNE 564	Continuous Process improvement	3	Wenzhen Huang
MNE 565	Economic Analysis of Engineering Projects	3	Farhad Azadivar/Sheikh Ferdous
MNE 570	Reading and Research	3	Advisor
MNE 580	MS Thesis	6	Advisor
MNE590	MS Project	6	Advisor
MNE591	FEM Simulation for Additive Manufacturing	3	Jun Li

MNE MS-ISE Courses

Course Number	Course Name	Credits	Instructor(s)
MNE 510	Manufacturing Systems Design	3	Sherif El Wakil
MNE 530	Simulation Modeling	3	Farhad Azadivar
MNE 533	Manufacturing Automation	3	Sherif El Wakil
MNE 535	Advanced Statistical Quality Control	3	Wenzhen Huang
MNE 538	Production Planning & Control	3	Sherif El Wakil
MNE 539	Engineering Optimization	3	Farhad Azadivar
MNE 560	Design of Statistical Experiments	3	Wenzhen Huang
MNE 562	Production System Planning & Control	3	Farhad Azadivar
MNE 563	Facilities Planning	3	Wenzhen Huang
MNE 564	Continuous Process improvement	3	Wenzhen Huang
MNE 565	Economic Analysis of Engineering Projects	3	Farhad Azadivar/Sheikh Ferdous
MNE 570	Reading and Research	3	Project Advisor
MNE590	MS Project	6	Project Advisor
POM 651	Advanced Operations Analysis	3	CCB Faculty
POM 677	Logistics Strategy and Management	3	CCB Faculty
POM 679	Management of Health Care Operations	3	CCB Faculty
POM 681	Business Analytics and Data Mining	3	CCB Faculty
MIS 672	Digital Economy & Commerce	3	CCB Faculty
MGT 677	Leading, Motivation & Empowering	3	CCB Faculty

Fall 2017 - Spring 2018 Schedule

Sub	Cat	Sect	Class #	Title	Topic	Instructor Name	Cap	Days	Start	End	Room	Class	Cr	Comment	Cross-list
MNE	231	01	2195	Material Science	-	El Wakil,Sherif D	96	TuTh	12:30 PM	01:45 PM		Lecture	4		
MNE	231	01L1	2197	Material Science	-	-	14	M	12:00 PM	01:50 PM		Laborator	4		
MNE	231	01L2	2198	Material Science	-	-	14	M	02:00 PM	03:50 PM		Laborator	4		
MNE	231	01L3	2199	Material Science	-	-	14	W	12:00 PM	01:50 PM		Laborator	4		
MNE	231	01L4	2200	Material Science	-	-	14	W	02:00 PM	03:50 PM		Laborator	4		
MNE	231	01L5	2201	Material Science	-	-	14	Tu	02:00 PM	03:50 PM		Laborator	4		
MNE	231	01L6	2202	Material Science	-	El Wakil,Sherif D	14	F	02:00 PM	03:50 PM		Laborator	4		
MNE	231	01R1	2196	Material Science	-	El Wakil,Sherif D	96	F	04:00 PM	04:50 PM		Recitatio	4		
MNE	332	01	2203	Fluid Mechanics	-	Laoulache,Raymond N	90	MWF	02:00 PM	02:50 PM		Lecture	4		
MNE	332	01L1	2205	Fluid Mechanics	-	Laoulache,Raymond N	30	M	11:00 AM	12:50 PM		Laborator	4		
MNE	332	01L2	2206	Fluid Mechanics	-	Laoulache,Raymond N	30	M	03:00 PM	04:50 PM		Laborator	4		
MNE	332	01L3	2207	Fluid Mechanics	-	Laoulache,Raymond N	30	Tu	03:00 PM	04:50 PM		Laborator	4		
MNE	332	01R1	2204	Fluid Mechanics	-	Laoulache,Raymond N	90	F	03:00 PM	03:50 PM		Recitatio	4		
MNE	345	01	2208	Design for Manufacturing	-	Huang,Wenzhen	88	TuTh	12:30 PM	01:45 PM		Lecture	4		
MNE	345	01L1	2210	Design for Manufacturing	-	Huang,Wenzhen	22	Tu	02:00 PM	03:50 PM		Laborator	4		
MNE	345	01L2	2211	Design for Manufacturing	-	Huang,Wenzhen	22	W	04:00 PM	05:50 PM		Laborator	4		
MNE	345	01L3	2212	Design for Manufacturing	-	Huang,Wenzhen	22	Th	02:00 PM	03:50 PM		Laborator	4		
MNE	345	01L4	2213	Design for Manufacturing	-	Huang,Wenzhen	22	Th	04:00 PM	05:50 PM		Laborator	4		
MNE	345	01R1	2209	Design for Manufacturing	-	Huang,Wenzhen	88	F	11:00 AM	11:50 AM		Recitatio	4		
MNE	400	01	3144	Engineering Internship	MRECO	Huang,Wenzhen	1					Practicum	3		
MNE	421	01	2214	Thermal Systems Design	-	Raessi,Mehdi	80	MW	10:00 AM	10:50 AM		Lecture	4		
MNE	421	01L1	2216	Thermal Systems Design	-	Raessi,Mehdi	16	Tu	10:00 AM	11:50 AM		Laborator	4		
MNE	421	01L2	2217	Thermal Systems Design	-	Raessi,Mehdi	16	Tu	12:00 PM	01:50 PM		Laborator	4		
MNE	421	01L3	2218	Thermal Systems Design	-	Raessi,Mehdi	16	W	01:00 PM	02:50 PM		Laborator	4		
MNE	421	01L4	2219	Thermal Systems Design	-	Raessi,Mehdi	16	W	03:00 PM	04:50 PM		Laborator	4		
MNE	421	01L5	2465	Thermal Systems Design	-	Raessi,Mehdi	16	Th	12:00 PM	01:50 PM		Laborator	4		
MNE	421	01R1	2215	Thermal Systems Design	-	Raessi,Mehdi	80	F	02:00 PM	03:50 PM		Recitatio	4		
MNE	436	1		Marine Hydrodynamics and Propulsi		Cowles, Geoff	30	TuTh	9.30 AM	10:45 AM					
MNE	457	01	3084	Vibration and Sound	-	Brown David	30	MW	03:30 PM	04:45 PM		Lecture	3		
MNE	452	01	2220	Mechanics of Material II	-	Chalivendra,Vijaya	30	MWF	12:00 PM	12:50 PM		Lecture	3		
MNE	482	01	2819	Robotics	-	Fowler,Alex J	24	TuTh	12:30 PM	01:45 PM		Lecture	3		
MNE	497	01	2221	ME Design Project I	-	Staff	100	TuTh	02:00 PM	03:15 PM		Lecture	2		
MNE	497	02H	2820	ME Design Project I	-	Staff	20	TuTh	02:00 PM	03:15 PM		Lecture	2		
MNE	500	01	2222	Mechanical Engineering Sem	-	Raessi,Mehdi	15					Seminar	1		

MNE	503	01	2223	Continuum Mechanics	-	Li Jun	20	MW	5:00 PM	6:15 PM		Lecture	3		
MNE	514	1		Fracture Mechanics		Chalivendra Vijaya	15	MWF	10:00 AM	10:50 AM		Lecture	3		
MNE	521	01	2224	Convection Heat transfer	-	Fowler,Alex J	15	TuTh	05:00 PM	06:15 PM		Lecture	3		
MNE	591/	01	2782	Special Topics: Engineering	-	Louhghalam Arghavan	20	TuTh	5: 00PM	6:15 PM		Lecture	3		
MNE	560	01	2225	Method Experiment Resch	-	Huang,Wenzhen	20	TuTh	06:30 PM	07:45 PM		Lecture	3		
MNE	570	01	3036	Reading and Research	-	Chalivendra,Vijaya	1					Independ	3		
MNE	570	02	3111	Reading and Research	-	Bhowmick,Sankha	1					Independ	3		
MNE	570	03	3156	Reading and Research	-	Huang,Wenzhen	1					Independ	3		

Sub	Cat	Sect	Class #	Title	Topic	Instructor Name	Cap	Days	Start	End	Room	Class	Cr	Comment
EGR	111	01	1901	Intro Engineering & Com	-	Payton,Karen L	88	MWF	11:00 AM	11:50 AM		Lecture	3	
EGR	111	02	2226	Intro Engineering & Com	-	Amirzadeh Goghari,Afsoon	88	MWF	02:00 PM	02:50 PM		Lecture	3	
EGR	111	03	2229	Intro Engineering & Com	-	Sengupta,Sukalyan	88	MWF	03:00 PM	03:50 PM		Lecture	3	
EGR	111	04	2232	Intro Engineering & Com	-	Rogers,Clinton	88	MWF	03:00 PM	03:50 PM		Lecture	3	
EGR	111	01L1	2236	Intro Engineering & Com	-	Payton,Karen L	44	Tu	08:00 AM	09:50 AM		Laborator	3	
EGR	111	01L2	2237	Intro Engineering & Com	-	Payton,Karen L	44	Tu	10:00 AM	11:50 AM		Laborator	3	
EGR	111	02L1	2227	Intro Engineering & Com	-	Amirzadeh Goghari,Afsoon	44	Th	08:00 AM	09:50 AM		Laborator	3	
EGR	111	02L2	2228	Intro Engineering & Com	-	Amirzadeh Goghari,Afsoon	44	Th	10:00 AM	11:50 AM		Laborator	3	
EGR	111	03L1	2230	Intro Engineering & Com	-	Sengupta,Sukalyan	44	Tu	12:00 PM	01:50 PM		Laborator	3	
EGR	111	03L2	2231	Intro Engineering & Com	-	Sengupta,Sukalyan	44	Tu	02:00 PM	03:50 PM		Laborator	3	
EGR	111	04L1	2233	Intro Engineering & Com	-	Rogers,Clinton	44	Th	12:00 PM	01:50 PM		Laborator	3	
EGR	111	04L2	2234	Intro Engineering & Com	-	Rogers,Clinton	44	Th	02:00 PM	03:50 PM		Laborator	3	
EGR	111	05H	2235	Intro Engineering & Com	Honors	Ferreira,Tracie L	44	MWF	02:00 PM	02:50 PM		Lecture	3	
EGR	111	05HL	2238	Intro Engineering & Com	Honors	Ferreira,Tracie L	44	F	03:00 PM	04:50 PM		Laborator	3	
EGR	241	01	2657	Eng Mechanics I:Statics	-	Beaudry,Jeffrey W	60	MWF	09:00 AM	09:50 AM		Lecture	3	
EGR	241	02	2239	Eng Mechanics I:Statics	-	Amirzadeh Goghari,Afsoon	60	MWF	11:00 AM	11:50 AM		Lecture	3	
EGR	301	01	2240	Applied Engineering Mat	-	Bhowmick Sankha	100	MWF	01:00 PM	01:50 PM		Lecture	4	
EGR	301	01L1	2241	Applied Engineering Mat	-	Bhowmick Sankha	25	W	11:00 AM	12:50 PM		Laborator	4	
EGR	301	01L2	2242	Applied Engineering Mat	-	Bhowmick Sankha	25	Th	02:00 PM	03:50 PM		Laborator	4	
EGR	301	01L3	2243	Applied Engineering Mat	-	Bhowmick Sankha	25	F	04:00 PM	05:50 PM		Laborator	4	
EGR	301	01L4	2466	Applied Engineering Mat	-	Bhowmick Sankha	23	M	03:00 PM	04:50 PM		Laborator	4	
EGR	303	01	2658	Engineering Economics	-	Beaudry,Jeffrey W	70	TuTh	08:00 AM	09:15 AM		Lecture	3	
EGR	303	02	2244	Engineering Economics	-	Staff	70	TuTh	11:00 AM	12:15 PM		Lecture	3	
EGR	497	01	1862	Bioengineer Capstone De	-	Fan,Qinguo	24	TuTh	02:00 PM	03:15 PM		Lecture	2	
EGR	497	02H	1863	Bioengineer Capstone De	Honors	Fan,Qinguo	24	TuTh	02:00 PM	03:15 PM		Lecture	2	
EGR	911	01	2990	Co-Op Work Session I	Tegra N	Balasubramanian,Ramprasad	1					Lecture	0	
EGR	911	02	3026	Co-Op Work Session I	Ashland	Balasubramanian,Ramprasad	1					Lecture	0	

Spring 2018 Schedule and Teaching Assignments

Sub	Cat	Sect	Class #	Title	Instructor	SP18 Cap	SP17 E	Class Comp	Meet	Start	End	Room	Cr	Department
MNE	101	01	5803	Intro Mechanical Engineering	Amirzadeh Goghari, Afsoon Ferdous	0	0	Lecture	Tu	12:00 PM	01:50 PM	SENG-201	3	Mechanical Engineering
MNE	101	01	5803	Intro Mechanical Engineering	Amirzadeh Goghari, Afsoon Ferdous	50	29	Lecture	MW	10:00 AM	10:50 AM		3	Mechanical Engineering
MNE	101	02	5804	Intro Mechanical Engineering	Amirzadeh Goghari, Afsoon Ferdous	0	0	Lecture	Th	12:00 PM	01:50 PM	SENG-201	3	Mechanical Engineering
MNE	101	02	5804	Intro Mechanical Engineering	Amirzadeh Goghari, Afsoon Ferdous	50	49	Lecture	MW	11:00 AM	11:50 AM		3	Mechanical Engineering
MNE	220	01	5807	Engineering Thermodynam I	Fowler, Alex J	134	136	Lecture	MWF	10:00 AM	10:50 AM		3	Mechanical Engineering
MNE	252	01	5808	Mechanics of Materials	Chalivendra, Vijaya	80	91	Lecture	TuTh	11:00 AM	12:15 PM		4	Mechanical Engineering
MNE	252	01L1	5810	Mechanics of Materials	Kardam, Aakash	20	21	Laboratory	M	01:00 PM	02:50 PM	SENG-107	4	Mechanical Engineering
MNE	252	01L2	5811	Mechanics of Materials	Kardam, Aakash	20	23	Laboratory	M	03:00 PM	04:50 PM	SENG-107	4	Mechanical Engineering
MNE	252	01L3	5812	Mechanics of Materials	Rabbi, Md Fazlay	20	25	Laboratory	Tu	01:00 PM	02:50 PM	SENG-107	4	Mechanical Engineering
MNE	252	01L4	5813	Mechanics of Materials	Rabbi, Md Fazlay	20	22	Laboratory	Tu	03:00 PM	04:50 PM	SENG-107	4	Mechanical Engineering
MNE	252	01R1	5809	Mechanics of Materials	Chalivendra, Vijaya	80	91	Recitation	F	01:00 PM	01:50 PM		4	Mechanical Engineering
MNE	280	01H	13327	Honors Enrichment	Fowler, Alex J	20	6	OtherOther	W	02:00 PM	02:50 PM		1	Mechanical Engineering
MNE	296	01	13642	Directed Study	Chalivendra, Vijaya	4	7	Independen				-	1	Mechanical Engineering
MNE	311	01	5814	Heat Transfer	Bhowmick, Sankha	70	65	Lecture	MWF	12:00 PM	12:50 PM		3	Mechanical Engineering
MNE	381	01	5815	Design of Machine Elements	Li, Jun	70	53	Lecture	TuTh	11:00 AM	12:15 PM		3	Mechanical Engineering
MNE	391	01	5816	Systems Design & Control	Amirzadeh Goghari, Afsoon	80	59	Lecture	MW	01:00 PM	01:50 PM		4	Mechanical Engineering
MNE	391	01L1	5817	Systems Design & Control	Amirzadeh Goghari, Afsoon	20	19	Laboratory	Tu	01:00 PM	02:50 PM	SENG-107	4	Mechanical Engineering
MNE	391	01L2	5818	Systems Design & Control	Amirzadeh Goghari, Afsoon	20	15	Laboratory	Tu	03:00 PM	04:50 PM	SENG-107	4	Mechanical Engineering
MNE	391	01L3	5819	Systems Design & Control	Amirzadeh Goghari, Afsoon	20	15	Laboratory	Th	01:00 PM	02:50 PM	SENG-107	4	Mechanical Engineering
MNE	391	01L4	5820	Systems Design & Control	Amirzadeh Goghari, Afsoon	20	10	Laboratory	W	03:00 PM	04:50 PM	SENG-107	4	Mechanical Engineering
MNE	391	01R1	5821	Systems Design & Control	Amirzadeh Goghari, Afsoon	80	59	Recitation	F	10:00 AM	11:50 AM		4	Mechanical Engineering
MNE	400	1	14023	Engineering Internship	Huang, Wenzhen	1	1	Practicum				-	1	Mechanical Engineering
MNE	400	02	14847	Engineering Internship	Li, Jun	1	1	Practicum				-	3	Mechanical Engineering
MNE	476	01	5823	Manufact Quality Control	Huang, Wenzhen	30	23	Lecture	MWF	12:00 PM	12:50 PM		3	Mechanical Engineering
MNE	481	01	5824	Comptr Aided Manufactrng	El Wakil, Sherif D	30	30	Lecture	MWF	02:00 PM	02:50 PM		3	Mechanical Engineering
MNE	485	01	13451	Finite Element Method	Asadpoure, Alireza	25	10	Lecture	TuTh	05:00 PM	06:15 PM		3	Mechanical Engineering
MNE	435	01	5825	Ocean Wave Energy Convers	Raessi, Mehdi	30	25	Lecture	MW	03:00 PM	04:15 PM		3	Mechanical Engineering
MNE	422			Energy Conversion	Fowler, Alex J	30		Lecture	MWF	2:00 PM	2:50 PM		3	
MNE	490	02	5826	Special Topics	Cowles, Geoffrey W	45	36	Lecture	TuTh	09:30 AM	10:45 AM		3	Mechanical Engineering
MNE	490	03	5827	Special Topics	Laoulache, Raymond N	30	7	Lecture	TuTh	12:30 PM	01:45 PM		3	Mechanical Engineering
MNE	490	04	12756	Special Topics	Tandon, Amit	16	8	Lecture	TuTh	06:30 PM	07:45 PM	SENG-207	3	Mechanical Engineering
MNE	490	05	12757	Special Topics	El Wakil, Sherif D	15	22	Lecture	MW	05:00 PM	06:15 PM		3	Mechanical Engineering
MNE	490	06	13735	Special Topics	Brown, David A	15	3	Lecture	MW	05:00 PM	06:15 PM		3	Mechanical Engineering
MNE	498	01	5822	Mech Eng Des Proj II	Foster, Donald A Ferdous	100	73	Lecture	TuTh	02:00 PM	03:15 PM		2	Mechanical Engineering
MNE	498	01	5822	Mech Eng Des Proj II	Foster, Donald A Ferdous	100	73	Lecture	TuTh	02:00 PM	03:15 PM		2	Mechanical Engineering
MNE	498	02H	13613	Mech Eng Des Proj II	Foster, Donald A Ferdous	5	1	Lecture	TuTh	02:00 PM	03:15 PM		2	Mechanical Engineering
MNE	498	02H	13613	Mech Eng Des Proj II	Foster, Donald A Ferdous	5	1	Lecture	TuTh	02:00 PM	03:15 PM		2	Mechanical Engineering
MNE	500	01	5828	Mechanical Engineering Semi	Raessi, Mehdi	20	5	Seminar				-	1	Mechanical Engineering
MNE	502	01	5829	Applied Numerical Method	Laoulache, Raymond N	20	9	Lecture	TuTh	05:00 PM	06:15 PM		3	Mechanical Engineering
MNE	510	01	13914	Manufact Systems Design	El Wakil, Sherif D	15	4	Lecture	MW	06:30 PM	07:45 PM	SENG-305	3	Mechanical Engineering
MNE	517	01	13723	Mech Composite Materials	El Wakil, Sherif D	15	9	Lecture	MW	05:00 PM	06:15 PM		3	Mechanical Engineering
MNE	525	01	10168	Bioengineering Fundamentals	Fowler, Alex J	20	1	Lecture	MW	05:00 PM	06:15 PM		3	Mechanical Engineering
MNE	535	01	13696	Adv Statistical Qual Control	Huang, Wenzhen	10	7	Lecture	MWF	12:00 PM	12:50 PM		3	Mechanical Engineering
MNE	552	01	13511	Computational Fluid Mech	Raessi, Mehdi	30	5	Lecture	MW	05:00 PM	06:15 PM		3	Mechanical Engineering
MNE	563	1		Facilities Planning	Huang, Wenzhen	15		Lecture	MW	6:30 PM	7:45 PM			
MNE	570	01	13862	Reading and Research	Raessi, Mehdi	3	2	Independen				-	3	Mechanical Engineering
MNE	570	02	14218	Reading and Research	Meressi, Tesfay	1	1	Independen				-	3	Mechanical Engineering
MNE	570	03	14639	Reading and Research	Tandon, Amit	1	1	Independen				-	3	Mechanical Engineering
MNE	570	04	14878	Reading and Research	Laoulache, Raymond N	1	1	Independen				-	3	Mechanical Engineering
MNE	580	01	7383	Masters Thesis	Tandon, Amit	15	0	Thesis Resea				-	0	Mechanical Engineering
MNE	580	02	7405	Masters Thesis	Tandon, Amit	15	0	Thesis Resea				-	3	Mechanical Engineering
MNE	580	03	7525	Masters Thesis	Tandon, Amit	15	0	Thesis Resea				-	6	Mechanical Engineering
MNE	580	04	13645	Masters Thesis	Laoulache, Raymond N	2	2	Thesis Resea				-	3	Mechanical Engineering
MNE	580	05	13688	Masters Thesis	Chalivendra, Vijaya	1	1	Thesis Resea				-	6	Mechanical Engineering
MNE	580	06	13743	Masters Thesis	Bhowmick, Sankha	1	1	Thesis Resea				-	6	Mechanical Engineering
MNE	580	07	13821	Masters Thesis	Meressi, Tesfay	1	1	Thesis Resea				-	6	Mechanical Engineering
MNE	580	08	13837	Masters Thesis	Raessi, Mehdi	1	1	Thesis Resea				-	3	Mechanical Engineering
MNE	580	09	13838	Masters Thesis	Raessi, Mehdi	2	2	Thesis Resea				-	6	Mechanical Engineering
MNE	580	10	13947	Masters Thesis	Sundermeyer, Miles A	1	1	Thesis Resea				-	3	Mechanical Engineering
MNE	580	11	14175	Masters Thesis	Huang, Wenzhen	1	1	Thesis Resea				-	0	Mechanical Engineering
MNE	580	12	14737	Masters Thesis	Cowles, Geoffrey W	1	1	Thesis Resea				-	3	Mechanical Engineering
MNE	580	13	14992	Masters Thesis	Laoulache, Raymond N	1	1	Thesis Resea				-	0	Mechanical Engineering
MNE	590	01	14015	Masters Project	Huang, Wenzhen	1	1	Thesis Resea				-	3	Mechanical Engineering
MNE	590	02	14176	Masters Project	Huang, Wenzhen	1	1	Thesis Resea				-	6	Mechanical Engineering
MNE	590	03	14640	Masters Project	Tandon, Amit	1	0	Thesis Resea				-	3	Mechanical Engineering
MNE	590	04	14702	Masters Project	Yousefsibdari, Soheil	4	4	Thesis Resea				-	6	Mechanical Engineering
MNE	591	01	13161	Special Topics	Tandon, Amit	10	3	Lecture	TuTh	06:30 PM	07:45 PM	SENG-207	3	Mechanical Engineering
MNE	591	02	12758	Special Topics	Huang, Wenzhen	15	2	Lecture	Th	01:00 PM	03:30 PM	-	3	Mechanical Engineering
MNE	591	03	13734	Special Topics	Brown, David A	15	0	Lecture	MW	05:00 PM	06:15 PM		3	Mechanical Engineering

Sub	Cat	Sect	Class #	Title	Class Topic	Instructor Name	Enr Cap	Meet	Start Time	End Time	Room	Cr	Crosslist	Class Status	College	Department
EGR	242	01	4627	Eng Mechanics II:Dynamics	-	Amirzadeh Goghari,Afsoon	60	TuTh	09:30 AM	10:45 AM	-	3		Tentative	College of	College of Engineering
EGR	242	02	6006	Eng Mechanics II:Dynamics	-	Amirzadeh Goghari,Afsoon	60	MWF	11:00 AM	11:50 AM	-	3		Tentative	College of	College of Engineering

Appendix D Research Expenditures

AQAD Research Expenditures

	CEN*	CIS	ECE	BNG	MNE	PHY
FY 2014	534942	75968	938343	1328395	427294.6	179302
FY 2015	598313	140514	1093902	353783	596674.9	90714
FY 2016	805827	115000	1333000	270000	318509.6	113000
FY 2017	1344317	119622	1088985	241214	649325.4	56742
FY 2018	867848	339743	1051382	299384	1077116	41563
*includes HSRC						

** MNE-Mechanical Engineering Department

Appendix E MNE Graduate Student Handbook



Mechanical Engineering
Department

285 Old Westport Road
North Dartmouth, MA 02747-2300
508.999.8492 telephone
508.999.8881 fax

Graduate Student Handbook for the Master of Science in Mechanical Engineering

3/30/12

Introduction

This handbook is published as a guide for graduate students who are seeking a Master of Science Degree in Mechanical Engineering (MSME) or a Professional Masters Option in Industrial and Systems Engineering. The purpose of the handbook is to inform graduate students about the ME department's regulations, requirements, and procedures for the MSME degree. The handbook is intended as a supplement to the University Graduate School catalog; however, you should review the University Graduate Catalog for general rules and regulations governing the University's graduate programs. A copy of the catalog can be obtained on the University web site at <http://catalog.umassd.edu/index.php?catoid=2>

Advising and Registration

All new students will meet with the Graduate Program Director (GDP) before starting the first semester to get an orientation on the program and department, and register for classes. The director is the student's academic adviser until the student chooses a thesis or project adviser. At that time, the thesis or project adviser will become the student's academic adviser. If the student selects the course option, the director will remain as the student's adviser until graduation.

All students are required to meet their adviser a minimum of once per semester. Typically a student meets the adviser mid-semester after receiving a request from the University to register. The adviser monitors the student's progress towards completion of the course requirements and advises the student on course registration for the next semester. A tracking sheet is retained in the student's folder and is used to certify the student for graduation.

Students are encouraged to seek additional meetings with their adviser as needed.

Course Load Guidelines

Course load requirements are clearly spelled out in the University graduate catalog, "A course load of nine credits per semester is considered full-time in a graduate program. Students awarded full-time graduate assistantships may take no fewer than 6 and no more than 9 credits (including research and thesis or dissertation) per semester, unless approval is obtained in writing from the Graduate Director for the student's program. Twenty (20) hours per week of assistantship work and three (3) courses is considered a normal load. A course load of at least 7 credits is required for 3/4 time status and of at least 4 1/2 credits for half-time status."

A student who has completed their course requirements but has not completed the thesis or project may be given an in progress grade "IP," and may continue the thesis/project.

It is recommended that students who work full-time take only one course per semester.

Degree Requirements and Academic Progress

Each full-time candidate for the MSME Degree must obtain a minimum of 31 graduate credits (Thesis or Project tracks) or 34 graduate credits (Course Work track), maintaining a grade point average of at least 3.0 out of a 4.0 grading scale in course work with no more than two course grades below B-minus before the degree is awarded. Only courses with a C or better grade will be accepted toward fulfilling the degree requirements. Students receiving three or more grades below a B-minus are normally dismissed from the program.

Required Core Courses (10 credits)

MNE 500	Graduate Seminar	1
MNE 501	Advanced Engineering Mathematics	3
MNE 502	Applied Numerical Methods	3
MNE 503	Continuum Mechanics	3

15 credits – may be selected from any advisor-approved graduate level courses. No more than six of these credits may be in graduate courses offered outside the Mechanical Engineering Department. Any course taken outside the department must be approved by the thesis advisor or graduate program director. See course offerings at <http://catalog.umassd.edu/content.php?catoid=2&navoid=274>

Seminar Requirement

All new Mechanical Engineering MS students are required to attend the seminar class for two semesters (1 academic year). No student can miss more than one seminar/semester. If the student misses a semester of seminar, they have to make it up before they graduate. Part-time, working students who are unable to attend the seminar series are required to make two separate presentations at the seminar series- one explaining their work and one on their research topic.

Additional Requirements — Thesis, Project, or Course Work tracks (6 or 9 credits)

Thesis Option	MNE 580 Masters Thesis	6
Project Option	MNE 590 Masters Project	6
Coursework Option	3 additional courses	9

Because students completing the thesis option are required to complete original research that “advances the state of the literature,” students in the thesis option are expected to prepare a journal paper manuscript to the satisfaction of their thesis advisor prior to graduation. It is not required that the manuscript be accepted for publication prior to graduation; but the student should continue to work with the advisor to complete the peer-review process.

A student must remain continuously enrolled in the program (excluding summers) or receive approval for a leave of absence in order to maintain their status as a degree candidate. Failure to do this may result in dismissal from the program.

Project or Thesis Option: The thesis or project committee shall consist of at least three members, at least two must be ME faculty and one may be a senior scientist or engineer from outside the university or a faculty in another department. The principal advisor must be an ME faculty.

The members of student's thesis or project committee will be selected by the faculty advisor in consultation with the student. All thesis or project committees must be approved by the Graduate Program Committee.

There are three (3) phases of thesis/project preparation:

1. Submit the thesis/project proposal. In this phase the committee is formed.
2. Research and writing resulting in a thesis/project document.
3. Oral Thesis/Project Defense. **Note**, the Dean of the College of Engineering must be notified of the defense two weeks in advance by the principal advisor.

Course Option: Masters degree candidates who take the course option will take a comprehensive oral exam in their final semester. Failure to pass the exam will prohibit the student from receiving a degree. A student who has failed the exam may petition the Graduate Committee for permission to take the exam again.

The exam will cover three (3) areas of study, and the student must choose the specific areas from the following list:

Robotics and Control Systems
Thermal and Fluid Sciences
Engineering Mathematics
Manufacturing
Material Science
Solid Mechanics and Dynamics

It is assumed that the candidate has taken courses in the department in the chosen areas. Based on the topics chosen by the student, the Graduate Committee will select no less than 3 professors to serve on the Graduate Oral Exam Committee for the student and recommend this committee to the chairperson for approval. The specific format of the exam will be determined by the examination committee, but will take no more than 3 hours. It is recommended that the student

take the exam early in the final semester so that the student will have time to retake the exam if necessary during the same semester.

Policy for Maintaining Satisfactory Academic Progress

A student who has been admitted to an MS degree program in Mechanical Engineering, must maintain a 3.00 or higher grade point average (GPA).

- A. A student will be placed on academic probation if the student's GPA falls below 3.00. A student will return to academic good standing by obtaining a minimum 3.00 GPA by the time the next nine hours are completed. Coursework such as research and thesis/dissertation registration that are for IP grade cannot be included in these nine hours.
- B. A student may be recommended for dismissal from a graduate program if:
 - The student fails to increase the GPA listed above to a minimum of 3.0 by the time he/she completes the next nine credit hours;
 - or the student receives a grade below C while on academic probation;

Transfer Credits

If a student wants to take a course at another university for transfer credit, the student must fill a Mechanical Engineering Graduate Transfer Credit Evaluation Form prior to taking a course.

A maximum of six (6) credits may be transferred from another institution upon approval by the chairperson and Dean. The transferred course must have a B- or better grade.

Repeat Courses

The ME department allows a student to repeat a specific course once if it is offered at UMD. The repeat course grade will be used to calculate the student's GPA. Both grades will remain as part of the student's record.

Teaching and Research Assistantships

Students awarded an assistantship will work with a faculty mentor on a research project leading to a thesis. A student should complete a program of study by the end of the first or second semester indicating the thesis advisor.

Student Responsibilities

Students are expected to apply due diligence toward completion of their degree. This includes progress on research projects in addition to coursework. It is a matter of courtesy to discuss with the advisor when the student wishes to have time away from campus.

In general, students are limited to funding from University sources not to exceed a total of 20 hours per week during academic semesters or 40 hours per week during summer and intersession. However, in certain special cases, students can receive an exception so that more than 20 hours per week can be funded. Students must then have permission from their advisor and the GPD.

A student with a research assistantship is expected to spend 20 hours per week on project work and 20 hours per week on courses and thesis/project. The typical student will spend considerably more time than described above doing work relevant to their thesis or project to ensure that they will graduate in a timely manner. Students who are supported with a research assistantship should work approximately half time on their research when taking courses and full time when only thesis/project credits are taken and during the summers. Students should discuss time expectations with their advisor.

Other employment and time consuming activities can cause conflict of commitment issues for students. Full-time students and any students with full RA stipend support are discouraged from seeking other employment to ensure that they have enough time to adequately complete their degree. It is within the rights of individual departments or faculty advisors to forbid students to be otherwise employed, or to require notification of the advisor and/or person providing the funding source before the student considers outside employment. Graduate students are responsible for ensuring that their advisors and graduate committee members are kept up to date with their progress.

The student should also ensure that they are meeting all departmental, programmatic, and University requirements for the degree. This includes coursework, scheduling of the required examinations, and completion of the thesis or project by the required dates. Students are also expected to participate in required seminars.

The collected data and products of analysis of research projects is the property of the University of Massachusetts Dartmouth, and will be stored in accordance with university regulations. Students are obligated to provide their advisor with laboratory notebooks, computer files, and other materials as requested. This is a requirement of funding agencies, and UMD is held accountable for data from funded projects.

If the research has been implemented as planned and has potential for publication, the student will jointly write up the study with the advisor for submission for publication. It is in the best interest of students to complete drafts of manuscripts for publication prior to completion of their degree. If this is not possible, the student should discuss with the advisor the timeframe in which the first draft of the manuscript should be completed. If completed before the student leaves or within this timeframe, in most cases, the student will be assigned first authorship. After that date, the advisor retains the option to prepare the article for publication with authorship order at his or her discretion.

In either case, other collaborators will be included as co-authors depending on their contribution. To be listed as an author, a person must have made a direct, substantial academic contribution to at least **two** of the four main components of a typical scientific project or paper: (i) conception or design, (ii) data collection and processing, (iii) analysis and interpretation of data, (iv) writing sections of the paper. Anyone listed as an author should critically review successive drafts of the paper and approve the final version. Anyone listed as author should be able to defend the paper as a whole (although not necessarily all the technical details).

Faculty Responsibilities

Faculty who mentor graduate students have an obligation to provide students with the support they need to be successful. These responsibilities include:

- Providing guidance on the specific requirements for achieving the chosen degree, including advice on courses for the program of study, selection of appropriate research topics, evaluation of research progress, and expectations on the amount of time spent on research.
- Arranging with the student and maintaining a mutually agreeable schedule to discuss coursework and research progress. The advisor should then be available during these times to meet with the student.
- Ensuring that the objectives related to the student's program of study and research are attainable if the student exhibits due diligence. The typical M.S. thesis student should expect to graduate within six semesters (including summer semester). Individual time-to-degree goals may vary due to the nature of research, and the time spans noted here should serve as a guideline under which the major professor and the student can work together toward timely completion of the degree requirements.
- Participating in regular meetings to ensure that the student is obtaining appropriate guidance and making progress towards the degree.
- Informing the graduate student if extramural funding for the student's research project is in jeopardy.
- If at all possible, providing the student with professional development opportunities including attending conferences, participating in workshops, obtaining teaching experience, etc.

Leave of Absence

A leave of absence is granted only in exceptional circumstances, such as illness or family illness, or some other personal hardship. A leave request form should be filled, which requires a detailed justification and must be signed by the GPD, Dean and Graduate Office. Evidence of good academic progress is a requirement to obtain approval. International students must also obtain the approval from the International Students Office.

Students on leave are excused from the registration requirement during the period of the leave. Leaves are normally granted for six months; but, if necessary, leaves up to one year may be approved. If possible, requests for leaves of absence should be submitted one month prior to the semester for which the leave is requested. Leaves of absence are not granted for a semester already begun except under extenuating

circumstances. Instead, students should use the withdraw procedures. Leaves of absence are not granted to students who wish to absent themselves to undertake thesis or dissertation research elsewhere; such students should maintain continuous registration at UMD. Students going off campus to fulfill an internship related to degree requirements should also remain registered.

Once a leave of absence is granted, the right to use University facilities (i.e. libraries, athletic facilities, etc.) is halted as student status will not be active during the leave. This also applies to any UMD funding (e.g., fellowships, assistantships and loans). Therefore, a student is advised to deliberate before requesting a leave.

PROFESSIONAL MASTER’S OPTION IN INDUSTRIAL & SYSTEMS ENGINEERING

I. Program Definition

Objectives

College of Engineering at University of Massachusetts Dartmouth is offering a Professional Master’s Program in Industrial & Systems Engineering. It is a graduate program designed to provide graduate education to working engineering professionals to advance in their careers in industrial and systems engineering. The Program provides an integrated approach to engineering and management of production systems and engineering organization. Graduates of the program will achieve professional competence in concepts, knowledge, methodologies, and skills required for production system design/operations, quality assurance, and management in an engineering environment.

The program will require six graduate courses (18 credits) that are offered by Mechanical Engineering and three courses (9 credits) by School of Business. Project study (6 credits) under the guidance of academic advisors is also required. The total credit requirement is 33 credits. Participants completing both courses and project requirements will receive a MS Degree in the Industrial and Systems Engineering option of the Mechanical Engineering program. Detailed description of qualifications for enrollment and the requirements for the graduation are described below.

Admission

A BS or an equivalent degree in engineering or a closely related field is required. Admission applications of participants with non-engineering undergraduate degrees will be considered on a case by case basis by the Professional Master’s Program Committee for possible admission.

Required Graduate Courses

Courses included in this program are regular graduate level courses offered and taught by University of Massachusetts Dartmouth faculty. The list of required courses is as follows:

- Six courses out of the Group I courses offered by Mechanical Engineering Department (Appendix I)
- Three course of Group II courses offered by College of Business (Appendix II)
- Master project: this could be a project related to participant’s current position in the work place (MNE590 Master Project, Appendix I).

II. Program Implementation

Administration

The program will be administered by the Graduate Program Committee of the Mechanical Engineering department with inputs provided by the Professional Master's Program Committee. This committee will consist of faculty teaching production/manufacturing courses and will report to the Graduate Program Committee of the department.

Advising

Upon admission, each student will be assigned to a temporary advisor by the director of Mechanical Engineering graduate program. The temporary advisor will assist the new student through selecting of the first semester courses. After one semester of taking courses, the student will choose a permanent advisor.

Master Project

After one semester of taking courses, the student will choose a permanent advisor capable of advising him/her on conducting project that the student will choose. These projects will most of the time be related to participant's engineering duties. Students who do not have a work related project will choose a faculty advisor who could give them a project to work on. The Master Project will be approved by the Professional Master's Program Committee.

The thesis or project committee shall consist of a minimum of three members, at least two must be ME faculty and one may be a senior scientist or engineer (with a Ph. D. degree) from outside the university or a faculty in another department. The principal advisor must be an ME faculty.

The members of student's project committee will be selected by the faculty advisor in consultation with the student. All projects and project committees must be approved by the Graduate Program Committee.

There are three (3) phases of project preparation:

1. Submit the project proposal. In this phase the committee is formed.
2. Research and writing resulting in a project document.
3. Oral Project Defense. **Note**, the Dean of the College of Engineering must be notified of the defense two weeks in advance by the principal advisor.

Mechanical Engineering Faculty and Specialization

Farhad Azadivar

PhD Purdue University, MS Asian Institute of Technology, BS Tehran University.

Specialization: Computer Simulation, Modeling and Optimization of Manufacturing, Traffic, and Marine Fishery Systems. Deterministic and Stochastic Optimization.

Sankha Bhowmick

PhD University of Minnesota, MS Villanova University, BS Jadavpur University ,

Specialization: Heat and mass transfer, bioengineering, MEMS.

Vijay B. Chalivendra

PhD University of Rhode Island; MS and BS Sri Venkateswara University of College of Engineering. Specialization: Mechanical Behavior of Emerging Advanced Materials, Biomaterials, Nano-Composites, MEMS.

Sherif D. El Wakil

PhD Birmingham University, MS El-Azhar University, BS Cairo University. Specialization: computer-aided manufacturing, design for manufacturing, materials science.

Alex J. Fowler

PhD Duke University, BA Wesleyan University. Specialization: Fluid flow in porous media, heat transfer, thermodynamics, bioengineering.

Peter D. Friedman (Chairperson)

PhD Johns Hopkins University, MS Georgia Institute of Technology, BS Georgia Institute of Technology. Specialization: Experimental fluid mechanics and heat transfer, thermodynamics, nuclear power plant operation.

Wenzhen Huang

PhD2 University of Wisconsin-Madison and Shanghai Jiaotong University, Specialization: Manufacturing Systems Modeling, Computer- Aided Tolerance Design, Applied Statistics, Quality Control.

Raymond N. Laoulache

PhD Brown University, ScM, ScB Northeastern University. Specialization: Thermodynamics, multiphase flow, control systems, fluid mechanics, laser doppler anemometry, parallel computing.

Katja Holtta-Otto

PhD and MS Helsinki University of Technology. Specialization: Project Design and Development, Modularity, Product Platforms, Systems Engineering.

Tesfay Meressi

PhD, MS, University of California Santa Barbara, BS Addis Ababa University. Specialization:
Robotics, control theory, machine design.

Raessi, Medhi

PhD and MASc University of Toronto, BSc University of Tehran.
Specialization: Computational fluid dynamics and heat transfer, Interfacial flows, Two-phase flows with phase change, Microscale transport phenomena, Numerical methods for modeling multiphase flows.

John M. Rice (Graduate Program Director)

PhD University of Rhode Island, MS Stanford University, BS Northeastern University.
Specialization: Solid mechanics, computer-aided engineering, finite element analysis, composite materials.

APPENDIX I

GROUP I COURSES

MNE 530 three credits

Simulation Modeling

Prerequisites: EGR 301 and computer programming or equivalents Concepts and principles associated with systems simulation and modeling using contemporary software such as Simulation with Arena. Topics include probability and statistics, discrete event simulation, statistical techniques in simulation modeling. Statistical analysis is integrated for the most part into the simulation modeling, reflecting the joint nature of these activities in good simulation studies, and continuous simulation of industrial and manufacturing systems using SIMAN language. The student will work in a team producing a design project relating to these topics.

MNE 532 three credits

Advanced Robotics

Prerequisite: MNE 482 or equivalent

Advanced course in kinematics, dynamics and control of robots. Topics covered include: trajectory generation, position and force control of open chain and closed chain manipulators, kinematic redundancy, link flexibility, artificial intelligence and integration of industrial robots in integrated manufacturing systems.

MNE 533 three credits

Manufacturing Automation

Prerequisite: MNE 345 or equivalent. A study of the different components of an automated manufacturing system. Design of the hardware and software used in the different manufacturing systems. Analysis, modeling, performance and economics of flexible manufacturing systems and flexible manufacturing cells. Design of parts to facilitate automatic assembly.

MNE 535 three credits

Advanced Statistical Quality Control

Introduction of statistical principles and advanced techniques in statistical process control and quality improvement in various engineering fields in mechanical, chemical, electronics manufacturing process. Emphasis on associated applied statistics principles, Shewhart control charts for variables and attributes, short run, Cusum and EWMA charts multivariate process control and diagnosis techniques.

MNE 537 three credits

Manufacturing Systems Design

Prerequisite: MNE 345 or equivalent. Advanced topics in manufacturing systems design and analysis with emphasis on modeling and integration methodologies. Specific topics include production flow analysis, group technology, manufacturing cell design, facilities location and work design, material handling systems and auto-mated guided vehicles, flexible manufacturing systems, and systems evaluation. Term design projects are required using computer and software tools.

MNE 538 three credits

Manufacturing Planning and Control

Prerequisite: EGR 301 or equivalent. Advanced topics in manufacturing production planning and control with emphasis on design and resource utilization. Specific topics include operations planning and control, linear programming, capacity planning, resource computer and software tools.

MNE 539 three credits

Engineering Optimization

Prerequisite: EGR 301 or equivalent. Advanced topics in engineering optimization with emphasis on the algorithm and applications. Specific topics include linear and nonlinear optimization, mathematical modeling, constrained optimality criteria, transformation methods, constrained direct search, quadratic approximation methods for constrained problems, and comparison of constrained optimization methods. Term design projects are required using computer and software tools.

MNE 540 three credits

Advanced Simulation Modeling

Prerequisites: MNE 530 or Equivalent, and skill in one computer programming language.

Verification, validation, and statistical analysis of the inputs and outputs of simulation models.

Topics will include determination of the simulation run lengths, building and analyzing confidence intervals, variance reduction techniques, comparison of systems performances, experimental designs and simulation optimization.

MNE 560 three credits

Methods of Experimental Research

Prerequisite: Graduate standing. The need and subject matter of research. Laws, truths, analogy and hypothesis. Identifying and clustering parameters. Use of models. Experimental setup. Induction, deduction, statistics, and conclusions. Presentation and use of finding.

MNE 561 three credits

Systems Engineering

Pre-requisites: Upper Class Standing, Instructor Approval

Introduction to basic concepts and methods of Systems Engineering. The topics covered include requirements management, system architecture and modular design, system modeling, decision making, design synthesis, design verification, and designing for the system lifecycle.

MNE 562 three credits

Stochastic Processes To be developed

MNE 590 six credits

Masters Project

Prerequisites: Graduate standing, Project

Option, and approval of the student's Graduate Committee

Project research in conjunction with industry under a faculty advisor. A formal report must be submitted to fulfill the project requirements.

APPENDIX 2

GROUP II COURSES

POM 651 three credits

Advanced Operations Analysis

Techniques for the analysis and improvement of the value-adding activities of an organization. Such activities are called by a number of names: processes, operations, production, or just plain “work.” Value is added only when the output from a process meets the needs of customers, both internal and external. The course focuses on the efficient and effective management, in both manufacturing and service environments, of processes (a set of tasks or activities that contribute to delivering products and services in order to meet customers’ needs, whereby inputs are transformed into outputs thereby adding value).

POM 675 three credits

International Supply Chain Management

Management of the flow of materials into, through, and out of operations, in an international context. The course investigates how to manage such complexities as long distances, currency fluctuations, variable infrastructures, diverse cultures, political instability, and dissimilar legal systems. The value-adding activities of procurement, manufacturing/operations, and logistics/distribution are conceptualized as one integrated supply chain. By understanding various facets of the supply chain, this course will provide sufficient insight to analyze the challenges of configuration and coordination in a global environment.

POM 676 three credits

Business Process Design

Business processes through which “value-adding activities” to customers are accomplished, such as order fulfillment, product development, and customer service. The course provides fundamental ideas underlying total quality management, time-based competition, and business process reengineering. Specific topics include capacity management, integrated work, the impact of variability on process performance, tools for business process design, lean and agile management systems, dynamic flow management, time compression, performance measurement systems, and inter-firm coordination.

POM 677 three credits

Logistics Strategy and Management

This course focuses on logistics operations from global perspectives. Logistics is a vital component of a firm's supply chain. The aim of this course is to understand and analyze the concepts of logistics and supply chain management. Topics include customer service, inventory management, information systems, order processing and fulfillment, transportation, third-party logistics, warehousing, logistics relationships, performance measurement, and supply chain strategy from

global operations perspectives. Emphasis will be placed on challenges related to providing logistical support for procurement, manufacturing and distribution. The course will investigate contemporary theoretical and practical developments in the area of logistics and supply chain management. This course is based on a combination of lecture-based, discussion focused on critical thinking regarding assigned topics, and case study-oriented learning environment. Cases, textbooks and articles relating to the topic will be used. Term paper based on actual cases is required. Advanced preparation will be essential for effective class participation.

POM 686 three credits

Strategic Project Management

This course presents a view of managing projects from an organizational perspective. The principle areas of discussion will be aligning the projects with business strategies, managing multiple projects in the form of programs (Program management), and in the form of portfolios (Portfolio Management), and marshalling organizational assets through an project management office (PMO). Using a case study approach, students will explore the importance of using organizational strategies to align projects, how to use a project management office as a governance process, and apply practices to create portfolios and programs to leverage organizational assets and achieve project success. The use of project management software will be required.

POM 688 three credits

Risk Management in Projects

This course focuses on Risk Reduction and Quality Improvement in Project Management. The risk management process is a systematic and proactive approach to control projects while decreasing uncertainties. The result of risk reduction includes decreasing project time and cost, and improving quality, satisfaction, and success. This course helps students to implement risk management in their working environment. In this course the students will be asked to propose real-life work related projects that require risk assessment and risk resolution. Upon the approval of the project by the instructor, the students will develop a Risk Response Plan. To this end, they will follow the risk management process, which includes risk identification, qualitative, and quantitative risk analysis, risk response planning, and risk monitoring and control. The outcome of this process can be used as input into a quality improvement methodology in order to mitigate, reduce, or eliminate the associated risk.

MIS 671 three credits

Managing Systems

Managing in an information-intensive environment through skills and knowledge of business and systems change. This course teaches strategies for aligning a firm's information systems with rapidly changing business environments, taking the perspective of both organizational and technical issues. In addition, this course has a major emphasis on IT leadership and the skills necessary to be a successful leader in information-intensive environments. Case studies, field research, guest speakers,

lectures, and discussions are used to explore topics such as reengineering, systems development and implementation, legacy and enterprise information systems, project management, SAP, and other integrated systems. Students undertake projects with local companies that explore the class topics in actual business settings.

MGT 501 three credits

Operations Management

Facets of management ranging from the ordering of materials to the delivery of finished goods and services. Qualitative and quantitative techniques are equally emphasized. Students will apply these to their own organizations. Besides offering administrative problem solving skills, the course will focus on the strategic importance of this field in helping to resolve issues surrounding competitiveness in today's global marketplace. (UMass Dartmouth undergraduate equivalent MGT 345)

MGT 671 three credits

Management of Organizational Change

Knowledge, understanding, and skills to actively contribute, whether as a manager, leader, or change agent, to essential renewal and transformation processes within organizations. Change leadership is a core competency in successful twenty-first century organizations. The course examines how change occurs in large-scale organizations, the role of leadership in the change process, the use of vision, symbols, and metaphor to stimulate change, and the use of change forums to help employees maintain momentum during the process. Further, the course examines the organizational development perspective on planned change, how to design, implement, and institutionalize planned change in the human or technical systems of an organizations, and roles in the change process. The course will benefit managers who recognize the need for change in their organization and who want to develop change leadership skills.

MGT 677 three credits (Having ENL 605 below as an alternative if MGT 677 is not available)

Leading, Motivating, and Empowering Others

Fundamentals of collaborative work as they occur in traditional, hierarchical, and empowered workplaces. More than ever before, contemporary workplaces require joint effort whether between multiple individuals, groups, organizations, or nations. The course reviews selected theories of leadership, motivation, empowerment, communication, and learning. Further, the course explores their application to today's workplace, and considers differences in these actions upward, downward, and laterally. The course provides a highly interactive setting in which participants can assess and develop interpersonal skills necessary to influence others.

ENL 605 three credits

Persuasive Communication--Persuasive Writing and Speaking, We will survey strategies from Aristotle through Madison Avenue, focusing on ethics and legality and techniques of argumentative discourse: its substance, shape, and style. Emphasis also is on avoiding logical fallacies, composing persuasive messages for clients, customers, colleagues, supervisors, subordinates, and audiences; on writing advertising copy and on giving oral presentations.

**Academic Quality Assessment and Development
Self-Assessment Report**

Master of Science in Physics

**Department of Physics
College of Engineering**

**University of Massachusetts Dartmouth
North Dartmouth, MA**



Spring 2019

Contents

AQAD Self-Study Document Department of Physics	3
Organization of this Report	3
Provost's letter inviting the Department of Physics to initiate the AQAD review	4
Guidelines for Academic Quality Assessment and Development – AQAD (BOT Doc. T97-111, <i>Performance Measurement System</i>)	5
Introduction to the Physics Department	6
Overview of the Physics Department	6
I. Goals & Objectives	7
The University, College and Department Mission	7
I.1 Alignment with the Campus Mission & Strategic Plan	9
I.2 The Department Mission	9
II. Curriculum	15
Graduate Program Description	16
II.1 The Curriculum in Context of Existing Disciplinary Standards	16
II.2 Curricular Content: Review & Assessment	16
II.3 Curriculum Logic, Sequence & Coherence	18
Physics Program Outcomes	19
II.5 The Curriculum as Preparation for Further Study or Employment	19
III. Faculty Quality & Productivity	19
III.1 Faculty Experience & Credentials	20
III.2 Faculty Currency in Discipline Content & Curriculum	21
III.3 Program Expectations: Faculty Involvement in Teaching, Scholarship & Service	22
III.4 Program Support for Professional Development	23
III.5 Program Support for Off-Campus Constituencies	23
IV. The Teaching & Learning Environments	25
IV.1 Student Learning Outcomes	25
IV.2 Evaluation of Learning Outcomes: Program & Faculty	25
IV.3 Evaluation of Student Success after Graduation	26
IV.4 Teaching Assignments	26
V. Resources	27
Overview	27
V.1 Resource Allocation Process	27

V.2	Personnel	28
V.3	Space, Equipment & Funds	29
VI.	Future Plans & Opportunities	33
VI.1	The Physics Department – Initiatives	33
VI.2	The Physics Department – Strengths	34
VI.3	The Physics Department – Challenges	35
	Appendices	36
I.	Faculty Publication list (past three years)	37
I.1	Peer-reviewed Journal Articles	37
I.2	Books & Monographs	40
I.3	Open Access Publications	40
I.4	Conference Presentations & Invited Talks	41
I.5	Other: Contributed Articles	44
II.	External Funding	45
II.1	Funding pending	45
II.2	Funded	46
III.	Memorandum requesting a tenure-track hire	47
IV.	University Curriculum Vitae	48
IV.1	University Curriculum Vitae – Robert T. Fisher	49
IV.2	University Curriculum Vitae – Alan Hirshfeld	50
IV.3	University Curriculum Vitae – Jong Ping Hsu	51
IV.4	University Curriculum Vitae – David Kagan	52
IV.5	University Curriculum Vitae – Gaurav Khanna	53
IV.6	University Curriculum Vitae – Grant V. O’Rielly	54
IV.7	University Curriculum Vitae – John Silva	55
IV.8	University Curriculum Vitae – Jianyi (Jay) Wang	56
IV.9	University Curriculum Vitae – Marguerite Zarrillo	57

AQAD Self-Study Document

Department of Physics

Organization of this Report

This self-study report by the Department of Physics at the University of Massachusetts Dartmouth is organized around five key topics established by the Office of the Provost and the Board of Trustees of the University of Massachusetts.

These topics include:

- I. Goals & Objectives
- II. Curriculum
- III. Faculty Quality & Productivity
- IV. The Teaching & Learning Environment
- V. Resources
- VI. Future Plans & Opportunities

- 1. Provost's letter inviting the Department of Physics to initiate the AQAD review
- 2. Office of the Provost/Board of Trustees guidelines for Academic Quality Assessment and Development, AQAD.

Also included as appendices to this report are a list of recent faculty publications and external funding awards, a memorandum for a new faculty request, and copies of the most recent University Curriculum Vitae for each member of the Physics Department.

Prepared by the Department AQAD Committee: Grant O'Rielly (Chair), Alan Hirshfeld, and Gaurav Khanna, with contributions from the entire Department of Physics.



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OFFICE OF THE PROVOST

Mohammad A. Karim, Ph.D.
Provost and Executive Vice Chancellor
for Academic and Student Affairs,
Chief Operating Officer

November 16, 2018

TO: Jianyi Jay Wang, Chair, Physics (Graduate Programs)

FROM: Mohammad Karim, Provost & Executive Vice Chancellor for Academic Affairs
& Chief Operating Officer 

CC: Jean VanderGheynst, Dean, College of Engineering
Raymond Laoulache, Interim Associate Dean, College of Engineering
Tesfay Meressi, Associate Provost for Graduate Studies
Magali Carrera, Vice Provost for Academic Affairs
Tammy Silva, Director, OIRA

RE: Academic Quality Assessment and Development

I am formally directing Physics (Graduate Programs) to complete the Academic Quality Assessment and Development (AQAD) process during AY2018-19. The process should be conducted so that external reviewers visit the campus in spring 2019 and submit an external report by the end of the spring 2019 semester. The COE Dean's office will provide a timeline and facilitate the AQAD process with the department.



Guidelines for Academic Quality Assessment and Development – AQAD (BOT Doc. T97-111, *Performance Measurement System*)

Academic Quality Assessment and Development is a component of the University Performance Measurement System. The primary purpose of this component is to assess and improve the core academic functions of teaching and learning, research/professional/creative activity, and public service/academic outreach through an ongoing system of quality control/program assessment at the unit level (i.e., department or program).

Each campus will establish, in consultation with the President's office and in accordance with these guidelines, procedures for implementing the Academic Quality Assessment and Development. These procedures will include a list of units (programs/departments), hereinafter called "Programs", to be reviewed; the cycle of reviews; and a list of core data to be used in Program reviews on that campus. The "Program Chair" shall be defined as the person with administrative oversight of the Program. Campus procedures shall be approved by the President.

All Programs will address the same core evaluation criteria, although these criteria will have varying degrees of relevance and applicability across the campus. Programs undergoing reviews for other purposes (e.g., accreditation) may submit these reviews in lieu of the Academic Quality Assessment and Development review, provided the review addresses the core criteria. If not, the Program shall prepare and submit a supplemental document addressing the core criteria.

Process

1. Each Program shall be reviewed on a regular cycle. Ordinarily, the length of time between reviews may be no more than five to seven years, but campus procedures may establish the circumstances under which exceptions to this timeframe may be granted.
2. Each Program review shall be conducted with the participation of Program faculty members.
3. Each Program review shall consist, minimally, of the following written documents: A Program self-assessment, the external reviewers' report, a Program response to the reviewers' report, and an action plan based on the review. These written documents will be submitted to the Dean. Faculty within the Program will receive copies of all documents.
4. Each Program shall be reviewed by a team of no fewer than two external reviewers from outside the campus (one reviewer may be from another campus within the University system). The Dean, in consultation with the Program chair and faculty members, will choose the external reviewers. The campus procedures shall stipulate the questions to be addressed by the external reviewers.
5. The Dean will review and comment on the written reports. The Dean's comments will be distributed to all Program faculty, who may prepare a written response to his/her comments. The Dean will forward the Program self-assessment, external reviewers' report, Program response to the reviewers' report, and his/her comments with faculty responses, if any, to the Provost. Prior to accepting the review, the Provost will meet with the Program chair and the Dean to discuss the review and action plan.
6. The Provost of each campus shall forward to the President's office annually an executive summary of the Program reviews conducted. The summaries shall be submitted no later than June 30th. The documents comprising a review shall not, as a general matter, be circulated beyond the campus.

Core criteria and related questions

1. **Programs shall ensure that their goals and objectives are linked to the campus mission and strategic priorities.**
2. **Programs shall ensure that curriculum is relevant, rigorous, current and coherent.**
3. **Programs shall ensure faculty quality and productivity.**
4. **Programs shall ensure teaching/learning environments that facilitate student success.**
5. **Programs shall ensure that resources are used wisely.**

Introduction to the Physics Department

Overview of the Physics Department

The Department of Physics currently educates about 15 graduate students together with 35 undergraduate majors (from the Fall 2018 census numbers) and graduates an average of six master's in physics and seven physics majors each year. Approximately half of the graduates from the physics program pursue graduate education at highly ranked Ph.D. programs around the nation (a sample of these schools are listed below and in section II.5 on page 19) and the others enter the workforce directly in industry or business positions or in K-12 teaching careers.

In Fall 2018 the Department consisted of ten full-time faculty¹ (seven tenured faculty and three full-time lecturers) with expertise in areas ranging from atomic and nuclear physics to astronomy and astrophysics. Nine of these full-time faculty have an earned Ph.D. in physics or a closely-related field, and all the tenured faculty have active research programs. All the faculty are actively engaged in teaching, scholarship and service.

During the past three years the Physics Department faculty have published 33 scholarly articles (with another seven submitted) in peer-reviewed journals describing research in astrophysics, nuclear physics, computational simulation and gravitational theory. In addition, the faculty have produced seven books and monographs together with four open-access publications, 56 conference presentations and invited talks, and 19 technical reports and book reviews. In the same period, the faculty have been awarded research funding totaling \$350,000 together with \$650,000 for high-performance computing hardware from national funding agencies such as the National Science Foundation, the Department of Defense and NASA. Additional details are provided in Appendix

On the enrollment and degree preparation side, the Department has seen growth in the number of students since the previous AQAD report in 2003. During this period, the Department faculty have engaged in a process of curriculum redesign in the graduate program that has served to address student needs and strengthen student outcomes while also improving the efficiency of instructional delivery. As a consequence of these actions, the Department has seen the number of entering and graduating students in the physics graduate program stay constant during a period where the campus total graduate student enrollment has seen a decline of about 6%². Graduates from the M.S. programs have gone onto some of the most prestigious Ph.D. programs around the country at institutions including Arizona State University, Columbia University, the University of California Davis, Duke University, the University of Colorado Boulder, The George Washington University, the University of Illinois at Urbana-Champaign, the University of Notre Dame, SUNY Stony Brook, the University of Texas at Austin, Monash University and the University of Sydney in Australia and the University of Toronto in Canada, among others. Complementing these placement successes, the department currently has four students in the recently approved *Engineering & Applied Sciences* EAS and the *Intercampus Marine Science* IMS³ Ph.D. programs at the University of Massachusetts Dartmouth.

¹ At the end of Spring 2019 one tenured faculty member will be retiring, reducing the department's instructional resources to nine full-time faculty.

² The University's total graduate enrollment was 1228 in AY 2011 and 1153 in AY 2017. From https://www.umassd.edu/media/umassdartmouth/institutional-research/Data_Book_Fall-2017-Revised.pdf

³ Prior to 2013 when Prof. A. Tandon transferred to the Department of Mechanical Engineering.

I. Goals & Objectives

Programs shall ensure that their goals and objectives are linked to the campus mission and strategic priorities.

The Program should evaluate its purpose and planning in light of the campus mission and strategic priorities. The review should answer the following questions:

1. What is the Program's mission and is it clearly aligned with the campus mission and direction?
2. How does the Program's mission relate to curriculum; enrollments; faculty teaching, research/professional/creative activity, and outreach? Is it aligned with the campus strategic priorities?

The University, College and Department Mission

The University of Massachusetts Dartmouth is a public research university dedicated to excellence in teaching, scholarship and service. The University has the following statements regarding the its mission and vision ⁴.

Mission Statement: *UMass Dartmouth distinguishes itself as a vibrant, public research university dedicated to engaged learning and innovative research resulting in personal and lifelong student success. The University serves as an intellectual catalyst for economic, social, and cultural transformation on a global, national, and regional scale.*

Vision Statement: *UMass Dartmouth will be a globally recognized premier research university committed to inclusion, access, advancement of knowledge, student success, and community engagement.*

The Faculty Senate of the University of Massachusetts Dartmouth approved the following statement regarding the University's Commitment to Student Learning:

A University of Massachusetts Dartmouth education is a foundation from which graduates continually engage and impact their community, both locally and globally. In all aspects of their lives, UMass Dartmouth graduates skillfully locate, analyze, synthesize, and evaluate information and can communicate their knowledge effectively and creatively. They have depth in a field of study and broad knowledge across many areas of inquiry, and they continue after graduation to explore and to acquire understanding within and beyond their field of study. UMass Dartmouth graduates think critically and possess the confidence to integrate and apply their learning to solving complex problems. They have excellent interpersonal skills and a sense of purpose. Guided by empathy and integrity, UMass Dartmouth graduates respond constructively to changing personal, professional, and societal challenges in a diverse world ⁵.

⁴ from <https://www.umassd.edu/about/missionandvision/>

⁵ from <https://www.umassd.edu/universitystudies/umassdcommitment/>

The Physics Department mission is one that strives to maintain excellence in three major areas⁶:

Research and publication. Faculty are expected to be active participants in the scientific endeavor. They will conduct research or similar scholarly activity in their area of expertise; involve students in their work; seek external grant support; and publish their results. Such research may include original, publication-quality studies and implementation of new teaching techniques.

Teaching at all curricular levels. The Department will maintain its longstanding commitment to the education of its undergraduate and graduate majors and also to service and general education courses designed for non-majors. For physics students, we will provide a comprehensive, unified, rigorous, and up-to-date set of courses in both theoretical and experimental physics, including the opportunity to learn by active participation in faculty research. The curriculum will have sufficient flexibility to serve the diverse interests of physics students, each of whom will receive one-to-one guidance from a faculty advisor to formulate an effective, individualized educational plan. Our service courses for students in other science or technical departments will convey the fundamental physical principles underlying the scientific study of the natural world. The Department will also offer a wide range of general education courses for non-science majors; these courses will give students an appreciation of both the methods and results of scientific investigation and also the role of science in societal issues. In all courses, faculty will strive to implement effective teaching strategies based on proven pedagogical research.

Public outreach. The Department recognizes the University's role as an educational resource for the citizens of southeastern Massachusetts. The Department will take an active role in support of elementary- and secondary-level science teachers and also to promote the public understanding of science through programs reaching the wider community. The Department will achieve its mission through individual and cooperative efforts of its faculty, staff, and students. To that end, Department members will maintain close working relationships that foster cooperation, creativity, and mutual respect. The Department will maintain a supportive working environment that instills a culture of collegiality among its members while respecting differences in gender, background, or opinion. All faculty and staff will participate in the governance and administration of the Department. The Department will also play a leadership role in the broader educational mission of the College of Engineering and the University.

⁶ from <https://www.umassd.edu/engineering/phy/about/missionstatement/>

I.1 Alignment with the Campus Mission & Strategic Plan

The Department of Physics is closely aligned with the University's commitment to provide life-long student success and to the advancement of knowledge. The department faculty are committed to excellence in the areas of teaching, research and service. The department aims to provide a high-quality educational experience in the physics graduate courses. The courses offered by the physics department introduce students to the fundamental principles in physics and develop the analytical skills and critical thinking necessary to solve problems. The goal is to prepare student for success in a broad range of careers including K-12 teaching, graduate studies, and positions in industry, business and government. To advance knowledge that can address the challenges facing the region and the world, the department faculty conduct research and publish articles in their respective areas of expertise, seek external funding, and engage undergraduate and graduate students in their research activities.

I.2 The Department Mission

a. The Curriculum

At the graduate level, the department offers a master's degree in Physics with specialties in multiple areas of physics represented by the expertise of the faculty. The core courses in the graduate program present advanced physics topics in fundamental areas of physics along with advanced material in the student's chosen research topic. Complementing this are other advanced courses to provide the students with a broad range of skills and knowledge. The physics department is also a part of the "umbrella" *Engineering and Applied Sciences* Ph.D. program in the College of Engineering which includes a graduate track in *Computational Science*.

b. Recruitment, Enrollment & Courses Delivered

i. Student Recruitment

Applications for entry into the physics master's program come from national and international sources. All applications go to the University's graduate office which forwards completed packets to the department's Graduate Program Director. These application packets are reviewed by the members of the Graduate Committee (this consists of all the research active faculty) and ranked for the purpose of making Teaching Assistantship offers. The Graduate Program Director makes these offers (with approval of the department Chairperson and the College Dean) to the applicants. The number of offers made each year depends of the number of "free" Teaching Assistant lines available, typically this is six or seven each year.

ii. Enrollment Management

The total current (fall 2018) graduate enrollment is 19 students, 15 in the master's program and 4 in the EAS doctoral program with another 35 students in the physics undergraduate program. These enrollment numbers are slightly lower than the average enrollment for the past decade.

Table 1: Total enrollments in physics graduate programs each academic year since 2010.

	Enrollment totals in the physics graduate programs									
	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Average enroll.
Physics M.S.	19	15	19	18	17	16	19	18	15	17.3
Ph.D. (EAS)	—	—	2	3	3	3	4	5	4	3.4
totals	19	15	21	21	20	19	23	23	19	20.0

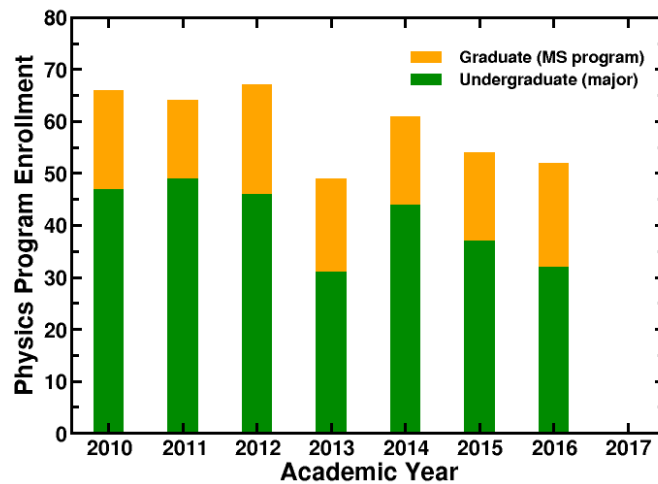


Figure 1: Total enrollment (graduate & undergraduate) in the physics program for each academic year since 2010.

The number of students entering the graduate programs in the physics each year average about six students for the master's program and one student for the EAS Doctoral program each year. Typically, about a third to a half of these students are from the department's undergraduate physics program.

Table 2: Number of students entering the physics graduate programs each academic year since 2010.

	Students entering the physics graduate programs									
	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Average
M.S.	6	6	9	8	6	8	7	7	7	6.0
Ph.D. (EAS)	—	—	2	1	0	2	1	1	1	1.1
totals	6	6	11	9	6	10	8	8	8	8.0

iii. Courses Delivered

In AY 2017 the Department delivered a total of 267 student credit hours (SCH) at the graduate level, with another 5034 at the undergraduate level. This equates to 589 SCH per FTE faculty and a student to faculty ratio of 22.2:1. Considering the major and graduate programs only, the department provided 47.4 SCH per FTE with a student to faculty ratio of 7.3:1. The student credit hours delivered have remained fairly stable for the past several years, the table below shows the student credit hours and unique⁷ course sections delivered during the academic year for each of the past eight years.

Table 3: Student Credit Hours delivered each academic year from 2010 – 2017.

		Student Credit Hours and Sections Delivered in each academic year since 2010								
		2010	2011	2012	2013	2014	2015	2016	2017	Ave
Undergraduate Courses	SCH	5431	4869	5118	5433	5624	5122	5098	5034	
	sect.	50	45	49	49	41	38	39	48	
Graduate Courses⁸	SCH	189	177	168	171	204	246	210	267	
	sect.	10	7	5	6	7	8	7	9	
Total	SCH	5617	5037	5346	5667	5915	5380	5338	5268	
	sect.	60	52	54	55	48	55	46	57	

⁷ Cross-listed courses are counted only once in the unique section count.

⁸ Graduate research and thesis sections and SCH are excluded from the graduate courses counting.

Over the past eight years the department has delivered an average of 5450 student credit hours each academic year. The figure below shows the breakdown of student credit hours and unique course sections delivered in each of General Education courses, required service courses⁹, major courses and graduate courses for the academic years 2010 – 2017 (excluding the summer semester).

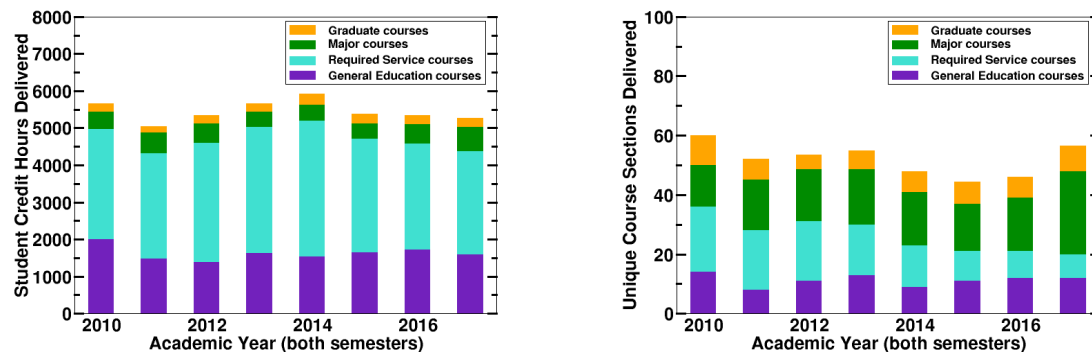


Figure 1: The student credit hours and unique course sections delivered by the physics department in General Education courses, required service courses, major courses and graduate courses for the academic years 2010 – 2017. Cross-listed courses are included once only in the unique section count. The decrease in the number of required service course sections offered from 2015 onwards is due to the change in delivery mode for the introductory physics courses for engineers.

iv. Graduation and Degree Production

The following table shows the number of graduate degrees awarded from 2002 through 2017. The production of physics master's degrees has remained roughly constant with a recent average of 5.7 students per year for AY 2012 – 2017.

Table 4: Number of graduate degrees in physics awarded each year since 2002.

	Degrees Awarded																Ave. (prior 6 yrs.)
	AY 02	AY 03	AY 04	AY 05	AY 06	AY 07	AY 08	AY 09	AY 10	AY 11	AY 12	AY 13	AY 14	AY 15	AY 16	AY 17	
M.S.	8	7	7	3	5	11	7	2	7	5	7	4	7	4	5	7	5.7
EAS Ph.D.	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	1

⁹ Those courses that are required courses in another major.

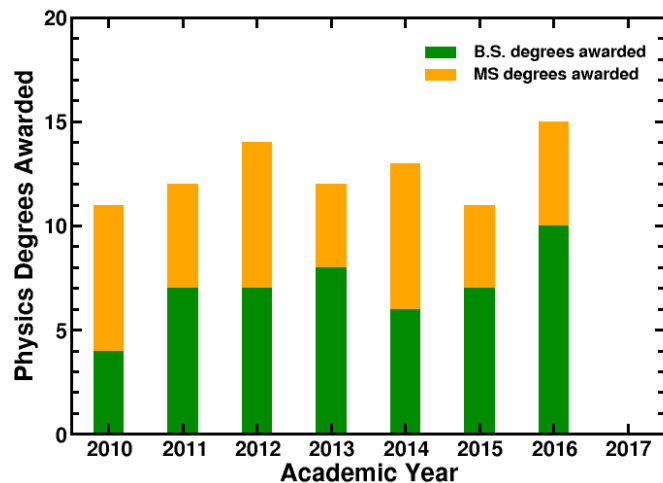


Figure 2: The number of degrees (graduate and undergraduate) awarded each year since 2010.

v. Student Diversity: Gender Disparities & Underrepresented Minority Students

The education of women and minorities in physics, and the STEM disciplines more generally, is widely recognized as a key challenge facing the nation. Recently the Physics Department became a member institution in the APS Bridge Program¹⁰ which is “a coalition of academic institutions, national labs, and other organizations that share a commitment to increasing educational opportunity for underrepresented minority physics students”.

Table 6: The number of master’s degrees awarded to women and underrepresented minorities (URM).

	Degrees Awarded to Women and Underrepresented Minorities												
	AY 08	AY 09	AY 10	AY 11	AY 12	AY 13	AY 14	AY 15	AY 16	AY 17	Total 08-17	UMassD %	National %
M.S. (all)	7	2	7	5	7	4	7	4	7	5	55	–	–
M.S. (women)	3	0	1	0	2	0	2	2	2	1	13	24%	20%
M.S. (URM)	1	0	0	0	1	1	0	0	0	0	3	5.5%	5%

The master’s program, which draws students from a wide geographic range, both nationally and internationally, has a significantly higher diversity, as represented both by women and underrepresented minority graduation rates than the department’s undergraduate program. The number of master’s degrees awarded to women and

¹⁰ <https://www.apsbridgeprogram.org/>

underrepresented minority students were 24% and 5.5% respectively, which are in-line with than the nationwide rates reported by the AIP Statistical Research Center.

c. Faculty Teaching, Scholarship & Outreach

i. Teaching

Consistent with the University's mission of being dedicated to engaged learning and student success, the physics department offers degrees at the undergraduate and graduate levels as well as providing a significant number of required service and general education courses for students outside of the physics major. Full-time faculty members provide high-quality instruction at every level of the undergraduate and graduate programs, including in the required service courses and General Education courses. The faculty members take responsibility for curriculum content in the courses that they teach, they also develop new courses in their own areas of research specialization, providing a rich array of options for students in the physics major and graduate programs. The learning outcomes defined in the course syllabi together with the assessment materials used to evaluate student performance in each course are aligned with the University's mission of engaged learning which produces graduates who can locate, analyze, synthesize, and evaluate information.

ii. Scholarship

In accordance with the University's mission of being a public research university dedicated to innovative research resulting the advancement of knowledge, the physics department faculty are engaged in world-class research in fields such as astrophysics, computational simulation and modeling, marine science, nuclear physics, theoretical physics and traffic engineering. The faculty have received competitive research awards from national funding agencies such as the National Science Foundation, the Department of Defense, the Office of Naval Research, the US Department of Transportation and NASA. Over the past three years, research funding totaling \$350,000 together with \$650,000 for high-performance computing hardware has been awarded to department faculty. In this same timeframe the physics department faculty have published 33 scholarly articles (with another seven submitted) in peer-reviewed journals describing research in astrophysics, nuclear physics, computational simulation and gravitational theory. In addition, the faculty have produced seven books and monographs together with four open-access publications, 56 conference presentations and invited talks, and 19 technical reports and book reviews. New faculty requests and recent hires in the department have been tailored such that the department's research profile is aligned with the cluster-hire model for research activities at the University. The physics department is heavily invested in interdisciplinary research and teaching in areas such as transportation, educational pedagogy and computational science, and the department anticipates growing some of these research activities.

iii. Outreach

Consistent with the University's mission of being an intellectual catalyst for economic, social, and cultural transformation committed to community engagement, the department faculty are involved in multiple activities in community outreach and public service. These activities are directed towards the general public, local government, high school physics teachers as well as professional bodies.

In the area of science education to the general public, the department has monthly Open House events using the campus observatory. Alan Hirshfeld coordinates these events which often include participation by the local amateur astronomy group, the *Astronomical Society of Southern New England* who provide extra telescopes and

enthusiastic presenters. For the partial solar eclipse that occurred in 2017, the department obtained 50+ pairs of protective glasses and advertised an eclipse viewing event which attracted in excess of a thousand visitors to campus. Faculty and students from the department circulated amongst the visitors to describe what happens during an eclipse. Another successful event took place in 2016 when the physics and mathematics departments together with the Center for Scientific Computing jointly coordinated an event “*The Science of the Movies*” centered around the movie *Interstellar*. A panel of research faculty presented short talks¹¹ on the science behind aspects of the movie followed by a discussion about the movie featuring faculty from several departments (Art History, Psychology & Physics) and including Kip Thorne from Caltech (a 2017 Nobel laureate), one of the principal researchers involved with studies of general relativity and gravitational waves. Ongoing, Grant O’Rielly serves on the steering committee of the New Bedford Science Café¹² which has a public monthly gathering with one or two scientists who share insights on a topic with an informal Q&A with the public afterwards.

In the area of teacher preparation, Jay Wang coordinates regular meetings with local physics teachers through the *Southern New England Physics Alliance* as a part of a PhysTEC site grant. These meetings provide the high school teachers an opportunity to discuss teaching strategies with each other and with department faculty. It also serves a recruiting device for the physics department, with these teachers recommending the UMass Dartmouth physics program to those students interested in physics.

As a part of her research program into Intelligent Traffic Design, Marguerite Zarrillo has worked with the local *Council on Ageing* to provide real-time tracking of buses and vans used by the Council. This tracking information is made available to users of the service and is a welcome feature for these users.

The department faculty are also actively engaged in the New England Section of the APS. Grant O’Rielly has served on the executive board of this group for several years and is currently (2018 – 2019) the Section President. The Physics Department recently hosted the Fall 2018 Section Meeting¹³ with the theme “*Gravitational Wave Astronomy and Computational Physics*”, highlighting some of the research strengths of the department. This was a successful meeting with over 60 attendees and featuring invited presentations from junior physics faculty at universities in the New England region as well as contributed research talks and posters from graduate and undergraduate students.

II. Curriculum

Programs shall ensure that curriculum is relevant, rigorous, current and coherent.

The need to provide a high-quality education for students should be the primary consideration when evaluating the relevancy, currency, and coherence of curricula. Evaluation of the curriculum should reflect an awareness of changing knowledge, trends in the discipline, and the professional context for curriculum. The review should answer the following questions:

1. How does the Program determine curricular content? How does the curriculum relate to current existing standards, if any, of the discipline?

¹¹ <http://cscvr1.umassd.edu/events/horizons/2016/index.html>

¹² <https://newbedfordsciencecafe.weebly.com/>

¹³ <http://cscvr1.umassd.edu/events/APS2018/>

2. What internal or external measures of review are employed to ensure that the curriculum is relevant and up-to-date?
3. Are the curricular offerings structured in a logical, sequential and coherent manner? Is there an appropriate balance between breadth and depth?
4. In what way does the Program contribute to the education of students in terms of general knowledge, critical thinking capacity and other essential cognitive skills?
5. If consistent with the Program mission, does the curriculum adequately prepare students for further study or employment?

Graduate Program Description

II.1 The Curriculum in Context of Existing Disciplinary Standards

The major professional organizations in physics, the *American Physical Society (APS)* and *American Institute of Physics (AIP)* do not prescribe specific courses for a graduate program in physics. For the graduate program at the University of Massachusetts Dartmouth, the department offers a master's degree in Physics. The curriculum for the graduate physics program is similar to that offered by the physics departments around the nation with courses in quantum mechanics, electricity and magnetism, statistical thermodynamics and mathematical methods in physics. These core courses are supplemented with specialty courses based on the department faculty's area of expertise; these include courses in astrophysics, atomic & molecular physics, computational physics, general relativity, nuclear physics, string theory, traffic engineering and advanced topics such as QED and QFT. The Physics Department is also a part of the "umbrella" *Engineering and Applied Sciences* Ph.D. program in the College of Engineering which includes a Ph.D. program in *Computational Science*.

II.2 Curricular Content: Review & Assessment

The graduate program at the University of Massachusetts Dartmouth has undergone significant redesign in the past decade to include expanded course offerings to create a comprehensive curriculum with courses in multiple, fundamental areas of physics including quantum mechanics, electrodynamics, fluid mechanics, statistical thermodynamics, solid state physics, nuclear physics, computational physics, astrophysics, general relativity, as well as advanced topics such as quantum electrodynamics, string theory, and quantum black holes. The department makes use of the PHY 510 *Special Topics in Physics* course designation to initially offer new courses to establish the degree of student interest. Following campus policy, after three offerings as PHY 510 the courses are submitted to formal review and approval as a new course; most recently the course on *General Relativity, Black Holes & Gravitational Waves* was recently approved as PHY 565 and has been added to the graduate catalogue.

a. Graduate Elective Courses

To increase the number of graduate electives in core areas in physics, three new courses have been developed and are made available on a regular basis. These courses are: PHY 612 *Advanced Electromagnetism*, PHY 543 *Statistical Thermodynamics* and PHY 635 *Introductory Solid-State Physics*. As the department recognizes both the small annual enrollment and the required instructional resources, these courses are offered on an every-other-year basis. To further increase enrollment, these courses are cross-listed with corresponding undergraduate classes (PHY 412, 441 and 442 respectively). This cross-listing had the benefit of increasing the number and breadth of senior elective offerings that are available to students in our undergraduate program. Through cross-listing, different grading scales can legitimately be applied to undergraduate and graduate student, ensuring the department maintains high expectation for the graduate students without having inappropriate standards for

undergraduate students. By scheduling these courses in this manner, these advanced elective courses typically have enrollments typically in excess of 12 students each time they are offered.

Table 5: Enrollment numbers for graduate elective courses. The numbers show both the undergraduate and graduate enrollments for each course for the past decade. The entry – indicates that the course was not offered that year.

Course Topic	Course number	PHY	Year Offered												average enroll. (when offered)
			AY 06	AY 07	AY 08	AY 09	AY 10	AY 11	AY 12	AY 13	AY 14	AY 15	AY 16	AY 17	
Adv. E&M	412	u/g	8	–	–	4	–	4	7	–	4	0	4	4	4.4
	612	grad	–	–	–	16	–	11	7	–	11	8	9	2	9.1
		total	8	–	–	20	–	15	14	–	15	8	13	6	12.4
Stat. Thermo.	441	u/g	8	–	6	–	15	–	12	–	9	–	4	–	9.0
	543	grad	8	–	7	–	8	–	8	–	10	–	13	–	9.0
		total	16	–	13	–	23	–	20	–	19	–	17	–	18.0
Solid State Physics	442	u/g	–	2	–	4	13	–	3	–	–	–	–	5	5.4
	635	grad	–	5	–	12	4	–	7	–	–	–	–	0	5.6
		total	–	7	–	16	17	–	10	–	–	–	–	5	11.0
Traffic Eng.	419	u/g	–	–	2	0	0	1	3	5	2	–	8	3	2.7
	519	grad	–	–	2	2	2	2	0	1	0	–	0	0	1.0
		total	–	–	4	2	2	3	3	6	2	–	8	3	3.7

b. Accelerated 4+1 Programs

The Physics Department has explored offering a 5-year B.S./M.S. program. After extensive review, the department has decided that such a program would not serve the Physics majors as those who might be interested in such a program are also interested in completing a graduate thesis to improve their academic resume. A single year after the bachelor's degree is insufficient time to complete both the required course work (15-credits, 5 courses) and a master's thesis.

The Department does support a 4+1 program (BS/MAT) for those students interested in a K-12 teaching career. This allows students to earn the physics bachelor's degree together with a MA in Teaching.

c. Graduate Research Opportunities

Beyond the graduate courses offered by the department, the program has also improved considerably in the context of graduate research. The Department offers three tracks in the physics master's program¹⁴; Master of Science with Thesis, Master of Science with Research Project, and Master of Science by Course Work (including a comprehensive exam). Almost all graduate students choose to complete their degree with a research experience

¹⁴ http://catalog.umassd.edu/preview_program.php?catoid=54&poid=7904&returnto=4460

(either as thesis or research project). Many students are able to publish the results of their research efforts in top peer-reviewed journals before they graduate; this is quite remarkable given that they accomplish this in less than two years. Moreover, nearly all students are highly successful upon graduation, whether they pursue a Ph.D. program or take a career path outside of academia such as industry, teaching, business or finance.

II.3 Curriculum Logic, Sequence & Coherence

Until recently, the MS program course requirements only stipulated a total of 30 credits (up to 6 of these can be graduate thesis or research credits) with at least 15 credits to be taken at the graduate level in the Physics Department. However, in recent years, the department's graduate committee has been working towards the establishment of a core curriculum with electives for different tracks within the graduate. This change will ensure that graduates from the MS program will have a consistent set of core skills and thus have a greater likelihood of success after graduation. A core curriculum will also permit the department to develop a regular schedule of courses making teaching assignments more predictable allowing for better planning, student advising, and coordination with the undergraduate senior-level offerings.

To earn the required 30-credits for the master's degree, students with a research project or thesis typically take three graduate courses in their first semester during which they identify a potential research project and faculty advisor. For a master's with research or thesis, the student will take two graduate lecture courses in each of the next two semesters and one lecture course in the final semester along with graduate research and/or graduate thesis courses to complete the writing of their research report or thesis.

Year-level	Course Number	Course Title
First semester	PHY 531	Quantum Mechanics I
	PHY 612	Electromagnetic Fields
	PHY 5XX	Graduate elective
Second semester	PHY 631	Quantum Mechanics II
	PHY 5XX	Graduate core course (depends on research specialty)
	PHY 680	Graduate research
Third semester	PHY 5XX	Graduate core course (depends on research specialty)
	PHY 5XX	Graduate elective
	PHY 680	Graduate research
Fourth semester	PHY 5XX	Graduate elective or core course (depends on research specialty)
	PHY 680	Graduate research or thesis
	PHY 690	

The department also offers a master's-by-course work option which requires that all 30-credits are completed as lecture courses. Over the past two decades, no student has elected to take this option for the master's in physics.

Physics Program Outcomes

II.5 The Curriculum as Preparation for Further Study or Employment

The physics department defines success in meeting the University's commitment to student learning as:

- 1) The successful placement of the student into a graduate M.S. or Ph.D. program in physics or an allied field employing their physics education (including medical physics, astrophysics, and engineering disciplines)
- or**
- 2) The successful entry of the student into the job market within a timeframe of one-year after graduation.

The post-graduate goals of students in the physics major and graduate M.S. programs are divided into two groups; those who wish to pursue graduate education and those who seek to move directly into employment in industry, business or K-12 education. Based upon internal tracking data for our recent majors for whom postgraduate study and employment data are available, a significant majority of our students have pursued an M.S. degree program after graduation. A significant fraction of the physics undergraduate program alumni will move directly into the M.S. physics program at UMass Dartmouth, which has a long record of accomplishment in providing graduate education. The next most common placement is a Ph.D. program in physics or a closely allied field like astronomy. A smaller number of graduates directly seek employment in an area utilizing their physics education after the completion of the bachelor's degree. The rate of students still actively seeking employment a year after graduation is in line with the most recently available national statistics from the class of 2009-10, which place the national level of physics bachelor's unemployment at 5%¹⁵.

Graduates from the M.S. programs have gone onto some of the most prestigious Ph.D. programs around the country at institutions including Arizona State University, Columbia University, the University of California Davis, Duke University, the University of Colorado Boulder, The George Washington University, the University of Illinois at Urbana-Champaign, the University of Notre Dame, SUNY Stony Brook, the University of Texas at Austin, Monash University and the University of Sydney in Australia and the University of Toronto in Canada, among others. Complementing these successes, the department currently has four students in the recently approved (2012) *Engineering & Applied Sciences* EAS program and *Inter-campus Marine Science* IMS¹⁶ Ph.D. program.

In addition to the formal program curriculum review, the department seeks feedback from alumni as a way to improve and update the course content as well as the curriculum. In addition, the department's annual seminar series includes at least one presentation by a department alumnus. This helps provides context to the current students about the possibilities and opportunities open to graduates with a physics degree.

III. Faculty Quality & Productivity

¹⁵ From the AIP Statistical Research Center

¹⁶ Prior to 2013 when Prof. A. Tandon transferred to the Department of Mechanical Engineering.

Programs shall ensure faculty quality and productivity.

Programs shall ensure that faculty possess the expertise to assure effective curriculum development, instructional design and delivery, and evaluation of outcomes. Faculty should exhibit awareness of trends in the discipline and the professional field as appropriate. Collectively, faculty should be involved in teaching, research/ professional/creative activity, and public service/academic outreach as appropriate to the mission and regional context of the campus. The review should answer the following questions:

1. Do faculty possess the appropriate background, experience and credentials?
2. Are faculty current in relation to the knowledge base and content of the discipline and curricular offerings?
3. Are the Program expectations for faculty involvement in teaching, research/ professional/creative activity, and public service/academic outreach activities appropriate; and how are these expectations met? Are these expectations consistent with program policies regarding teaching assignments, merit allocations, and other aspects of faculty roles and rewards?
4. In what ways does the Program foster professional development and growth of faculty?
5. In what ways does the Program faculty lend its professional expertise – as expressed through teaching and research, scholarly and creative activity – to off-campus constituencies?

III.1 Faculty Experience & Credentials

As of Fall 2018, the physics department consists of seven¹⁷ tenured faculty members (one Chancellor Professor, three Full Professors, three Associate Professors), three full-time lecturers, and one adjunct faculty member (with no teaching duties). Of the full-time faculty, nine have an earned Ph. D in physics or a related field. Part-time lecturers are hired into the department on an as-needed basis to cover faculty course releases and sabbaticals. Many of the faculty taught at other institutions before joining the University of Massachusetts Dartmouth and thus have brought relevant experience and new ideas in teaching pedagogy to the physics department.

Table 6: Current (Fall 2018) full-time and adjunct faculty members of the physics department

Faculty Member	Academic Rank	Research Interests
Robert Fisher	Associate Professor	Computational Astrophysics
Alan Hirshfeld	Full Professor	History of Physics
J.P. Hsu	Chancellor Professor	High-Energy Particle Theory
David Kagan	Full-Time Lecturer	High-Energy Particle Theory
Gaurav Khanna	Full Professor	Gravitational Physics & High-Performance Computing

¹⁷ At the end of Spring 2019 one faculty member will be retiring, reducing the department's instructional resources to six tenure-track faculty and a total of nine full-time faculty.

Grant O’Rielly	Associate Professor	Experimental Nuclear Physics
Richard Price ¹⁸	Adjunct Professor	Gravitational Physics
Renuka Rajapakse	Full-Time Lecturer	Quantum Optics & Quantum Computing
John Silva	Full-Time Lecturer	Earth Sciences
Jay Wang	Associate Professor	Atomic, Molecular & Optical Physics
Marguerite Zarrillo	Full Professor	Traffic Engineering

The table below shows the number of instructional faculty by rank in the physics department over the past two decades. The number of tenure-track/tenured faculty has been reduced to nearly half of the total present in AY 2002 while the number of full-time lecturers has stayed steady at two or three and the number of part-time lectures has dramatically decreased, this decrease came about largely due to changes made in how the introductory physics courses are delivered.

Table 7: The number of instructional faculty by academic rank in the physics department

	Faculty Numbers by Academic Rank																
Rank	AY 02	AY 03	AY 04	AY 05	AY 06	AY 07	AY 08	AY 09	AY 10	AY 11	AY 12	AY 13	AY 14	AY 15	AY 16	AY 17	AY 18
TT	12	11	11	10	10	9	8	8	8	8	8	8	7	7	7	7	7
FTL	2	2	2	2	3	3	3	3	2	2	2	2	2	2	2	2	3
PTL	3	4	4	4	4	4	7	3	1	1	1	1	0	0	1	2	0

III.2 Faculty Currency in Discipline Content & Curriculum

The research interests of the physics faculty span a broad range of fields in physics, with expertise in areas ranging from atomic and nuclear physics to astronomy and astrophysics. Most of the tenured faculty have active research programs in their area of expertise. Many of the faculty emphasize theoretical studies in their research with just two faculty with research activities as experimentalists. During the past three years the Physics Department faculty have published 33 scholarly articles (with another seven submitted) in peer-reviewed journals describing research in astrophysics, nuclear physics, computational simulation and gravitational theory. In addition, the faculty have produced seven books and monographs together with four open-access resources, 56 conference presentations and invited talks, and 19 technical reports and book reviews. The faculty have been awarded research funding

¹⁸ Dr. Price has no teaching duties.

totaling \$350,000 together with \$650,000 for high-performance computing hardware from national funding agencies such as the National Science Foundation, the Department of Defense and NASA.

III.3 Program Expectations:

Faculty Involvement in Teaching, Scholarship & Service

a. Teaching

The standard teaching load for research-active faculty in the College of Engineering is 12-teaching units of course work though the academic year (this is typically a course load of two-two), this does not include course buy-outs or course releases made available to those faculty who take on leadership roles in the department or other academic programs, the Faculty Senate or the Faculty Federation. Full-time lecturers have a standard teaching load of 24-teaching units though the academic year (typically a four-four course load). The Faculty Federation collective bargaining agreement states that tenured faculty are expected to distribute their activities across all three areas of evaluation; teaching (40%), scholarship (40%) and service (20%). Full-time lecturers are not required to undertake research and are evaluated annually on their teaching (80%) and service (20%).

b. Scholarship

The physics faculty have a strong record of research in their respective disciplines. Research publication from the physics department accounts for roughly a quarter to a third of all high-impact publications at the University, as determined by the 2018 index¹⁹. The Nature Index, developed by the Nature Publishing Group, tracks research publications among a selection of 68 high-impact journals. According to the publishing group, "*the Nature Index provides a close to real-time proxy for high-quality research output at the institutional, national and regional level*".

The faculty are members of professional associations including the American Physical Society, the American Astronomy Association, the American Association of Physics Teachers, and Traffic Engineering Society. The faculty routinely attend professional conferences and meetings in their respective fields both to present the results of their own research and to stay current in their area of research.

Physics faculty members have been disproportionately active in the leadership of collaborative and interdisciplinary initiatives. The most significant such activities are:

The *Engineering & Applied Sciences* (EAS) doctoral program is a multi-track, interdisciplinary doctoral program that spans departments in the College of Engineering, the College of Arts and Sciences as well as the Charlton College of Business. The Physics Department participates in the Computational Science track of the EAS program, which is the track with the largest enrollment. This program plays an important role in maintaining the University's recently earned DRU status. The Graduate Program Director of the EAS program, responsible for all administrative aspects, has been a Physics Department faculty member since the program's approval by the UMass Board of Trustees in 2012.

¹⁹ Based on the 2018 Nature Index's Weighted Fractional Count from <https://www.natureindex/institution-outputs/united-states-of-america-usa/university-of-massachusetts-dartmouth/513906be34d6b65e6a000571>

The *Center for Scientific Computing & Visualization Research (CSCVR)* is an interdisciplinary research center with 25 faculty members from the engineering and science departments and their graduate students. The Center promotes high-performance computing activities through several HPC clusters; these are shared resources available for use by all scientific computing group members. Through its educational efforts, the Center provides a focal point for research projects for undergraduate and graduate students, thus providing high-quality, discovery-based educational experiences. Research expenditures in the Center are approximately \$250k annually. This Center was co-founded and is co-directed by Gaurav Khanna from the Physics Department together with a faculty member from the Department of Mathematics. The department's professional technician attends to all hardware related technical issues in the Center. The resources available through the CSCVR have been crucial in attracting and retaining new computational science and engineering tenure-track faculty in the Departments of Computer & Information Science, Mechanical Engineering, Civil & Environmental Engineering and Mathematics. It also serves as a key recruitment tool for faculty cluster-hires in the Departments of Computational and Information Science, Biology and Chemistry.

c. Service to the College and University

The physics faculty have been engaged in many service activities at the College and University level. Physics faculty represent the College on numerous important committees including the University Curriculum Committee, the Honor Committee and the General Education Committee. Supporting the role of faculty in shared governance, physics faculty members have served on the Faculty Senate (including as senators and as the Engineering Council representative to the senate steering committee) and on the executive board of the Faculty Federation. Grant O'Rielly served as Senate President for the years 2010 – 2014 and currently is serving as Vice-President of the Faculty Federation since 2017.

III.4 Program Support for Professional Development

The College of Engineering Dean's office provides up to \$850 annually to each faculty member to supplement expenses for faculty to present at professional conferences and meetings. An additional \$500 may be provided by the Provost's office upon application. The University of Massachusetts Dartmouth provides sabbatical leave to tenured faculty members upon approved application.

It is worth noting that the Physics Department is generally collegial and provides a supporting environment to the tenured faculty and full-time lecturers. Many of the faculty happily share their syllabus and lecture presentations when a colleague takes on a new teaching assignment, this willingness to share extends to those graduate students who agree to teach the summer sections of introductory physics.

III.5 Program Support for Off-Campus Constituencies

The Department faculty are engaged with several community and professional organizations to which they provide their expertise and time. Faculty members serve as judges for local high school science fairs each year and several faculty members have given public lectures on topics in physics and astronomy. Many of the research active faculty have served as reviewers for national funding agencies (such as NSF and Canada's equivalent, the National Science & Engineering Research Council, the UK's Royal Society and others), evaluating and ranking research proposals in their field of physics. Faculty from the Physics Department also serve in key leadership roles with professional societies.

IV. The Teaching & Learning Environments

Programs shall ensure teaching/learning environments that facilitate student success.

Programs shall provide learning environments that promote student success. Students are expected to learn both content and skills appropriate to the discipline. The program should indicate clear expectations for student learning outcomes. The teaching/learning environment should be accessible to all students, should include a variety of instructional methodologies, and should provide timely feedback to students. The review should answer the following questions:

1. To what extent does the Program have articulated learning outcomes (content and skills) for students? By what means are these outcomes measured? Are they achieved by most students?
2. How is assessment of student learning outcomes used in reviewing or evaluating Program curriculum and faculty?
3. In what ways does the Program evaluate student success following graduation and the Programs' contribution to that success?
4. What is the role of the core faculty in teaching lower division, upper division and graduate courses? What is the rationale for these assignments?
5. Metrics on Freshman and overall retention and graduation rates shall be provided for the period since the previous AQAD review.

IV.1 Student Learning Outcomes

The student learning outcomes expected from the graduate courses in the physics programs include that the students gain an understanding of fundamental physics concepts and how they apply to real-world situations as well as having the students develop related skills in problem solving, critical thinking, and mathematical analysis. Each faculty member includes tailored student learning outcomes in their course syllabi that are aligned with these broader program learning outcomes set by the department.

The department does not possess any formal, externally-defined means for assessing student attainment of the program and course-specific learning outcomes for the graduate programs. Internal assessment of the student learning outcomes is done using a variety of methods including the course exams, in-class quizzes and homework assignments. The in-class quizzes and homework assignments are used by instructors to assess the student understanding and, if necessary, to adjust the course as required to ensure that the students meet the expected learning outcomes. While these internal measures have not been validated against external references, the department is confident that the success of the students graduating from the physics graduate program indicates that the student learning outcomes are being met.

IV.2 Evaluation of Learning Outcomes: Program & Faculty

Teaching and Advising is one of the areas used to evaluate faculty every year. The department Faculty Evaluation Committee (FEC) reviews the Faculty Activity Report submitted by each faculty member at the end of the Spring

semester. This evaluation also includes the student teaching ratings for each course. Members of the FEC also conduct peer evaluations of faculty teaching as a component of personnel actions.

IV.3 Evaluation of Student Success after Graduation

Illustrating the quality of the physics major and master's programs, graduates from these programs have achieved national recognition in many areas. Recent examples of highly successful graduates include: Peter Jumper (B.S. 2013) who was one of seven finalists nationwide for the highly prestigious Apker Prize offered by the APS. He was offered a full five-year Dean's Fellowship for the Ph.D. program at Columbia University's Astronomy Department – the highest fellowship honor which Columbia offers to incoming graduate students. More recently, Danielle Tinkham (B.S. 2005, M.S. 2008) and Gary Forrester (M.S. 2012) were recognized as a PhysTEC Teacher of the Year in 2016 and 2018 respectively.

IV.4 Teaching Assignments

The tenured faculty in the physics department provide instruction at every level of the undergraduate and graduate programs. Faculty teaching assignments are made each semester by the Department Chairperson in consultation with the department faculty and the approval of the Dean's office. The course assignments made reflect the preferences of the faculty members subject to the program instructional needs, enrollment projections and the University's course cancellation guidelines. Every effort is made to maintain continuity in teaching assignments across the academic year and thereby reduce the number of new course preparations assigned to any faculty member. The department maintains a two-year roster of probable course offerings so that faculty advisors can discuss course options with students.

The department has been very fortunate that its two most recent hires of full-time lecturers each hold a Ph.D. in physics. These lecturers can teach at every level of the physics programs and, while their teaching assignments are less flexible, the department makes every effort to allow them to teach at least one graduate or upper-division course each year. This has also provided the department with additional upper-division/graduate course that can be offered to the students. Research-active faculty are provided with the opportunity to offer a graduate-level course in their specialty at least every two years (this scheduling frequency makes the course available to all students at some point in their program).

V. Resources

Programs shall ensure that resources are used wisely.

Programs shall ensure that the resources available are used to meet Program goals and objectives, and as appropriate, engage in use of innovation to enhance resources; should engage in both intra- and inter-campus collaboration; and should demonstrate a commitment to effective and efficient use of resources. The review should answer the following questions:

1. What process does the Program use to allocate resources?
2. In what ways does the Program maximize the use of its human resources?
3. In what ways does the Program maximize the use of material resources such as space, equipment, operating funds, etc.?

Overview

The Physics Department has an annual operating budget of approximately \$12,000. The College of Engineering Dean's Office provides additional funds of approximately \$105,000 annually for stipends for the seven graduate Teaching Assistants²⁰ in the physics department and another approximately \$4,000 annually used to hire undergraduate students to assist instructors in those courses with large enrollments²¹. The discretionary resources controlled by the department are approximately \$25,000 in accumulated Research Indirect Expenditures²² and \$1,000 in University Foundation funds²³. The operating budget is provided by the Dean's Office and depends on the number of majors.

V.1 Resource Allocation Process

University approved vendors are used for all department purchases. The Department Chairperson authorizes expenditures from the operating funds, subject to approval by the Dean's Office and University regulations and policies. Requests for approved conference travel reimbursement are made through the Chairperson.

The department operating funds are used for regular office expenses (photocopier lease, stationery, phone, office supplies, etc.), the repair and maintenance of the (introductory) teaching laboratory equipment and the purchase of teaching laboratory consumables. If sufficient funds are available at the end of each fiscal year, the department Chair will consult with the department faculty on how these funds could best support the physics program. When

²⁰ The graduate Teaching Assistants are the instructor of record for the introductory physics laboratory and recitation sessions.

²¹ Referred to as "graders", for the past three years the physics department has used these funds to support undergraduate Learning Assistants in the introductory physics courses.

²² At the University of Massachusetts Dartmouth, departments are allocated 10% of the total Research Indirect Expenditures associated with research awards controlled by a department faculty member. These funds have been accumulated over multiple years. The rate of replenishment depends on the value of the research expenditures made by the department faculty each year.

²³ Some Foundation accounts are dedicated to specific activities and are controlled by a particular faculty member in the departments rather than the Chairperson.

available, these funds are typically used to purchase equipment for use in the sophomore and upper-division laboratory courses in the major.

The department discretionary funds are somewhat restricted in their uses. Funds from the Research Indirect account are used to support the research activities of the department; recent uses have included support for a graduate student to travel and present research results at an international conference, and stipend support for graduate students to enable them to complete their research project and M.S. thesis. Foundation funds are typically associated with a specific project or activity such as the campus Observatory and are used to support these activities only.

V.2 Personnel

As of Fall 2018, the physics department consists of ten full-time faculty members together with one department technician and one office clerk. Several undergraduate students are hired each semester to support department activities.

a. Support Staff

The department's full-time support staff consists of a computer technician, Mr. Glenn Volkema, who is responsible for the maintenance of the introductory physics teaching laboratory computers, and the department clerk, currently Ms. Anne-Marie Bedard, who is responsible for the physics office operations. In addition, the department typically hires two work-study students each year to assist Ms. Bedard in her activities, and approximately ten undergraduate students as Learning Assistants for the introductory courses. Prior to Fall 2018, the department also hired one or two part-time lecturers each year as instructors for required courses.

Computer Technician: Mr. Volkema's tasks involve the following activities; hardware and software maintenance for the computers used in the physics laboratory rooms, coordination with the faculty in the physics department and other engineering departments and the mathematics department who also used these rooms for courses. In 2014, with the retirement of another technician from the department, he also took on the task of supporting the teaching laboratory equipment, working with the Teaching Assistants responsible for the labs to ensure sufficient equipment is available and coordinating with the department clerk to order requires supplies. Mr. Volkema also works with the faculty associated with the Center for Scientific Computing and Visualization research supporting their research, and he provides support to physics faculty member Prof. Khanna, assisting him with hardware and software support for Prof. Khanna's research into novel, high-performance computing platforms.

Office Clerk: Ms. Bedard has a Clerk IV position and employed full-time to support the Physics Department, particularly assisting the Chairperson in their duties. Her primary responsibilities include staffing the physics office, and responding to inquiries from faculty, students, and staff. She also maintains the department's office supplies (ordering items as required), assists with budget matters, coordinates the student hiring processes with the Dean's office and HR and supervises work-study students each semester.

b. Department Committees & Positions

The department has several standing committees, each chaired by a tenured faculty member as a part of their expected service activities. These committees are:

1. Faculty Evaluation Committee
2. Department Curriculum Committee
3. Graduate Committee
4. Awards & Scholarship Committee
5. Seminar Committee
6. Computer Committee
7. Finance Committee
8. Space Committee

The first three listed committees are the most active. The Faculty Evaluation Committee deals with the required annual personnel evaluations. The Department Curriculum Committee addresses all curriculum issues in the undergraduate and graduate programs including; new course proposals, University Studies (general education) course reapprovals, evaluation of course syllabi and evaluation of course sequencing. In addition, the Curriculum Committee regularly reviews the physics curriculum in terms of recruitment, student success, degree progression and relevance to student employment and post-graduate studies, and considers what, if any, changes are warranted. The Graduate Committee reviews graduate student applications and assists the Graduate Program Director in their work.

In addition to these standing committees, the department has a Graduate Program Director who, in consultation with the Graduate Committee members, is responsible for reviewing graduate student applications, selecting students for open Teaching Assistant positions, making these Teaching Assistant offers and completing the necessary Teaching Assistant employment paperwork for review and approval by the Chairperson and Dean's Office. At the start of every semester the Graduate Program Director assigns graduate Teaching Assistants as instructors for the introductory physics course laboratory and recitation sections.

V.3 Space, Equipment & Funds

The physical spaces allocated to the Physics Department has remained constant since the previous AQAD review. These spaces include faculty offices, the department main office and other common spaces, and classrooms used predominately for physics courses.

a. Office & Common Spaces

Each full-time member of the faculty and the department technician has their own office, most of these offices are located close to the main physics office although one faculty member's office is in another campus building some distance away from the main office. Dedicated graduate student space is available in room SENG 217D (310 sq. ft.) with additional space in SENG 208 (554 sq. ft) and SENG 306 (1180 sq. ft). The graduate students are each provided with a desk/cubicle.

Common spaces for the department are located in the *Science & Engineering Building* in SENG 203 and SENG 204. Room SENG 203 include the department main office, the department conference room and a storage hall where the photocopier and office supplies are located. Also located in this area is an office space previously used by a department technician. Upon this technician's retirement this space was repurposed to additional storage for the introductory laboratory equipment and supplies. Room SENG 204 (674 sq. ft) includes the technician's office, storage space for teaching and laboratory equipment and a "student lounge". This last space was created using

hand-me-down furniture²⁴ obtained from campus facilities group and is heavily used by the physics majors during the semester.

b. Office Equipment & Technology

The physics department has a networked multifunction device (photocopier/printer/scanner) and FAX machine for use by the physics faculty. Graduate students are provided with their own code for the multifunction device with a small monthly print limit. Those graduate Teaching Assistants who need to make large numbers of copies for their teaching assignments can request an increase in their print limit. The common spaces include two small refrigerators for use by the department faculty, staff and physics students.

Each faculty member is provided with a university-owned laptop (both Mac and PC are available), typically on a four-year replacement cycle, that is generally used for classroom lecture presentations. The University has site-licenses for the MS Office suite, the Adobe Suite and anti-virus software which are preinstalled on each computer. Since many of the research-active faculty require high-performance computers for numerical simulations or data analysis as a part of their research, the physics department has provided them with desktop computers. These computers were built mostly using components from a decommissioned high-performance computing cluster with some additional parts (case and monitor) purchased at a small cost to create a desktop unit.

c. Classroom Spaces

There are four classroom spaces largely dedicated to physics instruction, one of these is a small capacity (527 sq. ft. with 15 seats) classroom (SENG 102) used for many of the required major courses, two of these rooms are dedicated to the introductory physics laboratory sections and the calculus courses for engineering students; SENG 201 (1505 sq. ft.) and SENG 207 (1763 sq. ft.). The fourth room, SENG 306 (1180 sq. ft. with 12 seats) is used for the sophomore and senior lab courses (four section offered each year) as well as many of the upper-division electives and graduate lecture courses. This room also has desks for three graduate students.

SENG 102: This is a 15-seat, technology equipped classroom that includes a whiteboard, an LCD projector with a DVD player and a document camera able to connect to a laptop for displaying presentations.

SENG 306: This room has laboratory benches with space for 10 – 12 students and is used for the laboratory courses in the major; PHY 225 *Intro. to Experimental Physics I*, PHY 227 *Intro. to Experimental Physics II*, PHY 322 *Electric Devices & Circuits* and PHY 421 *Advanced Physics Laboratory*. This room also has tables with 12-seats together with a blackboard that is used as a classroom for many of the upper-division elective and graduate courses offered by the department.

SENG 201 & SENG 207: These two rooms were renovated during Summer 2018. Prior to these renovations, these rooms were each 48-seat classrooms with 24 computer stations. The two rooms used to have a similar layout and were used for the introductory physics laboratory sections as well as used for traditional lectures in the introductory calculus sections offered to engineering students. These rooms were an early implementation of what is referred to as studio-style learning spaces where the lecture delivery and laboratory exercises are combined. The layout of these rooms had not kept pace with the most pedagogically effective teaching approaches with a

²⁴ A couch and two armchairs salvaged during renovations of the student dormitory rooms were donated to the physics department.

negative impact on undergraduate student recruitment. The previous facilities were not ideal for encouraging group work or implementing practices such as the participation of undergraduate Learning Assistants. In addition, the equipment used for the laboratory exercises were last upgraded in 2012 (for the E&M labs) and 2003 (for the mechanics labs). Due to wear-and-tear on the equipment this led to numerous student complaints over the years about the poor condition or lack of equipment for the lab exercises. Compounding this, the changes made in 2014 to the delivery of the introductory physics courses for engineering students removed the course instructor from the laboratory room, resulting in a decline in the organization and general housekeeping in these rooms. Consequently, there has been diminished training for the graduate TAs assigned as the instructors for these labs. This has been made more acute by the reduction in technical support positions in the physics department (from two to one). Finally, the students and faculty are also dissatisfied with the present laboratory activities as they are written in a “cookbook” style which discourages critical engagement and impedes students’ drawing connections between their laboratory exercises and the main course material.

During the planning process for the renovations the physics department recommended that each room should serve a dedicated function, with one configured as a true lecture room and the other as a modern, studio-style laboratory space. This recommendation was accepted, and SENG 207 is now a 60-seat, technology equipped classroom that includes a whiteboard, two LCD projectors connected to a DVD player and a document /laptop input for displaying presentations. This room is used by the mathematics department to deliver the introductory calculus courses to engineering students. The other space, SENG 201, is now a 48-seat studio-style classroom with workstations for 6-students each arranged throughout the room. This new layout makes it easier for the graduate TA laboratory instructors to assist individual groups. This room is used for both the mechanics and E&M introductory laboratory sections in PHY 103, 104, 111, 112, 113 and 114 as well as for the Introduction to Engineering course EGR 111.

d. The Campus Observatory

The campus observatory consists of a 16” Meade reflector telescope with a research grade CCD camera attached. The telescope mount was replaced several years ago with a computerized version to provide a more stable system with better tracking capabilities. The observatory is predominately used for public outreach with month open-house events. It has also been used to obtain the data for some graduate master’s theses.

e. Library Resources

The library recently eliminated its subscription to almost all the physics journals, so faculty and students must rely on interlibrary loans or a personal journal subscription through their professional society membership to access the journal articles needed for their research.

f. High-Performance Computing Resources

The Physics Department was deeply involved in the establishment and leadership of the University’s Center for *Scientific Computing & Visualization Research* (CSCVR). This offers an extensive array of computing and information technology support services through the campus *Computing and Information Technology Services* (CITS), services that are made available to the members of the Physics Department as well as to other researchers at the University.

These resources include a large computational cluster that was established through funding from the *Office of Naval Research* (ONR). This cluster consists of 50 nodes each with 24 Intel Xeon 2.5 GHz processor cores and 48 GB

of main memory. A significant fraction of these nodes (15) also include a high-end Nvidia V100 GPU for OpenCL or CUDA-accelerated computing. There is a RAID storage unit attached to these nodes with a total capacity of 132 TBs. In addition, this cluster also includes two OpenPOWER9 servers each with 32 processor cores and 2 Nvidia V100 GPUs that support the NVLink2 interconnect between the CPU and GPUs, maximizing data throughput. These systems are housed in the CITS data center on campus

There are also several innovative compute clusters built entirely from consumer-grade video-gaming components (eg. over 300 Sony PlayStations) for the exploration of low-cost/high-efficiency technology for high-performance computation. These systems have been developed as a part of Gaurav Khanna's research program.

For data visualization, the CSCVR offers two, frame-mounted, Sharp 80-inch aquos board interactive display systems (full array LED backlight with touch-screen, 1080p HD). The displays are driven by a high-end visualization server powered by a Nvidia Quadro graphics card. An additional high-resolution, multi-panel, visualization wall is planned.

Additional computing resources available to the Physics Department include access to the *Massachusetts Green High-Performance Computing Center* (MGHPCC). This is a unique initiative by the University of Massachusetts, Boston University, Harvard University, MIT, Northeastern University and the Commonwealth of Massachusetts to deliver a world-class computational infrastructure to the research and academic community, indispensable in the increasingly data-rich environment of modern science. With the increasingly integrated role of computation in basic and applied research, the MGHPCC represents a critical piece of infrastructure that will fuel the innovation economy of the Commonwealth. The MGHPCC is located in Holyoke MA and provides computing to the five University of Massachusetts Campuses. The UMass shared high performance computer cluster has 14,376 cores available with 660 TBs of high-performance EMC Isilon X series storage and 513 TBs of Farline storage.

g. Department Seminar Series

The Physics Department runs a research seminar series annually. Over a typical year, on average six colloquia-style invited talks are scheduled at a time that is convenient for most faculty and students. Most speakers are external, from regional institutions, and their travel expenses are covered by a \$1,000 Provost's seminar award that the Department has received every year (through a campus-wide proposal review process). The seminar series is managed by the seminar committee.

h. Direct Instructional Expenditures

The direct instructional expenditure per full-time equivalent student for the Physics Department has been roughly stable for the past decade.

Table 8: Instructional expenditures by the Physics Department each year since 2010.

Physics Department Instructional Expenditure per FTE Student							
Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Average
\$7,124	\$8,484	\$7,581	\$7,438	\$7,410	\$8,514	N/A	\$7,759

VI. Future Plans & Opportunities

VI.1 The Physics Department – Initiatives

a. Short-term Plans

The department will seek to maintain or raise the program quality under constrained or diminishing resources, grow the Engineering and Applied Science doctoral program under flat research funding, maintain the diversity and number of undergraduate and graduate course offerings, provide new opportunities for undergraduate students to be involved in faculty research, continue to respond to student needs and requirements, continue to look for opportunities to grow enrollment in the major and minor programs, continue to identify opportunities to increase research funding, and improve the effectiveness and efficiency in instruction and research.

b. Long-term Plans

The department will seek to grow the enrollments in both the undergraduate and graduate programs with significant growth in the Engineering and Applied Science doctoral program. The department will make strategic investments in new interdisciplinary research directions (eg. Environmental Science and Big Data Science) and will increase research funding.

These goals are consistent with the University's mission statement that "we provide young people from all backgrounds and circumstances with the education and skills necessary to become knowledge workers". They are aligned with the university's strategic plan of increasing revenue through enrollment growth and investing in doctoral program growth.

Astrophysics/Gravitational Wave: A tenure-track position is requested to add to the department's existing strength in the area of astrophysics. This would not be a new faculty line. Rather, it would be a replacement position given Dr. Zarrillo's retirement at the end of the 2018/19 academic year. The envisioned focus area for such a position is gravitational waves — an area experiencing tremendous growth due to the recent Nobel Prize winning discoveries made by LIGO and other similar observatories. An additional research-active faculty member in astrophysics would allow the Physics Department to develop new major in astrophysics. The department already offers a popular concentration in astrophysics as part of the major. This proposed astrophysics major would use the existing, strong core curriculum in physics and astrophysics and would add a new emphasis on gravitational waves, making it different from the existing astrophysics major at the University of Massachusetts Amherst and almost unique in the nation. This new major would take advantage of existing faculty expertise and research interests (Gaurav Khanna, Robert Fisher in the Physics Department and Scott Field from the Mathematics Department). With a strong background in physics and computational science, students graduating from this new major would have a range of career options open to them. Having such a major would distinguish us from the other physics programs in the region as well as help drive enrollment in the department's undergraduate and, eventually, graduate programs. For full details, the formal request for this position is included in Appendix III.

A review of existing astrophysics majors from around the nation show that most require 5 – 6 courses in astrophysics across the undergraduate curriculum. With the existing courses already offered by the department, it would be necessary to develop just one or two new courses to create a compelling and competitive astrophysics major.

The curriculum specific to the astrophysics major would look something like the following:

Freshman Year

PHY 152 – *Stars, Planets and the Search for Extraterrestrial Life*

This course would also be offered as a General Education course.

Sophomore Year

PHY 210 – *Intro. To Black Holes & Gravitational Waves*

PHY 252 – *Elementary Astrophysics*

Junior Year

PHY 363 – *Intermediate Astrophysics*

PHY 3XX – this would be a course relevant to astrophysics

eg. Computer Modelling, Nuclear Physics, Statistical Thermodynamics

Senior Year

Two of the following courses:

PHY 410 – *General Relativity: Black Holes & Gravitational Waves*

PHY 410 – *Cosmology*

PHY 410 – *Galactic Structure & Evolution*

PHY 410 – New Course, to be developed

All these courses would be cross-listed with graduate courses and would be made available as electives to students in the regular physics major.

Optional, encouraged for those students seeking to continue into a graduate program in astrophysics

PHY 480/490 – *Undergraduate Research and/or Thesis with an astrophysics topic*

Big Data Science: An assistant professor position is requested to strongly impact the new, university-wide, interdisciplinary Engineering & Applied Sciences (EAS) doctoral program and the Data Science degree program. The EAS program has a critical need for additional faculty researchers for mentoring doctoral students and for external funding support. In particular, the position would be sharply focused on the nationwide Big Data initiative, which is anticipated to have considerable support from all federal grant agencies over the next decade. This position would make a clear and direct contribution to the university's goal of achieving "research-one" classification within the decade. It is ideal for this position to be housed in the physics department as it is playing a key role in advancing and administering the EAS doctoral program and is also playing a lead role in the broad area of computational science through the Center for Scientific Computing and Visualization Research.

VI.2 The Physics Department – Strengths

Highlighting the strengths of the department are the high-quality instruction provided by full-time faculty at every level of the undergraduate and graduate programs, and the very close advising and mentoring provided to all majors in the Physics program. The Department continuously assesses its programs and makes appropriate adjustments to the program curriculum through available course offerings and experiential learning opportunities. These changes strongly benefit the students, as demonstrated by their success in graduate program applications or finding rewarding employment post-graduation. On the research side, the Department's aggregate research output ranks competitively with other departments in the College, despite the Physics Department being much

smaller in research faculty numbers, having a predominately science focus, and the large service burden of the department to the College of Engineering and the University as a whole.

VI.3 The Physics Department – Challenges

The principal challenge the physics department faces is growing enrollment and maintaining the quality of the existing programs in a time of diminished instructional resources and fiscal belt-tightening. Meeting this challenge has required inventive changes over the past several years in how the Department meets its instructional obligations. These changes have improved the overall productivity in delivering student credit hours in both the undergraduate and graduate classrooms, but essentially all such opportunities for this have been implemented within the Physics program.

One significant challenge faced by the physics graduate program is that the Teaching Assistantship stipends offered are not competitive with those offered by other institutions, making it difficult to recruit highly-qualified students into the program. The value of these stipends was increased in 2018 since the value of the existing stipend was less than the cost-of-living (as determined by the University's graduate office) and international applicants were required to demonstrate additional cash assets in order to apply for their student visa. The new stipend slightly exceeds the cost-of-living. Further, these stipends are for the nine-month academic year and there are limited university resources to provide summer support for graduate students.

Another problem, one not unique to the physics department, is that the Graduate Office staffing has not kept pace with the growth in graduate programs at the university. This results in significant delays in both processing applications for the graduate program, which has a negative impact on the department's ability to recruit and enroll students into the physics master's program, and in conferring degrees, which impacts the student's applications for employment or entry into a Ph.D. program.

A different challenge is presented by the growth of the graduate profile of the University. The department has historically been one of the strongest master's-level physics programs in the nation. With the introduction of the new EAS doctoral program, the graduate program in Physics now must begin to re-invent itself and compete with Carnegie DRU R2 & R1 institutions for a limited pool of highly-qualified Ph.D. graduate students. As it does this, the department must balance the growth of the doctoral program with the continuing need to support the existing master's program. Furthermore, as the University is now a Carnegie DRU R2 institution and moves towards earning Carnegie DRU R1 designation in its own right, the department must increase its research funding in order to support new Ph.D. students. The success of these new graduate programs will present new opportunities for increased research productivity on the part of our faculty. However, the EAS doctoral program comes online in a time of fiscal tightening imposed as the University meets its financial challenges, this impacts the department's ability to respond quickly to new opportunities. Additional fiscal concerns are driven by the budgetary sequestration at the national level that has resulted in reduced funding from national agencies and even greater competition for already scarce research dollars from these agencies. The success of research and graduate education in the department, as well as the College of Engineering as a whole, hinges on how well the university's administration and faculty can work together to support existing research programs, particularly during faculty-funding gap periods, and in assessing and actively investing in new areas of research activity.

Appendices

- I. Publication list (past three years)
- II. External Funding (past three years)
- III. Memorandum requesting tenure-track hire in the area of Astrophysics/Gravitational Wave
- IV. Faculty CVs (presented alphabetically)
 - 1. Robert T. Fisher
 - 2. Alan Hirshfeld
 - 3. Jong Ping Hsu
 - 4. David Kagan
 - 5. Gaurav Khanna
 - 6. Grant O’Rielly
 - 7. John Silva
 - 8. Jianyi (Jay) Wang
 - 9. Marguerite Zarrillo

I. Faculty Publication list (past three years)

I.1 Peer-reviewed Journal Articles

(in preparation)

- i. **The Intrinsic Stochasticity of the ^{56}Ni Distribution of Single-Degenerate Type Ia Supernovae**
C. Byrohl, R. Fisher, and D. Townsley
submitted to *The Astrophysical Journal*.
- ii. **Double-Degenerate Carbon-Oxygen and Oxygen-Neon White Dwarf Mergers: A New Mechanism for Faint and Rapid Type Ia Supernovae**
R. Kashyap, T. Haque, P. Lorén-Aguilar, E. García-Berro, and R. Fisher
accepted to *The Astrophysical Journal*.
- iii. **Carbon Detonation Initiation in Turbulent Electron-Degenerate Matter**
R. Fisher, P. Mozumdar, and G. Casabona
submitted.
- iv. **Measurement and Quantum Dynamics in the Minimal Modal Interpretation of Quantum Theory**
J. A. Barandes and D. Kagan
submitted to *Annals of Physics* [arXiv:1807.07136]
- v. **Exact Hubble Velocity and Cosmic Redshift z Based on Quantum Yang-Mills Gravity**
J.P. Hsu and L. Hsu
submitted to *Mod. Phys. Letters* (2018)
- vi. **Comparative Analysis of Capacitance and Electrostatics by Meshfree and Mesh-based Methods.**
N. J. Moniz, J. Wang, and Y. Hao
submitted to *Journal of Computational Physics* (2018).
- vii. **Application of Discrete Symplectic Method to the Schrodinger Equation**
T. Robertson and J. Wang
accepted: *URCA, NCHC Journal of Undergraduate Research and Creative Activity* (2018).

(in press)

- viii. **Observations of SN 2015F suggest a correlation between the intrinsic luminosity of Type Ia supernovae and the shape of their light curves > 900 days after explosion**
O. Graur, D. Zurek, A. Rest, I. Seitenzahl, B. Shappee, R. Fisher, J. Guillochon, M. Shara, and A. Reiss
The Astrophysical Journal, 859, 79 (2018).
- ix. **Black Hole Spectroscopy: Systematic Errors and Ringdown Energy Estimates**
V. Baibhav, E. Berti, V. Cardoso, and G. Khanna
Phys. Rev. D **97**, 044048 (2018).
- x. **Linearized Stability of Extreme Black Holes**
L. Burko and G. Khanna
Phys. Rev. D **97**, 061502(R) (2018) [Rapid Communication].
- xi. **Von-Neumann Stability and Singularity Resolution in Loop Quantized Schwarzschild Black Hole**
A. Yonika, G. Khanna and P. Singh
Class. Quant. Grav. **35**, 045007 (2018).

- xii. **Closed Timelike Curves Produced by Moving Naked Line Singularities**
C. Mallery, G. Khanna and R. Price
Class. Quant. Grav. **35**, 175020 (2018).
- xiii. **Big Jets Model with CPT Invariance and Dynamics of Expansion with Quantum Yang-Mills Gravity**
J. P. Hsu, L. Hsu and D. Katz)
Mod. Phys. Letters A, **33**, 1850116 (2018).
- xiv. **Compton Scattering from the Deuteron Above Pion-Production Threshold**
B. Strandberg, J.R.M. Annand, W. Briscoe, J. Brudvik, F. Cividini, L. Clark, E.J. Downie, K. England, G. Feldman, K.G. Fissum, D.I. Glazier, K. Hamilton, K. Hansen, L. Isaksson, R. Al Jebali, M.A. Kovash, S. Lipschutz, M. Lundin, M. Meshkian, D.G. Middleton, L.S. Myers, D. O'Donnell, G. O'Rielly, B. Oussena, M.F. Preston, B. Schröder, B. Seitz, I. Strakovsky, and M. Taragin
*Phys. Rev. C***98** 012201 (2018).
- xv. **Constraining the Single-Degenerate Channel of Type Ia Supernovae with Stable Iron-Group Elements In SNR 3C 397**
P. Dave, R. Kashyap, R. Fisher, F. Timmes, D. Townsley, and C. Byrohl
The Astrophysical Journal, 841, 1 (2017).
- xvi. **One-Armed Spiral Instability in Double-Degenerate Post-Merger Accretion Disks**
R. Kashyap, R. Fisher, E. García-Berro, G. Aznar-Siguán, S. Ji, and P. Lorén-Aguilar
The Astrophysical Journal, **840**, 16 (2017).
- xvii. **Scalar collapse in AdS with an OpenCL open source code**
S. Liebling and G. Khanna
Class. Quant. Grav. **34**, 205012 (2017).
- xviii. **Gravitational wave sources: reflections and echoes**
R. Price and G. Khanna
Class. Quant. Grav. **34**, 225005 (2017) [Special recognition: 2017 Highlights].
- xix. **Black Hole Ringing, Quasinormal Modes, and Light Rings**
G. Khanna and R. Price
*Phys. Rev. D***95**, 081501(R) (2017).
- xx. **Scalar Fields in Black Hole Spacetimes**
I. Thuestad, R. Price, and G. Khanna
*Phys. Rev. D***96**, 024020 (2017).
- xxi. **Scientific Computing Using Consumer Video-Gaming Hardware Devices**
G. Volkema and G. Khanna
IEEE HPEC Conference, Waltham, MA (2017).
- xxii. **Quark Confinement, New Cosmic Expansion and General Yang-Mills Symmetry**
J.P. Hsu
*Chin. Phys. C***41**, (10), 105101 (2017).
- xxiii. **Meshfree computation of Electrostatics and Related Boundary Value Problems**
J. Wang and Y. Hao
American Journal of Physics **85**, 542-549 (2017).
- xxiv. **Clickers can Promote Fact Retention but Impede Conceptual Understanding: The Effect of the Interaction Between Clicker Use and Pedagogy on Learning**
A.M. Shapiro, J. Sims-Knight, G.V. O'Rielly, P. Capaldo, T. Pedlow, L. Gordon, and K. Monteiro
Computers & Education **111**, 44—59 (2017).
- xxv. **Light Curves and Spectra from a Thermonuclear Explosion of a White Dwarf Merger**
D. van Rossum, R. Kashyap, R. Fisher, R. T. Wollaeger, E. García-Berro, G. Aznar-Siguán, S. Ji, and P. Lorén-Aguilar
The Astrophysical Journal, **827**, 128 (2016).

- xxvi. **Gravitational Waves from a Plunge into a Nearly Extremal Kerr Black Hole**
L. Burko and G. Khanna,
Phys. Rev. D **94**, 084049 (2016).
- xxvii. **Arrival Times of Gravitational Radiation Peaks for Binary Inspiral**
R. Price and G. Khanna
Phys. Rev. D **94**, 104026 (2016).
- xxviii. **Cauchy-horizon Singularity inside Perturbed Kerr Black Holes**
L. Burko and G. Khanna
Phys. Rev. D **93**, 041501(R) (2016). (*Rapid Communication*).
- xxix. **Black hole Binary Inspiral: Analysis of the Plunge**
R. Price, S. Nampalliwar, and G. Khanna
Phys. Rev. D **93**, 044060 (2016).
- xxx. **Feasibility of Amazon's Cloud Computing Platform for Parallel GPU-Accelerated Multiphase Flow Simulations**
C. Freniere, A. Pathak, M. Raessi, and G. Khanna
IEEE's Computing in Science & Engineering 18, 68 (2016).
- xxxi. **Single Degenerate Type Ia Supernovae are Preferentially Overluminous**
R. Fisher and K. Jumper
The Astrophysical Journal, 805, 150 (2015).
- xxxii. **Spiral Instability Can Drive Thermonuclear Explosions in Binary White Dwarf Mergers**
R. Kashyap, R. Fisher, E. García-Berro, G. Aznar-Siguán, S. Ji, and P. Lorén-Aguilar
The Astrophysical Journal Letters, 800, L7 (2015).
- xxxiii. **Gauge Independence of the Eikonal Equation in Yang-Mills Gravity**
J.P. Hsu and K. O. Cottrell
Euro. Phys. J. Plus 130 (7), 1-7 (2015).
- xxxiv. **A Unified Model with a Generalized Gauge Symmetry and Its Cosmological Implications**
J.P. Hsu and K. O. Cottrell
Chin. Phys. C 39, (10), 105101 (2015).
- xxxv. **Comparison of Meshfree and Mesh-based Methods for Boundary Value Problems in Physics**
P. Niraula, Y. Han, and J. Wang
Journal of Physics: Conference Series 640, 26th IUPAP Conference on Computational Physics, 012067:1-6 (2015).
- xxxvi. **Stellar Parallax**
A. Hirshfeld
Discoveries in Modern Science: Exploration, Invention, Technology, Farmington Hills, MI: Macmillan (2015).
- xxxvii. **Compton Scattering from ^{12}C Using Tagged Photons in the Energy Range 65 - 115 MeV**
L.S. Myers, K. Shoniyozov, M.F. Preston, M.D. Anderson, J.R.M. Annand, M. Boselli, W.J. Briscoe, J. Brudvik, J.I. Capone, G. Feldman, K.G. Fissum, K. Hansen, S.S. Henshaw, L. Isaksson, R. Jebali, M.A. Kovash, K. Lewis, M. Lundin, I.J.D. MacGregor, D.G. Middleton, D.E. Mittelberger, M. Murray, A.M. Nathan, S. Nutbeam, G.V. O'Rielly, B. Schröder, B. Seitz, S.C. Stave, and H.R. Weller
Phys. Rev. C **89**, 035202 (2014).
- xxxviii. **Simulation and Visualization of Few-Body Systems and Differential Precession of Mercury**
B. Marmaras and J. Wang
Computing in Science and Engineering 76, 42-50 (2014).
- xxxix. **Tumbling through a landscape: Evidence of instabilities in high-dimensional moduli spaces**
B. R. Greene, D. Kagan, A. Masoumi, D. Mehta, E. J. Weinberg, and X. Xiao
Phys. Rev. D 88 2, 026005 (2013) [arXiv:1308.0538]

- xl. **Warped Vacuum Statistics**
P. Ahlqvist, B. R. Greene, and D. Kagan
JHEP 1207 066 (2012) [arXiv:1202.3172]

I.2 Books & Monographs

- i. **Space-Time, Yang-Mills Gravity and Dynamics of Cosmic Expansion, 2nd edition**
J.P. Hsu and L. Hsu
World Scientific to be published in 2019.
- ii. **The Minimal Modal Interpretation of Quantum Theory**
J. A. Barandes and D. Kagan
to be released as a *Springer Monograph* [arXiv:1405.6755].
- iii. **Astronomy Activity and Laboratory Manual, 2nd edition.**
A. Hirshfeld
Jones & Bartlett Publishers Burlington, MA, to be published December 2018.
- iv. **Proceedings of the 12th Asia-Pacific International Conf. on Gravitation, Astrophysics and Cosmology, Dedicated to the Centenary of Einstein's General Relativity**
Ed. V. Melnikov and J. P. Hsu
World Scientific, 2016.
- v. **Computational modeling and visualization of physical systems with Python**
J. Wang
Wiley, New York, 492 pages, January 2016.
- vi. **Computational modeling and visualization of physical systems with Python: Digital Online Companion**
J. Wang
Wiley, New York, 291 pages, October 2015.
- vii. **Computational modeling and visualization of physical systems with Python: Solutions Manual**
J. Wang
Wiley, New York, 50 pages, October 2015.

I.3 Open Access Publications

- i. **Open-source computer simulation programs** – Over 120 codes actively maintained
J. Wang
<https://github.com/com-py/comp> & <http://www.faculty.umassd.edu/j.wang/> (2014—present)
- ii. **Simulation movies and image gallery**
J. Wang
<http://www.faculty.umassd.edu/j.wang/> & <http://vpython.org/> (2010--present)
- iii. **Interactive modeling of exoplanets (PICUP computational exercise set)**
J. Wang
Partnership for Integrating Computation into Undergraduate Physics, accepted (2018).
- iv. **Boltzmann distribution: the statistical way (PICUP computational exercise set)**
J. Wang

Partnership for Integrating Computation into Undergraduate Physics, in review (2018).

I.4 Conference Presentations & Invited Talks

- i. R. Fisher
Union College Colloquium, 4/12/2018
- ii. R. Fisher
AAS 231 Plenary, 1/12/2018
- iii. R. Fisher
EUROWD21 Austin, 7/23/2018 - 7/27/2018
- iv. R. Fisher
AAS 229, 1/6/2017
- v. R. Fisher
AAS 227, 1/6/2016
- vi. R. Fisher
ASTRONUM17, St. Malo France, 6/29/2017
- vii. R. Fisher
UMass Amherst Astronomy Colloquium, 12/8/2016
- viii. R. Fisher
Harvard Center for Astrophysics, Institute for Theory and Computation Colloquium, 10/20/2016
- ix. R. Fisher
Harvard Center for Astrophysics, Institute for Theory and Computation Luncheon, 10/20/2016
- x. R. Fisher
Tufts University Physics & Astronomy Colloquium, 10/7/2016
- xi. R. Fisher
ICRANet Pescara Meeting, 6/2016
- xii. A. Hirshfeld
Amateur Telescope Makers of Boston, Cambridge MA, May 2018.
- xiii. A. Hirshfeld
Astronomical Society of Southern New England, Rehoboth MA, Feb 2018.
- xiv. **Experiments on the CMB spectrum, Big Jets Model and Their Implications for the Missing Half of the Universe**
L. Hsu and J. P. Hsu
in *Proc. of the Int. Conf. on Gravitation, Astrophysics and Cosmology*
EPJ Web of Conferences 168, 01012 (2018).
- xv. **Experiments on Frequency Dependence of the Deflection of Light in Yang-Mills Gravity**
Yun Hao, Yiyi Zhu, J. P. Hsu
in *Proc. of the Int. Conf. on Gravitation, Astrophysics and Cosmology*
EPJ Web of Conferences 168, 02004 (2018).
- xvi. **Baryon Force for Accelerated Cosmic Expansion and Generalized U(1) Gauge Symmetry in Particle Cosmology**
in *Proc. of the Int. Conf. on Gravitation, Astrophysics and Cosmology*
EPJ Web of Conferences 168, 04004 (2018).
- xvii. **Exploring Curved Spacetime---LIU Liao's Adventure**
Z. Zhao, S. Y. Pei and J. P. Hsu
in *Proc. of the Int. Conf. on Gravitation, Astrophysics and Cosmology*
Preface of EPJ Web of Conferences 168 (2018).
- xviii. **Remembering Vitaly N. Melnikov**
J. P. Hsu, S.P. Kim and S. W. Kim
in *Proc. of the Int. Conf. on Gravitation, Astrophysics and Cosmology*

- Preface of EPJ Web of Conferences 168 (2018).
- xix. **Unified Model for Quark Confinement and Cosmic Expansion due to Baryon Charge with Novel Symmetries**
Y. Hao and J. P. Hsu
Bulletin of the American Phys. Soc. 63 (2018).
- xx. **Modified finite difference method on the 1D Schrodinger equation**
T. Robertson, J. Pierre-Louis and J. Wang
APS New England Section Fall 2018 Meeting, Dartmouth MA (November 2018).
- xxi. **Engagement of physics students with computation and visualization**
J. Wang
AAPT Summer Meeting, Washington DC (August 2018).
- xxii. A. Hirshfeld
North Shore Amateur Astronomy Society, Feb 2017.
- xxiii. **Black Hole Simulations using PlayStations**
G. Khanna
Colloquium at UMass Amherst, November 1, 2017.
- xxiv. **Enhancing student learning with computational modeling**
J. Wang
AAPT Summer Meeting, Washington DC (August 2017).
- xxv. **Recruitment and preparation of physics teachers**
J. Wang
AAPT New England Section Meeting, Worcester, MA (March 2017).
- xxvi. **A streamlined pathway for recruiting physics teachers**
J. Wang
PhysTEC Conference, Atlanta (February 2017).
- xxvii. A. Hirshfeld
Gloucester Area Astronomical Club, Oct 2016.
- xxviii. A. Hirshfeld
Monadnock Summer Lyceum, Peterborough, NH; re-broadcast on New Hampshire Public Radio, Jul 2016.
- xxix. A. Hirshfeld
Ronald E. Hatcher Science on Saturday Series, Princeton Plasma Physics Laboratory, Princeton University, Princeton NJ, Jan 2016.
- xxx. **New Perspective on an Old Problem: The Bending of Light in Yang-Mills Gravity**
J.P. Hsu and K. O. Cottrell
in Proc. of the 12th Asia-Pacific International Conference on Gravitation, Astrophysics and Cosmology (Ed. V. Melnikov and J. P. Hsu), World Scientific, 378 (2016).
- xxxi. **Experiments on Invariance of Planck's Law and a New View of Anisotropy of Cosmic Microwave Background**
J.P. Hsu and L. Hsu
in Proc. of the 12th Asia-Pacific International Conference on Gravitation, Astrophysics and Cosmology (Ed. V. Melnikov and J. P. Hsu), World Scientific, 369 (2016).
- xxxii. **A Test of an Alternative Origin of the Cosmic Microwave Background Anisotropy**
J.P. Hsu and L. Hsu
in Proc. of the 12th Asia-Pacific International Conference on Gravitation, Astrophysics and Cosmology (Ed. V. Melnikov and J. P. Hsu), World Scientific, 3 (2016).
- xxxiii. **The IRES Program at MAX-lab: Student Involvement in Experimental Nuclear Physics**
G.V. O'Rielly
APS New England Section Fall 2016 Meeting, North Adams MA (October 2016).
- xxxiv. **A collaborative interdisciplinary model for recruiting and preparing physics teachers**
J. Wang
PhysTEC Conference, Baltimore (March 2016).

- xxxv. A. Hirshfeld
Altman Distinguished Lecture Series, Newton Lifetime Learning, Andover Theological Seminary, Newton, MA, Oct 2015.
- xxxvi. A. Hirshfeld
Photographic Historical Society of New England, Newton MA, Sep 2015.
- xxxvii. A. Hirshfeld
New Hampshire Astronomical Society, Manchester NH, Aug 2015.
- xxxviii. A. Hirshfeld
Needham Center for Aging, Needham MA Jun 2015.
- xxxix. A. Hirshfeld
Cabot Park Village, Newton MA, May 2015.
- xl. A. Hirshfeld
UMass Dartmouth Library, May 2015.
- xli. A. Hirshfeld
Northeast Astronomy Forum, Suffern NY, Apr 2015.
- xl.ii. A. Hirshfeld
Newton Free Library, Newton MA, Mar 2015
- xl.iii. A. Hirshfeld
North Shore Amateur Astronomy Club, North Andover MA, Mar 2015.
- xl.ii.v. A. Hirshfeld
Skyscrapers Astronomy Club, Scituate RI, Feb 2015.
- xl.v. A. Hirshfeld
South Shore Astronomical Society, Norwell MA, Jan 2015.
- xl.vi. A. Hirshfeld
Amateur Astronomers Association of Princeton, Princeton NJ, Jan 2015.
- xl.vii. A. Hirshfeld
Princeton Plasma Physics Laboratory, Princeton NJ, Jan 2015.
- xl.viii. **Scientific modeling and visualization with Python**
J. Wang
Gordon Research Conference on Visualization in Science and Education, Tufts University (July 2015)
- xl. ix. **Tagging Efficiency for Nuclear Physics Measurements at MAX-lab**
N. Miller, D. Elofson, C. Lewis, E. O'Brien, K. Buggelli, K. O'Connor, and G. O'Rielly
4th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan Waikoloa, Hawaii, Oct. 7 – 11, 2014
Bull. Am. Phys. Soc., vol. 59, no. 10, BAPS.2014.HAW.GB.77 (2014)
- l. **Characterization of Lead Glass Cherenkov Detectors Using Cosmic-Ray Muons**
D. Elofson, C. Lewis, E. O'Brien, K. Buggelli, N. Miller, K. O'Connor, and G. O'Rielly
4th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan Waikoloa, Hawaii, Oct. 7 – 11, 2014
Bull. Am. Phys. Soc., vol. 59, no. 10, BAPS.2014.HAW.GB.79 (2014).
- li. **Calibration Procedures for Large Sodium Iodide Detectors**
K. Buggelli, D. Elofson, C. Lewis, E. O'Brien, N. Miller, K. O'Connor, and G. O'Rielly
4th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan Waikoloa, Hawaii, Oct. 7 – 11, 2014
Bull. Am. Phys. Soc., vol. 59, no. 10, BAPS.2014.HAW.GB.81 (2014).
- lii. **DIANA NaI-Detector Energy Calibration**
K. O'Connor, D. Elofson, C. Lewis, E. O'Brien, K. Buggelli, N. Miller, and G. O'Rielly
4th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan Waikoloa,

- Hawaii, Oct. 7 – 11, 2014
Bull. Am. Phys. Soc., vol. 59, no. 10, BAPS.2014.HAW.GB.82 (2014).
- liii. **Near-Threshold Measurement of $\gamma n \rightarrow \pi^-$ at MAX-lab**
 G.V. O’Rielly
 APS April Meeting, Savannah GA, April. 6 – 8, 2014
Bull. Am. Phys. Soc., vol. 59, no. 5, BAPS.2014.APR.R7.8 (2014).
 - liv. **Undergraduate Student Involvement in International Research -- The IRES Program at MAX-lab, Sweden**
 W.J. Briscoe, K.G. Fissum, and G.V. O’Rielly
 APS April Meeting, Savannah GA, April. 6 – 8, 2014
Bull. Am. Phys. Soc., vol. 59, no. 5, BAPS.2014.APR.D1.22 (2014).
 - lv. **Clickers don't always help: Classroom context and goals can mitigate clicker effects on student learning**
 A. Shapiro, G.V. O’Rielly, and J. Sims-Knight
 APS April Meeting, Savannah GA, April. 6 – 8, 2014
Bull. Am. Phys. Soc., vol. 59, no. 5, BAPS.2014.APR.R9.3 (2014).
 - lvi. **The Benefits and Pitfalls of Learning with Classroom Clickers: A Large-Scale, Multidisciplinary, Empirical Study**
 A. Shapiro, J. Sims-Knight, P. Capaldo, G. O’Rielly, C.T. Pedlow, L. Gordon, and K. Monteiro
American Educational Research Assoc. Ann. Meeting, Philadelphia PA, April 3 – 7, 2014.

I.5 Other: Contributed Articles

- i. **Catching Element Formation in the Act: The Case for a New MeV Gamma-Ray Mission: Radionuclide Astronomy in the 2020's**
 C. Fryer, F.X. Timmes, A. Hungerford, A. Couture + R. Fisher (and 95 co-authors)
A White Paper for the 2020 NASA Decadal Survey. (2018)
- ii. **The Importance of Computation in Astronomy Education**
 R. Zingale, F.X. Timmes, R. Fisher, and B. O’Shea (2016).
- iii. **A Longing for Truth and Meaning** (Book review)
 A. Hirshfeld
Wall Street Journal (Apr 7, 2018), C17.
- iv. **A New Astronomy Through 'The Telescope in the Ice** (Book review)
 A. Hirshfeld
Wall Street Journal (Dec 16, 2017), C14.
- v. **The Greatest Show on Earth & Sun and Moon Bookshelf** (Book reviews)
 A. Hirshfeld
Wall Street Journal (Aug 12, 2017), C7.
- vi. **All the Light We Cannot See** (Book review)
 A. Hirshfeld
Wall Street Journal (Aug 5, 2017), C7.
- vii. **Wordless Wonders** (Book review)
 A. Hirshfeld
Wall Street Journal (Apr 15, 2017), C6.
- viii. **Williamina Fleming, Astronomer: Brief Life of a Spectrographic Pioneer – 1857-1911**
 A. Hirshfeld
Harvard Magazine 119 (Jan-Feb 2017), 48-49.

- ix. **The Power of Totality** (Letter to the Editor)
A. Hirshfeld
Sky and Telescope, 132 (Dec 2016), 6.
- x. **The Great American Eclipse** (Book review)
A. Hirshfeld
Wall Street Journal (Oct 1, 2016), C6.
- xi. **The Nebula War** (Cover article)
A. Hirshfeld
Sky and Telescope, 131 (Jun 2016), 36-40.
- xii. **Hitching a Ride on a Light Beam** (Featured book review)
A. Hirshfeld
Wall Street Journal (Apr 22, 2016), C5-C6.
- xiii. **A Likely Story."** (Book review)
A. Hirshfeld
Wall Street Journal (Dec 26, 2015), C8.
- xiv. **William Cranch Bond: Brief Life of Harvard's First Astronomer**
A. Hirshfeld
Harvard Magazine (Sep-Oct 2015), 46.
- xv. **Reading History in the Heavens**
A. Hirshfeld
Sky and Telescope, 130 (Jul 2015), 86.
- xvi. **Sparking a Love for Science** (Book review)
A. Hirshfeld
Wall Street Journal (Jun 13, 2015), C5-C6.
- xvii. **Compton Scattering and π^- Photoproduction on the Deuteron**
G.V. O'Rielly
MAX-lab Activity Report 2014-2015 (2016)
- xviii. **International Research Experience for Students (IRES)**
G.V. O'Rielly
MAX-lab Activity Report 2014-2015 (2016).
- xix. **The PhysTEC project at University of Massachusetts Dartmouth**
J. Wang, S. Witzig, G.V. O'Rielly, and A. Hirshfeld
APS Physics: Forum on Education, 16-18 (Fall 2015).

II. External Funding

II.1 Funding pending

- i. **Master Teach! SouthCoast STEM**
PI: S. Witzig, Co-PIs: K. Kayumova, C. Orrill, and J. Wang
submitted to NSF (pending); \$1,440,809.

II.2 Funded

- ii. **Evaluating the Double-Degenerate Spiral Type Ia Merger Model**
PI: *R. Fisher*
2018 - 2021 NASA Astrophysics Theory Program (ATP); \$150,000
- iii. **The Supernova Remnant 3c 397: Constraining Physics of Type Ia Supernovae in the Single-Degenerate Scenario**
PI: *H. Yamaguchi (NASA GSFC/Kyoto), R. Petre (NASA GSFC), and R. Fisher*
2018 NuSTAR-XMM-Newton
- iv. **2018 - 2021 NASA HEC-SMD-17-1205 Supercomputer Award**
PI: *R. Fisher*
- v. **NSF XSEDE Supercomputer Allocation on Stampede2**
PI: *R. Fisher*
119,837 node hours, 7.7 Million CPU Hours; \$36,000 equivalent
- vi. **2016 NSF XSEDE Supercomputer Allocation on Stampede**
PI: *R. Fisher*
981,816.0 SUs; \$38,000 equivalent
- vii. **2015 NSF XSEDE Supercomputer Allocation on Stampede**
PI: *R. Fisher*
1,461,623.0 SUs; \$51,000 equivalent
- viii. **An Evaluation of Video-Gaming Technologies for Scientific High-Performance Computing in Gravitational Physics**
PI: *G. Khanna*
NSF Award, PHY 1414440; \$90K.
- ix. **Exploring Aspects of Large Mass-Ratio Black Hole Binaries Using Time-Domain Perturbation Theory**
PI: *G. Khanna*
NSF Award, PHY 1606333; \$20K.
- x. **Studies of Large Mass-ratio Black Hole Binaries Using Time-domain Perturbation Theory**
PI: *G. Khanna*
NSF Award, PHY 1701284; \$60K.
- xi. **A Heterogeneous Terascale Computing Cluster for the Development of GPU Optimized High Order Numerical Methods**
PI: *G. Khanna*
DoD Award, DURIP/ONR; \$650K
- xii. **IRES: Student Participation in Photonuclear Physics Research at MAX-lab, Sweden**
PI: *G.V. O’Rielly*
NFS IIA/IRES 1261150; \$249,695, 2014-2017.
- xiii. **UMass Dartmouth PhysTEC: Establishing a Collaborative Interdisciplinary Model for Recruiting/Preparing Physics Teachers**
PI: *J. Wang, Co-PIs: S. Witzig, A. Hirshfeld, and G.V. O’Rielly*
NSF/APS, \$29,958, 2014-2017.



COLLEGE OF ENGINEERING

Dr. Jay Wang
Chair, Department of Physics

July 22, 2018

To: Dean Ramprasad Balasubramanian
From: Prof. Jay Wang, Chair, Department of Physics
Subject: New Faculty Recruitment Proposal – PHYSICS

Rank: Assistant Professor

Field: *Computational Astrophysics*

(preference would be for candidates with a focus on gravitational wave physics
this position would ideally target junior women scientists from the LIGO Collaboration
as candidates)

Start date: Fall 2019

Salary range: \$55,330 – \$62,000

Startup cost: \$100,000 (includes travel, research computer & graduate student (RA) support)

Office location: SENG 203D

Lab location: Not applicable. Will use CSCVR and other high---performance computing resources
already available at UMass Dartmouth.

Teaching load (first 3 years): 1+1, 1+2, 2+2

The Department of Physics proposes a reduced teaching load of 2 courses in the first year, 3 courses
in the second year and the standard College of Engineering load of 4 courses in the third year and
after.

It is anticipated that the new tenure---track hire would develop and deliver new courses in the field
of astrophysics, in support the department's plan to **develop a new Astrophysics major**, with the
timetable for the development of these courses being negotiated with the new hire. One of these
courses would be at the graduate/senior elective level; this would be available to graduate students
as well as undergraduates in the astrophysics option with an anticipated enrolment of 15---18
students when offered. This estimate is based on the enrollment numbers from previous advanced
courses offered in the astrophysics option.

In addition to these courses, the new tenure---track hire would have the background knowledge and
preparation to teach courses in computational modeling and mathematical methods at the senior

elective and graduate level, including in the EAS Ph.D. program. The new hire would also be expected to teach at least one required course in the physics major each year, the typical enrolment in these major courses is 12---16 students.

A. Position Description and Priority

The NSF Laser Interferometer Gravitational---Wave Observatory (LIGO) has recently detected gravitational waves from black hole mergers for the first time ever, with several events being identified in the data since the initial detection [1]. This discovery has opened up an entirely new and exceedingly promising way of exploring the universe. It has stimulated great interest among researchers, as well as the national funding agencies, regarding the opportunity for gravitational---wave astronomy with several new LIGO---type detectors coming online over the next few years and the recent approval of a space---based detector array to be built [2]. The 2016 discovery paper has already been cited over 4000 times and the project members have received numerous prizes including the *Breakthrough Prize*. The founders of LIGO also received the *Nobel Prize* last year. It is noteworthy that one of these Nobel laureates, Dr. Kip S. Thorne, visited our campus in 2016 to participate in the department's public *Interstellar* event.

The University of Massachusetts Dartmouth has the timely opportunity to become a leading institution in this new research area right at its inception. Professor Khanna (Physics) and Assistant Professor Scott Field (Mathematics) are already significant contributors to the computer modeling required to interpret the data from LIGO. Through discussions with their colleagues in the LIGO Science Collaboration (LSC) on ways a department might build on the gravitational wave community's success, it is evident that UMass Dartmouth should hire a current LIGO post---doctoral researcher or academic affiliate into a tenure---track faculty position, ideally beginning in the 2019 Academic Year. This person would maintain their connection with the LSC and would continue to have access to the collaboration's data and resources (this arrangement would serve to minimize the start---up expenses and guarantee research productivity for the new hire) and they would continue to support the LIGO mission through computer modeling of the LIGO detector background, noise sources and undertake other data analysis tasks.

With three faculty researchers focused on LIGO---related science, UMass Dartmouth will become one of the few institutions with a strong gravitational waves group. This would certainly result in an enhancement of the department's, college's and university's reputation, quality and competitiveness via a "halo" effect.

Other universities are already taking advantage of the opportunities for growth in this emerging new field (eg. in the past years, several new tenure track positions targeting this research opened up nationwide). *It is worth pointing out that none of the other UMass campuses (including UMass Amherst) have any current strength or any significant plans for investment in this research area.* In fact, in the New England region, the only other institution that has a strong focused research group in gravitational waves is MIT (one of the founding institutions of LIGO, alongside Caltech). This

recruitment proposal is truly a once-in-a-lifetime opportunity for the University of Massachusetts Dartmouth to build a unique strength in a up-and-coming, exciting research area with a relatively modest investment (a single tenure track line) while also taking advantage of existing and established faculty interests and skills.

Given the computational techniques focus of the proposed tenure track hire, the new hire would fit extremely well into the *Center for Scientific Computing (CSCVR)* and the College of Engineering. This request is therefore fully aligned with the long-term hiring plans and improvement goals for both the department and the college. Moreover, due to the interdisciplinary nature of the subject, there are opportunities for interdisciplinary collaborations with faculty in the Department of Mathematics as well as the Data Science program.

Finally, we intend for this position to be an EEO position, in particular targeting female and underrepresented minorities candidates. The LSC has a significant number of women in senior leadership positions (including the former LIGO Spokesperson – a Hispanic woman) that has resulted a large pool of top-notch junior women scientists. We expect to tap this strong pool of junior researchers to ensure that our applicant pool has a strong representation of women.

The Department of Physics ranks the relative priority of this tenure track request as “essential”.

B. Educational Impact

The position will enable the department to develop and offer an *Astrophysics* major which is an area of high interest amongst the youth nationwide, and to maintain our top 10 program among peer departments in the APS. The Physics Department already has an extremely popular concentration in astrophysics at both the undergraduate and graduate levels. There is significant student interest and demand for astrophysics, as evidenced by the questions we hear from prospective students at Open House events and the overwhelming public interest seen with Dr. Kip Thorne's visit and the public lectures at the *Science Behind the Movie Interstellar* event in March 2016.

The Department of Physics intends to propose a new major in astrophysics in the next few years. This would build upon a strong, existing core curriculum in physics and astrophysics, and would add a new emphasis on gravitational waves, making the new major different from the existing astrophysics major offered at UMass Amherst and almost unique in the nation. With a strong background in both physics and computational science, students graduating from this major would have a range of career options open them, from traditional physics and astronomy career routes, to the newly-blossoming area of gravitational wave astrophysics, and industry. There would be an opportunity for undergraduates and graduates trained in this field (at UMass Dartmouth) to become future leaders in the rapidly growing field of gravitational wave astrophysics, and thereby further exporting our campus' reputation.

Illustrating the quality of the current physics major and graduate M.S. program, students graduating from these programs have achieved national recognition in many areas. Jeffrey Schoonover (B.S. 1994, M.S. 1999), was awarded the *Presidential Award for Excellence in Mathematics and Science Teaching* in

2010. Danielle Tinkham (B.S. 2006, M.S. 2008) was awarded one of ten nationwide *Outstanding Teacher Awards* by the national Physics Teacher Education Coalition (PhysTEC) in 2017. Chagaan Baatar (B.S. 1988) was the Program Officer with the Office of Naval Research who supported the graphene research that was awarded the 2010 Nobel Prize in Physics. Peter Jumper (B.S. 2013) was offered a full five---year *Dean's Fellowship* for the Ph.D. program at Columbia University's Astronomy Department – the highest fellowship honor which Columbia offers to incoming graduate students. Approximately half of all graduating students successfully apply for entry into Ph.D or M.S. programs, while almost all those students who leave the physics program seeking employment find a challenging and rewarding position in teaching, private industry or government.

C. Research Impact

Beyond the remarks already made on the broad significance of this emerging research area and the associated opportunities for growth, we highlight a number of points that indicate that the proposed tenure track hire would have a clear path to engage with the Physics Department and students at all levels immediately.

The new research efforts would be computational in nature and would involve Big Data, two of the University's stated areas of growth. Such a hire would also strengthen the existing connections between the Departments of Mathematics and Physics, and the *Center for Computing and Visualization Research* providing further opportunities for interdisciplinary collaboration and research.

There would be proven opportunities for new funding from national funding agencies, including the NSF and NASA, to support this research; NSF's recently announced *Big Ideas* includes *Windows on the Universe: The Era of Multi---messenger Astrophysics* which explicitly notes that gravitational waves will give us a different view on the universe leading us to a better understanding [3]. There would also be opportunity for significant international collaborations ----- possibly positioning UMass Dartmouth as a leading institution for upcoming future space---based missions.

The incoming graduate students attracted by the new hire and gravitational wave research opportunities would help populate the College of Engineering's EAS Ph.D. program, further expanding the Physics Department's role in this program and helping the University maintain its recently acquired *Doctoral Research University* status.

Finally, the LIGO Laboratory is willing to work with us to create an arrangement that would permit UMass Dartmouth faculty and students rare access to the LIGO instrumentation and data, likely through a collaboration with MIT. With this tenure track hire, students interested in becoming involved with gravitational wave research, both in the theoretical and modeling arenas as Professors Khanna and Field currently do, or from the instrumental and experimental perspective with the proposed new hire, would have the option of joining programs at a small number of institutions which would include Caltech, MIT and UMass Dartmouth. This, by itself, would place UMass Dartmouth as part of an impressive set of institutions and would highlight UMass Dartmouth's recent promotion to DRU status.

D. Departmental Plan

The proposed new tenure track hire would reverse the shrinking trend evident in the Physics Department's personnel numbers; in the past five or so years the department has lost a technician, a full-time lecturer, five part-time lecturer lines and a tenured faculty member (with Prof. Tandon's transfer to Mechanical Engineering), only one of which have been replaced. Despite these losses, the department has maintained, and even seen modest growth in, its delivery of required service courses to the College of Engineering and other science departments at the University as well as in the physics programs at both the undergraduate and graduate levels. With this new tenure-track hire, we are very confident that we could leverage our contribution to the University's research mission and raise the public profiles of the Department, the College of Engineering, and the University.

It is important to point out that, Dr. Marguerite Zarrillo, one of the most active faculty members in the department (and the college) has officially declared her intent to retire after the next year (AY '18 – '19). Given Dr. Zarrillo's disproportionate impact as a mentor, advisor, instructor and researcher -- especially as the only female tenured faculty member in the department -- her retirement will have a very significant negative impact on the department and also the college.

As mentioned previously, the Department of Physics intends to identify and explicitly recruit strong female candidates for this proposed tenure track position. The Department of Physics has worked tirelessly over the past decade to create an inclusive, welcoming environment and had maintained a relatively large fraction of female students in the program (currently at 28% which compares very favorably with the national average of 19% [4]). The department previously had a similar fraction of women as faculty members as well (at nearly 20%). However, after a retirement that is going to occur in the next year, the department will have no women tenure-track faculty members. It is well known that female faculty role models serve a critical role in the retention of female students, and the Department of Physics is determined to maintain and further improve the gender ratio that it has worked very hard to achieve. Having a woman as a research active, tenure-track hire in the Department of Physics would improve the recruitment of female students into the physics programs as well as providing the crucial role model for these students.

This proposed new tenure track hire will greatly enhance the College of Engineering and the Department of Physics. The educational mission of UMass Dartmouth will be strengthened through the addition of impactful curricular improvement at all levels of instruction, from the University Studies (general education) program, through the physics major to graduate courses at the Ph.D. level. The research profile of the Department of Physics will be further strengthened which will increase the opportunities for obtaining external funding, particularly in interdisciplinary research activities. The proposed hire would also further align the research activities of the Department of Physics with the computational track of the College of Engineering EAS Ph.D. program, helping to ensure the continued growth and success of this program.

E. Departmental Profile

Current academic staff in the Department of Physics and their course contributions. Since all of the elective courses in the physics major and graduate programs are offered on an every---other--- year basis (this is to increase the options available to the students while also maximizing the course enrolments), the courses offered by the department over two academic years are shown in the following table. Courses offered through the University Extension division are NOT included in this table.

Name	Academic Rank	Courses PHYSICS (exclusive)	Courses Other Programs (exclusive)	Courses (freshman)
Robert Fisher	Associate Professor	PHY 234, PHY 252 ¹ PHY 510 ¹ (2 courses)		PHY 113
Alan Hirshfeld	Professor	PHY 322 PHY 430/530 ^{1,2} PHY 421	(Univ. Studies) PHY 151, PHY 152 ¹	PHY 109
J.P. Hsu	Chancellor Professor	PHY 510 ¹ (2 courses) PHY 531, PHY 631		
David Kagan	Full---Time Lecturer	PHY 510 ¹ (2 courses) PHY 300		PHY 111/113 ² PHY 112/114 ²
Gaurav Khanna	Professor	PHY 313, PHY 411 PHY 412/612 ^{1,2} PHY 565 ¹	(EAS Ph.D. program) EAS 700 ¹ , EAS 602 ¹	
Grant O’Rielly	Associate Professor	PHY 225, PHY 227 PHY 363 ¹ PHY 442/635 ^{1,2} PHY 551 ¹		PHY 102
Renuka Rajapakse	Full-Time Lecturer	PHY 300, PHY 412 PHY 510		PHY 101
John Silva	Full---Time Lecturer		(Eng. Pathways) PHY 120 (Univ. Studies) PHY 162, PHY 171 PHY 172, PHY 182	PHY 102

Jianyi (Jay)	Associate	PHY 341, PHY 342	PHY 114
Wang	Professor	PHY 441/543 ^{1,2}	
		PHY 510 ¹ (2 courses)	
Marguerite	Professor	PHY 115	PHY 113
Zarrillo		PHY 213	PHY 114

¹ course not offered every year

² double course numbers, eg. 111/113, indicate these are offered as cross-listed courses

References

[1] LIGO Discoveries <https://www.ligo.caltech.edu/page/detection-companion-papers>

[2] LISA Mission approved <http://sci.esa.int/lisa/>

[3] NSF Big Ideas <http://www.sciencemag.org/news/2016/05/nsf-director-unveils-big-ideas-eye-next-president-and-congress>

[4] Percentage of Women in Physics, American Institute of Physics – Statistics Unit
<https://www.aps.org/programs/education/statistics/womenphysics.cfm>

Yours sincerely,

Jay Wang, Ph.D.

Chair, Department of Physics

cc. Department file

IV. University Curriculum Vitae

1. University Curriculum Vitae – Robert T. Fisher
2. University Curriculum Vitae – Alan Hirshfeld
3. University Curriculum Vitae – Jong Ping Hsu
4. University Curriculum Vitae – David Kagan
5. University Curriculum Vitae – Gaurav Khanna
6. University Curriculum Vitae – Grant V. O’Rielly
7. University Curriculum Vitae – John Silva
8. University Curriculum Vitae – Jianyi (Jay) Wang
9. University Curriculum Vitae – Marguerite Zarrillo

Curriculum Vitae (Revised 5/19/2018)

Dr. Robert Fisher

College of Engineering

Title : Associate Professor

Physics Department

Education

- University of California at Berkeley, Ph.D., (Physics, 2002)
 - Thesis : “Single and Multiple Star Formation in Turbulent Giant Molecular Cloud Cores”
 - Thesis Advisors : Christopher F. McKee and Richard I. Klein
- University of California at Berkeley, M.S., (Physics, 1998)
- Caltech, B.S. with Honors, (Physics, 1994)

Experience

A. Teaching

- Associate Professor, Department of Physics, University of Massachusetts Dartmouth (2014–current)
- Assistant Professor, Department of Physics, University of Massachusetts Dartmouth (2008–2014)
- Adjunct Faculty, Science Department, School of the Art Institute of Chicago (2007 - 2008)

B. Other

- Research Scientist and Astrophysics Group Leader, DOE Advanced Scientific Computing (ASC) Flash Center, Department of Astronomy & Astrophysics, University of Chicago (2005–2008)
- Lawrence Livermore National Laboratory, Postdoctoral Research Associate, (AX Division, 2002-2005)

Teaching Summary

Total Student-Credit Hours Delivered Fall 2008 - Spring 2018 : 3591

Mean Class Evaluation 2008 - Spring 2013 : 4.22 (unweighted by class size, based on total response from student surveys)

New Course Developments, or courses restructured completely during curricular enhancements, are indicated on the list below **in bold : 10 courses in total**.

Courses Taught

Spring 2018

Physics 213, Lecture and Recitation, Applied Modern Physics (3 Credits) - 22 Students
 Physics 252, Elementary Astrophysics (3 Credits) - 9 Students
 Physics 480, Undergraduate Research (3 Credits) - 1 Student
 Physics 690, Graduate Thesis (3 Credits) : 1 Student

Fall 2017

Physics 113, Classical Physics I (4 Credits) - 98 Students
Physics 313, Mechanics (3 Credits) - 6 Students
 Physics 685, Graduate Research (3 Credits) - 1 Student
 Physics 690, Graduate Thesis (3 Credits) : 2 Students
 Physics 421 (co-taught), Advanced Laboratory (3 Credits) - 10 Students

Fall 2016 - Spring 2017

Sabbatical

Fall 2015

Physics 113, Classical Physics I (4 Credits) - 120 Students
 Physics 330/34, Advanced Mathematical Methods (3 Credits) - 5 Students
 Physics 421 (co-taught), Advanced Laboratory (3 Credits) - 4 Students
 Physics 685, Graduate Research (3 Credits) - 1 Student

Spring 2015

Physics 234, Intermediate Mathematical Physics (3 Credits) - 10 Students
Physics 510, Special Topics - High Energy Astrophysics (3 Credits) - 13 Students
 Physics 680, Graduate Project (3 credits) : 1 Student
 Physics 690, Graduate Thesis (3 Credits) : 1 Student
 EAS 701, Doctoral Dissertation Research (3 Credits) : 1 Student

Fall 2014

Physics 113, Classical Physics I (4 Credits) - 130 Students
 Physics 300/334, Advanced Mathematical Methods (3 Credits) - 7 Students
 Physics 421 (co-taught), Advanced Laboratory (3 Credits) - 9 Students
 Physics 490, Senior Thesis (3 Credits) - 1 Student
 Physics 495, Independent Study (3 Credits) - 1 Student
 EAS 600, Dissertation Proposal Preparation (3 Credits) - 1 Student
 EAS 601, Pre-Dissertation Research (3 Credits) - 1 Student

Fall 2013

Physics 113, Classical Physics I (4 Credits) - 140 Students
 Physics 421, Advanced Laboratory (3 Credits) - 9 Students

Spring 2013

Physics 342, Modern Physics and Quantum Mechanics II (3 Credits) - 8 Students

4.60 +/- 0.55 (5 respondents)

Physics 421, Advanced Laboratory (3 Credits) - 9 Students

3.43 +/- 1.51 (7 respondents)

Physics 510, Special Topics - Stellar Structure and Evolution (3 Credits) - 14 Students

4.64 +/- 0.92 (11 respondents)

Physics 690, Graduate Thesis (3 Credits) - 1 Student

Fall 2012

Physics 151, Introductory Astronomy (3 Credits) - 73 Students

4.59 +/- 0.73 (37 respondents)

Physics 341, Modern Physics and Quantum Mechanics I (3 Credits) - 9 Students

4.25 +/- 0.89 (9 respondents)

Physics 396, Directed Study (3 Credits) - 1 Student

Physics 490, Senior Thesis (3 Credits) - 1 Student

Physics 685, Graduate Research (3 Credits) - 1 Student

Spring 2012

Physics 213 Lecture and Recitation, Applied Modern Physics (3 Credits) - 12 Students

4.38 +/- .744 (8 respondents)

Physics 252, Elementary Astrophysics (3 Credits) - 16 Students

3.33 +/- 1.155 (12 respondents)

Physics 396, Directed Study (3 Credits) - 1 Student

Physics 490, Senior Thesis - 2 Students

Physics 685, Graduate Research - 1 Student

Fall 2011

Physics 300, Undergraduate Seminar (3 Credits) - 10 Students

3.88 +/- 1.25 (9 respondents)

Physics 421 (co-taught), Advanced Laboratory (3 Credits) - 6 Students

4.50 +/- .548 (6 respondents)

Physics 616, Graduate Seminar - Dark Energy and the Accelerating Cosmos (3 Credits) - 7 Students

5.00 +/- 0 (6 respondents)

Physics 685, Graduate Research - 1 Student

Spring 2011

Physics 213, Applied Modern Physics (3 Credits) - 18 Students

4.63 +/- .62 (16 respondents)

Physics 342, Modern Physics and Quantum Mechanics II (3 Credits) - 7 Students

4.8 +/- .45 (5 respondents)

Physics 496, Directed Study : Astrobiology (3 Credits) - 1 Student

Fall 2010

Physics 151, Introductory Astronomy (3 Credits) - 65 Students

4.13 +/- 1.25 (33 respondents)

Physics 341, Modern Physics and Quantum Mechanics I (3 Credits) - 11 Students

4.79 +/- 0.5 (7 respondents)

Physics 690, Graduate Research - 2 Students

Spring 2010

Physics 213 Lecture and Recitation, Applied Modern Physics (3 Credits) - 8 Students

3.66 +/- 1.12 (6 respondents)

Physics 510, Special Topics - Stellar Structure and Evolution (3 Credits) - 7 Students

4.41 +/- .91 (5 respondents)

Physics 690, Graduate Thesis - 1 Student

Fall 2009

Physics 113, Classical Physics I (4 Credits) - 63 Students

3.75 +/- 1.12 (41 respondents)

Physics 252, Elementary Astrophysics II (3 Credits) - 11 Students

3.71 +/- 1.10 (6 respondents)

Physics 690, Graduate Thesis - 1 Student

Spring 2009

Physics 510, Independent Study (3 Credits) - 3 Students

Fall 2008

Physics 113, Classical Physics I (4 Credits) - 55 Students

3.78 +/- 1.09 (27 respondents)

Academic and Professional Honors

- Invited Plenary Speaker at American Astronomical Society (AAS) 231 Meeting (2018)
 - One of twelve invited plenary/prize speakers of more than two thousand attendees
- Visiting Sabbatical Faculty Member at Harvard-Smithsonian Center for Astrophysics (CfA) Institute for Theory and Computation (ITC) (2016 - 2017)
- Campus-wide ARNIE talk, “The Once and Future Cosmos: Understanding our Place in the Universe with Exploding Stars” (2016)
- Kavli Institute for Theoretical Physics (KITP) Scholar (2014 - 2016)
- Department of Energy Certificate of Service (2009), Awarded to members of the University of Chicago Flash Center “For... leadership in advancing the field of computational science and engineering by using high-performance computing within the University of Chicago Advanced Simulation and Computing (ASC) Alliance Center to elevate the understanding of the physical

problems of nuclear ignition, detonation, and turbulent mixing of complex multi-component fluids and other materials as represented by supernovae.”

- Visiting Scientist, Lawrence Livermore National Laboratory (2005 - 2012)
- NASA Graduate Student Research Fellowship (1998 - 2001)
- Lawrence Livermore National Laboratory Institute for Geophysics and Planetary Sciences (IGPP) Fellowship (1997)
- NASA/University of California at Berkeley Space Sciences Laboratory Summer Research Fellowship (1996)
- California Institute of Technology B.S. Physics with Honors (1994)
- George W. and Bernice E. Green Prize for Creative Scholarship (1994), awarded annually to a Caltech undergraduate for outstanding research.
 - Previous recipients include Paul Dimotakis (George Northrop Professor of Aeronautics, Caltech - '68), Steven Koonin (Former DOE Undersecretary of Science and Former Caltech Provost - '72), and Neil Brandt (Distinguished Professor of Astronomy and Astrophysics, Pennsylvania State University - '92)
- National Merit Scholarship Finalist (1990)

Publications

Publication Impact Summary (5 / 19 / 2018)

29 Total Publications in Peer-Reviewed Literature (16 at UMass Dartmouth)

10 Peer-Reviewed Papers with UMassD Graduate and Undergraduate Students Published, 8 with Student Lead Authorships

16 Non-Refereed Conference Proceeding Publications (5 at UMass Dartmouth)

1 Non-Refereed Conference Proceeding Paper with UMassD Student Co-Author

Total Citations as of 5/19/2018 (from Google Scholar)¹ : 1424

Mean Citations Per Peer-Reviewed Paper (24 papers > 1 yr old) : 53

***h*-index (largest number *h* such that *h* publications have at least *h* citations; inclusive of all publications) : 21**

***i*100-index (number of publications with greater than 100 citations; inclusive of all publications) : 4**

***i*10-index (number of publications with greater than 10 citations; inclusive of all publications) : 24**

¹ See [Google Scholar](https://scholar.google.com/citations?user=...) for an incomplete summary.

Journal Impact Factor Summaries

2010 ISI Physical Review Letters Impact Factor : 7.62 (2-year average, Science Watch #5 Top Ten Most-Cited Journals in All Fields, Top non-review impact in Physics)

2010 ISI Astrophysical Journal Impact Factor : 7.44 (2-year average, Science Watch #8 Top Ten Most-Cited Journals in All Fields, Top non-review impact in Astrophysics)

2010 ISI Physical Review D Impact Factor : 4.964 (2-year average)

2010 ISI Journal of Fluid Mechanics Impact Factor : 2.45 (2-year average, 9/123 Journals in Mechanics)

Note : Student co-authorships (including UMassD graduate students, undergraduate students, as well as international summer intern students) boldfaced below.

* Denotes a partially- or fully-alphabetized author list below.

Peer-Reviewed Journal and Conference Proceedings Published at UMass Dartmouth²

29. O. Graur, D. Zurek, A. Rest, I. Seitenzahl, B. Shappee, **R. Fisher**, J. Guillochon, M. Shara, A. Reiss, “Observations of SN 2015F suggest a correlation between the intrinsic luminosity of Type Ia supernovae and the shape of their light curves > 900 days after explosion,” accepted for publication in **The Astrophysical Journal**, 2018. [arXiv](#) (Citations : 1)

28. **P. Dave, R. Kashyap, R. Fisher**, F. Timmes, D. Townsley, and **C. Byrohl**, “Constraining the Single-Degenerate Channel of Type Ia Supernovae with Stable Iron-Group Elements In SNR 3C 397,” **The Astrophysical Journal**, **841**, 1, 2017. [DOI](#) (Citations : 8)

27. **R. Kashyap, R. Fisher**, E. García-Berro, G. Aznar-Siguán, **S. Ji**, and P. Lorén-Aguilar, “One-Armed Spiral Instability in Double-Degenerate Post-Merger Accretion Disks,” **The Astrophysical Journal**, **840**, 16, 2017. [DOI](#) (Citations : 1)

26. D. van Rossum, **R. Kashyap, R. Fisher**, R. T. Wollaeger, E. García-Berro, G. Aznar-Siguán, **S. Ji**, and P. Lorén-Aguilar, “Light Curves and Spectra from a Thermonuclear Explosion of a White Dwarf Merger,” **The Astrophysical Journal**, **827**, 128, 2016. [DOI](#) (Citations : 16)

25. **R. Fisher & K. Jumper**, “Single-Degenerate Type Ia Supernovae Are Preferentially Overluminous,” **The Astrophysical Journal**, **805**, 150, 2015. [DOI](#) (Citations : 22)

24. **R. Kashyap, R. Fisher**, E. García-Berro, G. Aznar-Siguán, **S. Ji**, P. Lorén-Aguilar, “Spiral Instability Can Drive Thermonuclear Explosions in Binary White Dwarf Mergers,” **The Astrophysical Journal Letters**, **800**, L7, 2015. [DOI](#) (Citations : 28)

23. **S. Ji, R. Fisher**, E. García-Berro, P. Tzeferacos, G. Jordan, D. Lee, P. Lorén-Aguilar, **P. Cremer**, and **J. Behrends**, “The Post-Merger Magnetized Evolution of White Dwarf Binaries:

² This section includes peer-reviewed conference proceedings in computational science and computer science. In the areas of computational science and computer science, these peer-reviewed proceedings are comparable in prestige to traditional peer-reviewed journals in other sciences.

The Double-Degenerate Channel of Sub-Chandrasekhar Type Ia Supernovae and the Formation of Magnetized White Dwarfs,” **The Astrophysical Journal**, **773**, 136, 2013. [DOI](#) (Citations : 54)

* 22. A. Dubey, A. Calder, C. Daley, **R. Fisher**, C. Graziani, G. Jordan, D. Lamb, L. Reid, D. Townsley, K. Weide, “Pragmatic Optimizations for Best Scientific Utilization of Large Supercomputers,” **International Journal of High Performance Computing Applications**, 2013. [DOI](#) (Citations : 11)

21. **P. Jumper & R. Fisher**, “Shaping the Brown Dwarf Desert : Predicting the Primordial Brown Dwarf Binary Distributions from Turbulent Fragmentation,” **The Astrophysical Journal**, **769**, 9, 2013. [DOI](#) (Citations : 22)

20. **A. Kumar & R. Fisher**, “Astrochemical Evolution of Turbulent Giant Molecular Clouds : I - Physical Processes and Method of Solution for Hydrodynamic Starless Clouds,” **Monthly Notices of Royal Astronomical Society**, **431**, 455, 2013. [DOI](#) (Citations : 4)

19. G. Jordan, H. Perets, **R. Fisher**, D. van Rossum, “Failed-Detonation Supernovae: Sub-luminous, Low-Velocity Ia Supernovae and Their Remnant-Kicked Iron-Core White Dwarfs,” **The Astrophysical Journal Letters**, **761**, L21, 2012. [DOI](#) (Citations : 72)

18. G. Jordan, C. Graziani, **R. Fisher**, D. Townsley, C. Meakin, K. Weide, L. Reid, J. Norris, R. Hudson, D. Lamb, “The Detonation Mechanism of the Pulsationally-Assisted Gravitationally-Confined Detonation Model of Type Ia Supernovae,” **The Astrophysical Journal**, **759**, 53, 2012. [DOI](#) (Citations : 39)

17. C. Hansen, R. Klein, C. McKee, and **R. Fisher**, “Feedback Effects on Low-Mass Star Formation,” **The Astrophysical Journal**, **747**, 22, 2012. [DOI](#) (Citations : 62)

16. **D. Falta, & R. Fisher** “The Stochastic Gravitational Wave Background from the Single-Degenerate Channel of Type Ia Supernovae,” **Physical Review D**, **84**, 12402, 2011. [DOI](#) (Citations : 2)

15. **D. Falta, R. Fisher, & G. Khanna**, “Gravitational Waves From Single Degenerate Channel of Type Ia Supernovae,” **Physical Review Letters**, **106**, 201103, 2011. [DOI](#) (Citations : 7)

* 14. R. Benzi, L. Biferale, **R. Fisher**, D. Lamb, & F. Toschi, “Inertial Range Eulerian and Lagrangian Statistics from Numerical Simulations of Isotropic Turbulence,” **Journal of Fluid Mechanics**, **653**, 221-244, 2010. [DOI](#) (Citations : 76)

Papers Published Prior to Arrival at UMass Dartmouth

* 13. D. Townsley, R. Bair, A. Dubey, **R. Fisher**, N. Hearn, D. Lamb, K. Riley, “Large-scale Simulations of Buoyancy-Driven Turbulent Nuclear Burning,” *Journal of Physics : Conference Series* **125**, 012009, 2008. [DOI](#) (Citations : 6)

- * 12. A. Arnèodo, R. Benzi, J. Berg, L. Biferale, E. Bodenschatz, A. Busse, E. Calzavarini, B. Castaing, M. Cencini, L. Chevillard, **R. Fisher**, R. Grauer, H. Homann, D. Lamb, A.S. Lanotte, E. Lévêque, B. Lüthi, J. Mann, N. Mordant, W. C. Müller, S. Ott, N.T. Ouellette, J. F. Pinton, S. B. Pope, S.G. Roux, F. Toschi, H. Xu, & P.K. Yeung, “Universality and Multifractality of Lagrangian Turbulence,” **Physical Review Letters**, **100** : 254504, 2008. [DOI](#) (Citations : 126)
11. P.S. Li, C. McKee, R. Klein, & **R. Fisher**, “Sub-Alfvénic Non-Ideal MHD Turbulence Simulations with Ambipolar Diffusion: I. Turbulence Statistics,” **The Astrophysical Journal**, **684**:380–394, 2008. [DOI](#) (Citations : 57)
- * 10. R. Benzi, L. Biferale, **R. Fisher**, L. Kadanoff, L., D. Lamb, & F. Toschi, “Intermittency and Universality in Fully-Developed Inviscid and Weakly-Compressible Turbulent Flows,” **Physical Review Letters**, **100** : 234503–07, 2008. [DOI](#) (Citations : 71)
9. J. Jordan, **R. Fisher**, D. Townsley, A. Calder, C. Graziani, S. Asida, D. Lamb, & J. Truran, “Three-Dimensional Simulations of the Deflagration Phase of the Gravitationally-Confined Detonation Model of Type Ia Supernovae,” **The Astrophysical Journal**, **681**:1448–1457, 2008. [DOI](#) (Citations : 120)
- * 8. **R. Fisher**, S. Abarzhi, K. Antypas, S. Asida, A. Calder, F. Cattaneo, P. Constantin, A. Dubey, I. Foster, J. Gallagher, M. Ganapathy, C. Glendenin, L. Kadanoff, D. Lamb, S. Needham, M. Papka, T. Plewa, L. Reid, P. Rich, K. Riley, & D. Sheeler. “Terascale Turbulence Computation on BG/L Using the FLASH3 Application Framework,” **IBM Research Journal Special Issue on Applications of Massively Parallel Systems**, 1 : 127 – 136, 2008. [Journal](#) (Citations : 47)
7. A. Dubey, L. Reid, and **R. Fisher**, “Introduction to FLASH 3.0, with application to supersonic turbulence,” **Physica Scripta**, 014046, 2008. [DOI](#) (Citations : 65)
6. F. Nakamura, C. McKee, R. Klein, & **R. Fisher**, “On the Hydrodynamic Interaction of Shock Waves with Interstellar Clouds. II. The Effect of Smooth Cloud Boundaries on Cloud Destruction and Cloud Turbulence,” **The Astrophysical Journal Supplement Series**, **164** : 477 –505, 2006. [DOI](#) (Citations : 116)
- * 5. K. Antypas, A. Calder, A. Dubey, **R. Fisher**, M. Ganapathy, J. Gallagher, L. Reid, K. Riley, D. Sheeler, & N. Taylor, “Scientific Applications on the Massively-Parallel BG/L Machine,” in **Parallel Computational Fluid Dynamics: Theory and Applications**, 2006. (Citations : 18)
4. R. Crockett, P. Colella, **R. Fisher**, R. Klein, & C. McKee, “An Unsplit, Cell-Centered Godunov Method for Ideal MHD,” **Journal of Computational Physics**, 2005, **203** : 422 –448. [DOI](#) (Citations : 61)
3. **R. Fisher**, “A Turbulent Interstellar Medium Origin of the Binary Period Distribution,” **The Astrophysical Journal**, 2004, **600** : 769–780. [DOI](#) (Citations : 63)

2. A. Boss, **R. Fisher**, R. Klein, & C. McKee, “The Jeans Condition and Collapsing Molecular Cloud Cores : Filaments or Binaries?,” **The Astrophysical Journal**, 2000, **528** : 325-335. [DOI](#) (Citations : 125)

1. J. Weinstein, **R. Fisher**, S. Vasanawala, M. Shapiro, & T. Tombrello, “Molecular Dynamics Simulation of Cluster-Ion Fragmentation,” **Nuclear Instruments and Methods in Physics Research Section B**, 1994, **88** : 74 – 80. [DOI](#) (Citations : 9)

Non-Refereed Publications

13. R. DiStefano, **R. Fisher**, J. Guillochon, & J. Steiner, “Death by Dynamics: Planetoid-Induced Explosions on White Dwarfs,” 2015. [arXiv](#) (Citations : 4)

* 12. R. Bair, J. Bernstein, C. Daley, B. Diemer, A. Dubey, **R. Fisher**, and others, “Verification and Validation of Current Models of Thermonuclear-Powered Supernovae Using Large-Scale Simulations,” **Proceedings of SciDAC 2010**, 2010. [PDF](#)

11. **R. Fisher**, **D. Falta**, C. Jordan, & D. Lamb, “The Role of Variations of Central Density of White Dwarf Progenitors Upon Type Ia Supernovae,” **Proceedings of The Ninth Asia-Pacific International Conference on Gravitation and Astrophysics (ICGA9)**, 2010, p. 335. [arXiv](#) (Citations : 5)

10. Jordan, C. Meakin, N. Hearn, **R. Fisher**, D. Townsley, D. Lamb, & J. Truran, “Simulations of the Gravitationally Confined Detonation Model of Type Ia Supernovae for Multiple Ignition Points,” **Numerical Modeling of Space Plasma Flows: ASTRONUM-2008 ASP Conference Series**, Vol. 406, 2009, p. 92. [arXiv](#) (Citations : 4)

9. A. Dubey, **R. Fisher**, C. Graziani, G. Jordan, D. Lamb, L. Reid, P. Rich, D. Sheeler, D. Townsley, & K. Weide, “Challenges of Extreme Computing using the FLASH Code,” in **Numerical Modeling of Space Plasma Flows : Astronom 2007 ASP Conference Series**, Vol. 385, 2008, p. 145. [ADS](#) (Citations : 10)

8. G. Jordan, **R. Fisher**, D. Townsley, A. Calder, C. Graziani, S. Asida, D. Lamb, & J. Truran, “Preliminary Results of Three-Dimensional Simulations of the Deflagration Phase of the Gravitationally Confined Detonation Model of Type Ia Supernovae,” in **Numerical Modeling of Space Plasma Flows : Astronom 2007 ASP Conference Series**, Vol. 385, 2008, p. 97. [ADS](#) (Citations : 2)

7. R. Klein, **R. Fisher**, C. McKee, & M. Krumholz, “Recent Advances in the Collapse and Fragmentation of Turbulent Molecular Cloud Cores,” in **Star Formation in the Interstellar Medium: In Honor of David Hollenbach, Chris McKee and Frank Shu**, 2004, 227–234. [ADS](#) (Citations : 1)

6. R. Klein, **R. Fisher**, & C. McKee, “Resolution Issues in the Collapse and Fragmentation of Turbulent Molecular Cloud Cores,” in **Gravitational Collapse: From Massive Stars to Planets**

: **A Meeting to Celebrate Peter Bodenheimer For His Outstanding Contributions to Astrophysics**, 2004. [ADS](#) (Citations : 5)

5. R. Klein, **R. Fisher**, M. Krumholz, & C. McKee, “Recent Advances in the Collapse and Fragmentation of Turbulent Molecular Cloud Cores,” in **Winds, Bubbles, and Explosions: A conference to Honor John Dyson**, 2003, 92-96. [ADS](#) (Citations : 22)

4. M.R. Krumholz, **R. Fisher**, R. Klein, & C. McKee, “Realistic Initial Conditions for Star-Formation Simulations,” in **Winds, Bubbles, and Explosions: A conference to Honor John Dyson**, 2003, 138 - 138. [ADS](#) (Citations : 1)

3. R. Klein, **R. Fisher**, C. McKee, & M. Krumholz, “Low Mass Star Formation in Turbulent Molecular Cloud Cores,” in **Star Formation at High Angular Resolution**, International Astronomical Union. Symposium no. 221, 2003. [ADS](#)

2. R. Klein, **R. Fisher**, & C. McKee, “Fragmentation and Star Formation in Turbulent Cores,” in **The Formation of Binary Stars, Proceedings of IAU Symposium 200**, 2001. [arXiv](#) (Citations : 10)

1. R. Klein, **R. Fisher**, C. McKee, & J. Truelove, “Gravitational Collapse and Fragmentation in Molecular Clouds with Adaptive Mesh Refinement Hydrodynamics,” in **Numerical Astrophysics : Proceedings of the International Conference on Numerical Astrophysics**, 1999. [arXiv](#) (Citations : 13)

Grants Summary

\$657,230 Grants (PI/Co-PI) Received to Date

24 External PI Proposals Submitted at UMass Dartmouth (9 Awarded, 14 Declined, 1 Withdrawn following award of similar proposal to another agency)

16 External Co-PI Proposals Submitted at UMass Dartmouth (4 Awarded, 11 Declined)

Over 130 Million CPU Hours of Computer Time (PI/Co-PI) Received to Date

Grants Received

Principal Investigator Grants Awarded at UMass Dartmouth

2018 - 2021 NASA Astrophysics Theory Program (ATP): "Evaluating the Double-Degenerate Spiral Type Ia Merger Model" \$150,000 **Awarded**

2018 NSF XSEDE “The Double-Degenerate Channel of Type Ia Supernovae” Supercomputer Allocation on Stampede2: 119,837 node hours (\$36,000 equivalent) - **Awarded**

2016 NSF XSEDE “The Double-Degenerate Channel of Type Ia Supernovae” Supercomputer Allocation on Stampede :981,816.0 SUs (\$38,000 equivalent) - **Awarded**

- 2015 NSF XSEDE : “The Double-Degenerate Channel of Type Ia Supernovae” (1/1/14 - 12/31/15) 1.5 Million CPU Hours (\$51,000 equivalent) - **Awarded**
- 2013 NSF XSEDE : “The Double-Degenerate Channel of Type Ia Supernovae” (7/1/13 - 6/30/14) 4 Million CPU Hours - **Awarded**
- 2012 AAS/NASA Small Research Grant : “Probing the Double-Degenerate Channel of Type Ia Supernovae” (1/01/12 - 12/31/12) \$3,200 - **Awarded**
- 2010 NSF MRI-R² : “Acquisition of a Heterogeneous Terascale Shared Campus Computing Facility” (10/01/10 - 10/01/11) \$199,480 - **Awarded**
- 2010 NSF Teragrid : “From Star Formation to Supernovae : Astrochemistry of Turbulent GMC Models and Gravitational Waves from Type Ia Supernovae” - 1.1 Million CPU Hours, requested and **Awarded**.
- 2009 NSF Teragrid : “Astrochemical Diagnostics of Turbulent Giant Molecular Clouds” 300,000 SUs requested and **Awarded**.

Principal Investigator Grants Awarded Prior to UMass Dartmouth

- 2007-2008 University of Chicago and Argonne National Laboratory Joint Theory Institute : “Support for International Collaboration on Turbulence Research,” \$78,000 **Awarded**.
- 2005 Lawrence Livermore National Laboratory : “Large-Scale 3-D Simulation of Weakly-Compressible Homogeneous Isotropic Turbulence with Lagrangian Tracer Particles,” 26.7 Million CPU hours on IBM BG/L (then fastest supercomputer in world) - **Awarded**.

Co-Principal Investigator Grants Awarded at UMass Dartmouth

- 2018 NASA NuStar : “The Supernova Remnant 3C 397: Constraining Physics of Type Ia Supernovae in the Single-Degenerate Scenario,” (PI H. Yamaguchi, NASA GSFC) \$26,750 UMass Dartmouth Share - **Awarded**
- 2009 AFOSR DURIP : “Acquisition of a Heterogenous Terascale Shared Campus Computing Facility” (10/01/10 - 10/01/11, PI S. Gottlieb, University Massachusetts Dartmouth) \$199,800 - **Awarded**
- 2009 DOE INCITE, “Study of Buoyancy-Driven Turbulent Nuclear Burning and Validation of Type Ia Supernova Models,” (PI D. Lamb, University of Chicago), 70 Million CPU hours **Awarded**.

- 2008 DOE INCITE, “Study of Buoyancy-Driven Turbulent Nuclear Burning and Validation of Type Ia Supernova Models,” (PI D. Lamb, University of Chicago), 22 Million CPU hours **Awarded**.

Co-Principal Investigator Grants Awarded Prior to UMass Dartmouth

- 2006 NSF Teragrid MRAC, : “Scientific Analysis and Visualization of Turbulence Data,” (PI M. Papka, Argonne National Laboratory) 30,000 SUs requested and **Awarded**.
- 2005 NSF Teragrid LRAC, “Progress Towards a Comprehensive Theory of Star Formation – From Low to High Mass and on to Giant Molecular Clouds,” (PI R. Klein, University of California at Berkeley/LLNL) 700,000 SUs **Awarded** on SDSC IBM SP-4.
- 2005 LBNL ERCAP “Toward a Comprehensive Theory of Star Formation,” (PI R. Klein, University of California at Berkeley/LLNL) 700,000 SUs on IBM SP-3 requested, 400,000 SUS **Awarded**.
- 2004 NSF NRAC, “Progress Towards a Comprehensive Theory of Star Formation – From Low to High Mass and on to Giant Molecular Clouds,” (PI R. Klein, University of California at Berkeley/LLNL) 1,100,000 SUs on SDSC IBM SP-4 requested and **Awarded**.
- 2004 LBNL NERSC ERCAP “Toward a Comprehensive Theory of Star Formation,” (PI R. Klein, University of California at Berkeley/LLNL) 700,000 SUS **Awarded** on IBM SP-3.
- 2003 NSF NRAC, “Towards A Comprehensive Theory of Star Formation – From Low to High Mass,” PI R. Klein, University of California at Berkeley/LLNL) 770,000 SUs on SDSC IBM-SP2 requested and **Awarded**.
- 2003 LBNL NERSC ERCAP “Toward a Comprehensive Theory of Star Formation,” (PI R. Klein, University of California at Berkeley/LLNL) 525,000 SUS **Awarded** on IBM SP-3.
- 2002 NSF NRAC “Towards a Comprehensive Theory of Star Formation – From Low to High Mass,” (PI R. Klein, University of California at Berkeley/LLNL) 500,000 SUs on SDSC IBM SP-2 requested and **Awarded**.
- 2001 NSF NPACI “Towards a Comprehensive Theory of Star Formation – From Low to High Mass,” (PI R. Klein, University of California at Berkeley/LLNL) 350,000 SUs on SDSC IBM SP-2, requested and **Awarded**.
- 2000 NSF NPACI “Star Formation in Turbulent Molecular Cloud Cores.” (PI R. Klein, University of California at Berkeley/LLNL) 156,000 SUs on Univ. Texas IBM SP-2 requested. 100,000 **Awarded**.
- 1999 NSF NPACI “Numerical Studies of Fragmentation in Star-Forming Regions,” (PI R. Klein, University of California at Berkeley/LLNL) 800 SUs on PSC Cray T90, 4000 SUs on Univ. Texas IBM SP-2, requested and **Awarded**.

- 1998 NSF NPACI “Numerical Studies of Fragmentation in Star-Forming Regions,” (PI R. Klein, University of California at Berkeley/LLNL) 1000 SUs requested and **Awarded** on SDSC Cray T90.
- 1997 NSF Pittsburgh Supercomputing Center “Numerical Studies of Fragmentation in Star-Forming Regions,” (PI R. Klein, University of California at Berkeley/LLNL) 400 SUs requested and **Awarded** on PSC Cray C90.

Conference Presentations

Works Presented

- Union College Physics Colloquium, “The Fate of Exploding White Dwarfs,” 4/12/2018
- AAS 231 Plenary, “The Fate of Exploding White Dwarfs,” 1/12/2018
- ASTRONUM17, St. Malo France, 6/29/2017
- AAS 229, "The Fate of Exploding Chandrasekhar-Mass White Dwarfs: The Production of Stable Iron Peak Elements in SNR 3C 397," 1/6/2017
- UMass Amherst Astronomy Colloquium, 12/8/2016
- Harvard Center for Astrophysics, Institute for Theory and Computation Colloquium, 10/20/2016
- Harvard Center for Astrophysics, Institute for Theory and Computation Luncheon, 10/20/2016
- Tufts University Physics & Astronomy Colloquium, 10/7/2016
- Invited Talk, ICRANet Pescara Meeting, 6/2016
- AAS 227, 1/6/2016
- UMass HPC Day, 11/14/2014
- Harvard Center for Astrophysics, Institute for Theory and Computation Luncheon, 10/16/2014
- Harvard Center for Astrophysics, Institute for Theory and Computation Colloquium, 10/16/2014
- Public Talk, American Museum of Natural History, NYC, 5/17/15
- Type Ia Supernova Workshop, University of Chicago, 9/15 - 9/19/14

- Invited Talk, “Unquiet Universe,” Cefalu, Sicily, 6/9 - 6/14/14
- American Astronomical Society 224th Meeting, 6/5/14
- Invited Physics Colloquium, “Type Ia Supernovae and Graduate Physics Education,” UMass Boston, 5/2/14
- Invited Physics Presentation, “Type Ia Supernovae and Graduate Physics Education,” Bridgewater State University, 1/28/14
- Invited Physics Colloquium, “Type Ia Supernovae and Graduate Physics Education,” Suffolk University, 1/23/14
- Invited Physics Colloquium, “Type Ia Supernovae and Graduate Physics Education,” Massachusetts College of Liberal Arts, 1/17/14
- Invited Seminar, “Big Data Challenges in Petascale High-Performance Computing Simulations,” High Performance Computing in Computational Science & Engineering Seminar, UMass Lowell ECE Department, 11/6/13
- Invited Lightning Talk, “Big Data Challenges in Petascale Computational Astrophysics Simulations,” UMass Boston Big Data Workshop, 10/4/13
- Public Talk, “Exploding Stars and the Accelerating Cosmos,” Maria Mitchell Association, Nantucket Island, 6/19/13
- Invited Seminar, “High Performance Computing in Computational Astrophysics,” High Performance Computing in Computational Science & Engineering Seminar, UMass Amherst, 9/28/12
- Invited Talk, “Turbulence in Type Ia Supernovae Simulations,” New England Numerical Analysis Day (NENAD), UMass Amherst, 4/21/12
- Invited Talk, “Turbulence in Type Ia Supernovae Simulations,” American Physical Society April Meeting, Invited Session on Advancements in Computational Physics Using NSF’s TeraGrid/XSEDE Resources, Atlanta, 4/1/12
- Invited Seminar, “Turbulence in Star Formation,” Harvard Center for Astrophysics, Institute for Theory and Computation, 2/22/12
- Invited Seminar, “Simulating the Single And Double Degenerate Channels of Type Ia Supernovae,” Harvard Center for Astrophysics, Institute for Theory and Computation, 2/7/12
- Invited Talk, “Barriers to Computing at Scale : Hardware, Algorithms, Modeling,” The Future of AstroComputing Conference, UC San Diego, 12/15/10

- Invited Physics Colloquium, “Type Ia Supernovae,” Southern Connecticut State University, 10/8/10
- Invited Physics Colloquium, “Type Ia Supernovae,” University of Wisconsin at Milwaukee, 5/14/10
- Keynote talk, “Type Ia Supernovae,” Region I Society of Physics Students Annual Meeting, Northeastern University, 4/10
- Invited talk, “Astrochemical Evolution of Turbulent Giant Molecular Clouds,” UC Berkeley Workshop on Massive Star Formation, 1/12/10
- Contributed talk “Astrochemical Evolution of Turbulent Giant Molecular Clouds,” 2nd Halifax Meeting on Computational Astrophysics, St. Mary’s University, Halifax, 10/09
- Invited talk “Type Ia Supernovae” at International Conference on Gravitation & Astrophysics 2009 in Wuhan, China, 06/09
- Invited astronomy seminar “Astrochemical Diagnostics of Turbulent Giant Molecular Clouds” at SUNY Stony Brook, 04/09
- Invited talk, October 2008, Astronomy & Astrophysics Department, University of Chicago, “The Transition to Distributed Nuclear Burning”, 10/08
- Invited colloquium on “Type Ia Supernovae from a Computational Fluids Perspective” at Università degli Studi di Roma Tor Vergata, 08/07
- Turbulent Mixing and Beyond Workshop, International Center for Theoretical Physics in Trieste, Italy. Contributed talk on “Large-Scale Numerical Simulations of Weakly-Compressible Turbulent Flows,” 08/07
- Turbulent Mixing and Beyond Workshop at International Center for Theoretical Physics in Trieste, Italy. “Supersonic Turbulence with the FLASH Code” contributed tutorial talk, 08/07
- American Physical Society Division of Fluid Dynamics Meeting in Tampa Florida. Contributed talk on “3D Large-Scale Simulations of Weakly-Compressible Homogenous Isotropic Turbulence with Lagrangian Tracer Particles,” 11/06
- Cornell Fluids Seminar, invited talk on “3D Large-Scale Simulations of Weakly- Compressible Homogeneous Isotropic Turbulence with Lagrangian Tracer Particles,” 10/06
- Computational Physics and New Perspectives in Turbulence, International Union of Theoretical and Applied Mechanics Symposium in Nagoya, Japan. Contributed talk, 09/06

- UCLA Institute for Pure and Applied Mathematics Astrophysical Fluid Dynamics Workshop. Invited talk on “The Formation of Brown Dwarfs : A Comparison of SPH and AMR Disk Fragmentation,” 04/05
- SF/ISM Seminar, University of California at Berkeley. Invited talk on “Brown Dwarf Formation,” 11/04
- Friday Lunchtime Astrophysics Seminar, University of California at Santa Cruz. Invited talk on “Brown Dwarf and Low Mass Star Formation in Protostellar Disks : A Critical Analysis of Numerical Simulations,” 10/04
- Cores, Disks, Jets, and Outflows Conference in Banff, Alberta. Contributed talk on “Numerical Simulations of Brown Dwarf and Low Mass Star Formation : A Resolvable Crisis,” 07/04
- Royal Astronomical Society Meeting in London. Invited talk on “Single and Multiple Star Formation in Turbulent Molecular Cloud Cores : AMR and SPH Simulations,” 12/03
- AMR Workshop, ASCI Flash Center, University of Chicago. Contributed talk on “How to do Subcycled, Self-Gravitating Hydrodynamics on an Adaptive Mesh : Essential Obstacles and Fundamental Methodology,” 09/03
- NASA Ames Center for Star Formation Studies. Invited talk on “Recent Progress on Star Formation in Turbulent Molecular Cloud Cores,” 01/03
- Lawrence Livermore National Laboratory, Seminar on “Single and Multiple Star Formation in Turbulent Molecular Cloud Cores,” 10/02
- Naval Postgraduate School, Colloquium on “Single and Multiple Star Formation in Turbulent Molecular Cloud Cores,” 01.
- Canadian Institute for Theoretical Astrophysics. Seminar on “Single and Multiple Star Formation in Turbulent Molecular Cloud Cores,” 11/00
- NASA Ames Center for Star Formation Studies. Invited talk on “Preliminary Results From Multiple Star Formation in Turbulent Molecular Cloud Core Models,” 03/00

University Service

- Founding faculty member (with Sigal Gottlieb, Gaurav Khanna, and others) of the Center for Scientific Computing and Visualization Research (CSCVR)
- Campus Faculty Representative, Massachusetts Green High-Performance Computing Center Initiative (2010 - present)

- Campus Director, Massachusetts NASA Space Grant (2009 - present)
 - Led effort to establish UMass Dartmouth as a NASA Space Grant Affiliate Campus
 - Developed a successful proposal for a NASA Space Grant augmentation award for UMass Dartmouth students for \$50K for 2017 - 2019
 - Program supports ~ 3 - 5 undergraduate and graduate student fellowships annually, valued at \$15 K - \$25 K in total
- Led the Coordination for a Public Event with Stephon Alexander (2018)
- Participated in a Pubic Event with Kip Thorne (2016)
- Member, Textiles Building Laboratory Design Committee (2011 - 2012)
- Office of Faculty Development Board Member (2009 - 2011)

College Service

- Member of College Academic Council (2017 -)
- Co-led (with Sigal Gottlieb), in collaboration with colleagues from physics, math, and other departments, the development of the Computational Science and Engineering option under the newly-created Ph.D. program in Engineering and Applied Science
- Engineering and Data Services Librarian Search Committee (2014)
- With Dean Peck, planned development of a campus-wide visualization facility — eventually realized under the auspices of the CSCVR
- Led Freshman Summer Institute (FSI) programs in 2011 and 2013

Department Service

- Physics Full-Time Lecturer Search and Screen Committee Co-Chair (2011 - 2012)
- Physics Department Library Liaison (2010 - present)
 - Accelerated transition to electronic journals in physics collection
 - Assisted in developing strategy to broaden journal collection by consolidating existing journals

- Society of Physics Students (SPS) Faculty Mentor (2009 - 2014)
 - Rebooted the club
 - Organizer of the SPS New England Zone Meeting, held at UMass Dartmouth April 1-2, 2011
- Physics Department Colloquium Organizer (2009 - present)
- Physics Department Journal Club Organizer (2009 - present)
- Creator and Administrator of Physics Department Facebook Page (2009 - present)
 - Promotes Physics Department activities in new media format ideally suited to Millennial generation members, and will also help facilitate longitudinal tracking of alumni in the future
 - Over 200 fans over lifetime of page from around the globe -- including Greece, Bangladesh, Italy, India, Canada, Indonesia, Germany, Peru, Turkey, Sweden, United Arab Emirates, Chile, Australia, Argentina, Egypt, Spain, UK, and Ethiopia
 - Near-parity gender ratio (40% female, 60% male) of fans broadens engagement of women in physics; double the gender ratio of US B.S. physics awarded in 2007 (20% female, 80% male; AIP)
- Physics Department Undergraduate Curriculum Committee Member (2008 - present)
 - Collaborated in the development of an astrophysics option for physics major
 - Developed and taught a new, three-semester modern physics and quantum mechanics sequence to better prepare majors for Physics GRE and graduate programs
 - Streamlined Gen-Ed requirements in Physics Curriculum

Membership in Professional Societies

- International Astronomical Union (IAU), American Astronomical Society (AAS), American Physical Society (APS), Division of Fluid Dynamics (DFD) and Division of Computational Physics (DCOMP)
- American Astronomical Society (AAS)
- National Society Black Physicists (NSBP)

- Society of Physics Students (SPS)

Curriculum vitae

Alan W. Hirshfeld, Ph.D.

June 1, 2018

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Education

B.A., astrophysics, Princeton University, 1973.
M.S., astronomy, Yale University, 1975.
Ph.D., astronomy, Yale University, 1978.

Current Positions

Professor, Physics Department, University of Massachusetts Dartmouth, 1990-present.
Associate of the Harvard College Observatory, 1999-present.
Director/outreach coordinator, UMass Dartmouth Observatory, 1992-present.

Other Professional Experience

Science book reviewer (free-lance), *Wall Street Journal*, 2011-present.
Associate Professor, Physics Department, University of Massachusetts Dartmouth, 1984-90.
Assistant Professor, Physics Department, University of Massachusetts Dartmouth, 1979-84.
Visiting Lecturer, Physics Department, University of Massachusetts Dartmouth, 1978-79.
Technical consultant to the books division of *Sky & Telescope* magazine, 1981-95.

Awards and Honors

Popular Writing Award, American Astronomical Society's Solar Physics Division, for the article
"The Greatest Show on Earth," about solar eclipses, in the *Wall Street Journal* (Aug 12, 2017), 2018.

Finalist, Julia Ward Howe Book Prize, Boston Authors Club, for *Starlight Detectives: How Astronomers, Inventors, and Eccentrics Discovered the Modern Universe*, 2016.

Innovation in Teaching Award, Office of Faculty Development, UMass Dartmouth, 2010.

Leo Sullivan Teacher of the Year Award, UMass Dartmouth, 2009.

2nd prize, Templeton Foundation Power of Purpose international essay competition, for essay about
19th century physicist Michael Faraday, 2004.

Recognition Award from Photographic Historical Society of New England for research on the history of

celestial photography, 2004.

2nd prize, Griffith Observatory/Hughes Aircraft Co. essay competition, for essay “The Leviathan of Parsonstown: An Amateur Astronomer's Dream,” 1974.

Publications

Books

Astronomy Activity and Laboratory Manual, 2nd edition. Burlington, MA: Jones & Bartlett Publishers, to be published Dec 2018.

Starlight Detectives: How Astronomers, Inventors, and Eccentrics Discovered the Modern Universe. New York: Bellevue Literary Press, 2014.

Parallax: The Race to Measure the Cosmos. Mineola, NY: Dover Publications, 2013. (Republication of original edition from 2001.)

Eureka Man: The Life and Legacy of Archimedes. New York: Walker, 2009 (hardcover); 2010 (paperback).

Astronomy Activity and Laboratory Manual. Sudbury, MA: Jones & Bartlett Publishers, 2008; Instructor's manual, 2009.

The Electric Life of Michael Faraday. New York: Walker, 2006.

Parallax: The Race to Measure the Cosmos, New York: W. H. Freeman, 2001 (hardcover); Henry Holt & Co., 2002 (paperback). Main selection of the Astronomy Book Club; Astronomical Society of the Pacific “Book of Note”; Editor's Choice Award, *Research News and Opportunities in Science and Theology*.

Sky Catalogue 2000.0, Vol. 1: Stars to Magnitude 8.0, with R. W. Sinnott, New York: Cambridge University Press and Cambridge, MA: Sky Publishing Corp., 1982; 2nd revised edition, with R. W. Sinnott and F. Ochsenbein, 1991.

Sky Catalogue 2000.0, Vol. 2: Double Stars, Variable Stars and Nonstellar Objects, with R. W. Sinnott, New York: Cambridge University Press and Cambridge, MA: Sky Publishing Corp., 1985.

Chapters in Books

“Stellar Parallax,” invited, peer-reviewed article in *Discoveries in Modern Science: Exploration, Invention, Technology*, Farmington Hills, MI: Macmillan, 2015.

“William Harkness,” “Warren de la Rue,” “Thomas Henderson,” “James Bradley,” “Matthew Stewart,” five invited, peer-reviewed articles in *Biographical Encyclopedia of Astronomy*, Hockey, Thomas, ed. New York: Springer, 2008.

“Astronomy,” with J. K. Beatty and D. H. Smith, in *Almanac of Science and Technology*, New York: Harcourt-Brace-Jovanovich, 1990.

Articles and Other Publications

“A Longing for Truth and Meaning.” (Book review) Wall Street Journal (Apr 7, 2018), C17.

“A New Astronomy Through 'The Telescope in the Ice.’” (Book review) *Wall Street Journal* (Dec 16, 2017), C14.

“The Greatest Show on Earth” & “Sun and Moon Bookshelf.” (Book reviews) *Wall Street Journal* (Aug 12, 2017), C7.

“All the Light We Cannot See.” (Book review) *Wall Street Journal* (Aug 5, 2017), C7.

“Wordless Wonders.” (Book review) *Wall Street Journal* (Apr 15, 2017), C6.

“Williamina Fleming, Astronomer: Brief Life of a Spectrographic Pioneer – 1857-1911.” *Harvard Magazine* 119 (Jan-Feb 2017), 48-49.

“The Power of Totality.” (Letter to the Editor) *Sky and Telescope*, 132 (Dec 2016), 6.

“The Great American Eclipse.” (Book review) *Wall Street Journal* (Oct 1, 2016), C6.

“The Nebula War.” (Cover article) *Sky and Telescope*, 131 (Jun 2016), 36-40.

“Hitching a Ride on a Light Beam.” (Featured book review) *Wall Street Journal* (Apr 22, 2016), C5-C6.

“A Likely Story.” (Book review) *Wall Street Journal* (Dec 26, 2015), C8.

“William Cranch Bond: Brief Life of Harvard’s First Astronomer.” *Harvard Magazine* (Sep-Oct 2015), 46.

“Reading History in the Heavens.” *Sky and Telescope*, **130** (Jul 2015), 86.

“Sparkling a Love for Science.” (Book review) *Wall Street Journal* (Jun 13, 2015), C5-C6.

“Ten Astronomers You’ve (Probably) Never Heard Of,” *BBC History Magazine* (July 2014).

“The Limit of Reason.” (Book review) *Wall Street Journal* (May 3, 2014), C9.

“Unravelling Starlight: William and Margaret Huggins and the Rise of the New Astronomy.” (Book review) *Science and Education* **22** (2013), 1281-1285.

“The Eternal Pursuit.” (Book review) *Wall Street Journal* (Dec 8, 2012), C7.

“How Curiosity Killed Schrödinger’s Cat.” (Book review) *Wall Street Journal* (Jun 30, 2012), C9.

“The Loneliest Planet.” (Book review) *Wall Street Journal* (Dec 31, 2011), C5.

“Scooped?” (Letter to the Editor) *Sky & Telescope*, **122** (Oct 2011), 8-9.

“Counting on Progress.” (Book review) *Wall Street Journal* (Jul 7, 2011), A13.

“An Engine of Perpetual Revolution.” (Book review) *Wall Street Journal* (Feb 26-27, 2011).

“All Hail the Hypotenuse.” (Book review) *Wall Street Journal* (Jan 8-9, 2011), C10.

“Asteroid Deflection and NEO Threats.” (Letter to the editor) *Sky & Telescope*, **121** (Feb 2011), 8.

“The Original Naked Scientist (Archimedes).” *The Naked Scientists* website (Fall 2010).

- “Galileo Measures a Mountain – on the Moon!” *The Classroom Astronomer* (Fall 2010).
- “The Universe of Archimedes.” *Sky and Telescope*, **120** (Nov 2010), 32-35.
- “The Strangest Man: The Hidden Life of Paul Dirac, Mystic of the Atom.” (Book review) *American Journal of Physics*, **78** (Apr 2010), 445-446.
- “The Parchment Brothers.” *Lost* literary magazine: www.lostmag.com (Oct 2009).
- “The Turbulent Lens (history of optical glassmaking).” *Lost* online magazine (Dec 2006).
- “Science vs. Spiritualism.” *BBC History Magazine*, **7** (Mar 2006), 20-21.
- “The Universe in the Mirror,” *Sky and Telescope*, **109** (Feb 2005), 44-50.
- “Detektive des Sternelichts” (“Starlight Detectives”), *Astronomie Heute/Astronomy Today* (Dec 2004), 22-28.
- “How Wonderfully We Stand Upon This World,” *Science & Spirit*, **15** (Nov-Dec 2004), 52-57.
- “Das Wettrennen um die Vermessung des Universums” (“The Race to Measure the Cosmos”), *Astronomie Heute/Astronomy Today* (Oct 2004), 22-27.
- “Starlight Detectives: The Birth of Celestial Spectroscopy,” *Sky & Telescope*, **108** (Aug 2004), 44-49.
- “The Triangles of Aristarchus,” *The Mathematics Teacher*, **97** (Apr 2004), 228-231.
- “Picturing the Heavens: The Rise of Celestial Photography in the 19th Century,” *Sky & Telescope*, **107** (Apr 2004), 36-42.
- “Revealing the Universe.” (Book review) *Isis*, **93** (Sep 2002), 523.
- “Wobbling the Cosmos,” *BBC History Magazine*, **3** (Apr 2002), 30-34.
- “Behold, the Cosmic Light of the Ages,” (Letter to the editor) *Boston Globe* (Sep 2002).
- “The Race to Measure the Cosmos” (Cover article), *Sky & Telescope*, **102** (Nov 2001), 38-45.
- “The Absolute Magnitudes of Stars,” *Sky & Telescope*, **88** (1994), 35-36.
- “ESSCO Series Star Charts,” series of 13 computer-generated star charts for Year 2000 and Year 0, Sky Publishing (1992).
- “Out of the Cradle: Exploring the Frontier Beyond Earth.” (Book Review) *American Scientist*, **76** (1986), 197.
- “Laboratory Exercises in Astronomy: How Far is the Galactic Center?” *Sky & Telescope*, **68** (1984), 518-522.
- “Sky Catalogue 2000.0 Bulletin,” with Roger Sinnott, *Sky & Telescope*, **67** (1984), 521.
- “Astronomy for the Inquiring Mind.” (Book review) *American Scientist*, **72** (1984), 78.

- “Webb Society Deep-Sky Observer's Handbook, Vol. 5: Clusters of Galaxies.” (Book review) *American Scientist*, **71** (1983), 532.
- “The Practical Astronomer.” (Book review) *American Scientist*, **70** (1982), 213.
- “Inside Dwarf Galaxies,” *Sky & Telescope*, **59** (1980), 287-90.
- “The Stellar Content of Dwarf Spheroidal Galaxies,” *Astrophysical Journal*, **241** (1980), 111-115.
- “Measurements of Abundances and Ages of Old Disk Clusters,” with R. D. McClure and B. A. Twarog, in *The HR Diagram*, A. G. D. Philip and D. S. Hayes, editors. Dordrecht, Holland: Reidel, 163; presented at the 80th Symposium of the International Astronomical Union, Washington, D.C. (1977).
- “Weighing the Galaxies -- An Impossible Task?” *Yale Scientific Magazine*, **51** (1976), 3-6.
- “On the Nature of the Bright Variables in Dwarf Spheroidal Galaxies,” with P. Demarque, *Astrophysical Journal*, **202** (1975), 346-350.
- “Column Densities of Interstellar Molecular Hydrogen,” with L. Spitzer and W. Cochran, *Astrophysical Journal Supplement Series*, No. 266 (1974).
- “The Leviathan of Parsonstown – An Amateur Astronomer's Dream,” *Griffith Observer*, **38** (1974), 2-5.

Presentations

“Starlight Detectives: How Astronomers, Inventors, and Eccentrics Discovered the Modern Universe,” invited lectures at:

Amateur Telescope Makers of Boston, Cambridge MA, May 2018.
 Astronomical Society of Southern New England, Rehoboth MA, Feb 2018
 North Shore Amateur Astronomy Society, Feb 2017.
 Gloucester Area Astronomical Club, Oct 2016.
 Monadnock Summer Lyceum, Peterborough, NH; re-broadcast on New Hampshire Public Radio, Jul 2016.
 Ronald E. Hatcher Science on Saturday Series, Princeton Plasma Physics Laboratory, Princeton University, Princeton NJ, Jan 2016
 Altman Distinguished Lecture Series, Newton Lifetime Learning, Andover Theological Seminary, Newton, MA, Oct 2015
 Photographic Historical Society of New England, Newton MA, Sep 2015
 New Hampshire Astronomical Society, Manchester NH, Aug 2015
 Needham Center for Aging, Needham MA Jun 2015
 Cabot Park Village, Newton MA, May 2015
 UMass Dartmouth Library, May 2015
 Newton Free Library, Newton MA, Mar 2015
 North Shore Amateur Astronomy Club, North Andover MA, Mar 2015
 Skyscrapers Astronomy Club, Scituate RI, Feb 2015
 South Shore Astronomical Society, Norwell MA, Jan 2015
 Amateur Astronomers Association of Princeton, Princeton NJ, Jan 2015
 Princeton Plasma Physics Laboratory, Princeton NJ, Jan 2015
 Partners Village Store, Westport MA, Nov 2014
 Astronomical Society of Southern New England, Rehoboth MA, Oct 2014

"Astronomy's Best Worst Telescope," Northeast Astronomy Forum, Suffern NY, Apr 2015.

“The Founding of the Harvard College Observatory,” Center for Astrophysics, Harvard University, Cambridge MA, Nov 2014.

Invited panelist for public forum in scientific research and education, “Ignorance and Curiosity”, Helix Center, New York Psychoanalytic Society and Institute, NY, Apr 2013.

Invited panelist in science writing seminar, MIT, Nov 2012.

“Eureka Man: The Life and Legacy of Archimedes,” invited seminar, Wheaton College, Nov 2012.

“Eureka Man: The Life and Legacy of Archimedes,” invited lecture, Needham (MA) Public Library, Jan 2011.

“Parallax: The Race to Measure the Cosmos,” invited seminar, Wheaton College, Mar 2010.

“Astronomy and Technology: Partners in Discovery,” invited lecture, Skyscrapers Astronomy Club, RI, Feb 2010.

“Starlight Detectives of the Victorian Age,” invited lecture, Astronomical Society of Southern New England, Jan 2010.

“Parallax: The Race to Measure the Cosmos,” invited seminar, Wellesley College, October 2009; Wheaton College, Mar 2010.

“Eureka Man: The Life and Legacy of Archimedes,” invited lecture, American Association of Physics Teachers semi-annual conference, Ann Arbor MI, Jul 2009; Newton Free Library, Newton, MA, Oct 2009.

“Stellar Parallax: Telescopes as Measuring Engines,” invited lecture, American Assn. for the Advancement of Science semi-annual conference, Chicago, IL, Feb 2009.

“Parallax: The Race to Measure the Cosmos,” invited lecture, Wellesley College, Wellesley, MA, Oct 2008; followed by invited seminar on science writing.

“Who Invented the Graph?” poster presentation, American Association of Physics Teachers semi-annual conference, Greensboro, NC, Jul 2007.

“The Story of Astronomy: An Activities-Based, Historical Approach to Classroom Instruction,” invited lecture, 37th Mid-American Regional Astrophysics Conference, University of Missouri, Kansas City, MO, Apr 2007.

“The Electric Life of Michael Faraday,” invited keynote lecture, 37th Mid-American Regional Astrophysics Conference, University of Missouri, Kansas City, MO, Apr 2007.

“An Activities-Based, Historical Approach to the Introductory Astronomy Curriculum,” poster presentation, American Astronomical Society semi-annual conference, Seattle, WA, Jan 2007.

“Faraday versus the Spiritualists,” contributed lecture, American Assn. of Physics Teachers semi-annual conference, Seattle, WA, Jan 2007.

“The Electric Life of Michael Faraday,” invited lecture, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, May 2006; Newton Free Library, Newton, MA, May 2006.

Invited seminar about science writing and the history of astrophysics, Wheaton College, Norton, MA, Feb 2006.

“Starlight Detectives of the Victorian Age,” invited lecture, Physics Dept., Tufts University, Medford, MA, Nov 2005.

“History of Celestial Photography,” invited lecture, Photographic Historical Society of New England, Waltham, MA, Oct 2004.

“Who Invented the Graph?” invited lecture, New England Assn. of Teachers of Mathematics annual conference, Providence, RI, Oct 2004.

“History of Astrophysics,” keynote lecture, Skyscrapers Astronomy Club, summer conference, Rhode Island, Jul 2004.

“Parallax: The Race to Measure the Cosmos,” invited lectures at:

South Shore Astronomical Society, Plymouth MA, Jan 2004

Stellafane astronomy convention, Springfield VT, Aug 2003 (keynote lecture)

Distinguished Lecturer Series, MIT Lincoln Labs, Lexington MA, Jan 2003

Custer Institute, Southold, Long Island NY, Nov 2002

Princeton University Alumni Assn. of New England, Boston MA, Dec 2002

Conjunction Astronomy Conference, Northfield MA, Sep 2002

Cape Cod Astronomical Society, Jun 2002

Northeast Astronomy Forum, Suffern NY, May 2002 (featured speaker)

Physics Dept., Tufts University, Medford MA, Apr 2002

MIT Gamma Ray Astronomy Conference, Woods Hole MA (featured speaker), Nov 2001

Scientific Seminar Series, American Museum of Natural History, NY, Nov 2001

Distinguished Authors in Astronomy Series, Hayden Planetarium/Rose Center, NY, Nov 2001

Puffin Cultural Forum, Teaneck NJ, Nov 2001

8th Annual Enchanted Skies Star Party/New Mexico Tech Homecoming Celebration, Socorro NM, Oct 2001 (featured speaker)

Newton Free Library, Newton MA Sep 2001

MIT Club of Southeastern Massachusetts, New Bedford MA, Sep 2001

Astronomical Society of the Pacific, annual meeting, St. Paul MN, Jul 2001 (invited booksigning)

Public Lecture Series, Harvard University, Dept. of Astronomy, Cambridge MA, Jun 2001

Morrison Planetarium, San Francisco CA, Jun 2001

American Astronomical Society, semi-annual meeting, Pasadena CA, Jun 2001

Griffith Observatory Lecture Series, Los Angeles CA, Jun 2001

“The Absolute Magnitudes of Stars,” featured lecture, StarConn Astronomy Symposium, Wesleyan University, 1995.

“What’s New in the Universe,” invited lecture, Massachusetts Association of Science Teachers, annual meeting, 1990 and 1991.

Membership In Professional Societies

American Astronomical Society (Vice-Chair/Chair-Elect Historical Astronomy Division)

American Association of Physics Teachers

American Association for the Advancement of Science

Union of Concerned Scientists

PEN/New England writers association

Jong-Ping Hsu
Chancellor Professor of Physics
Physics Department, UMass Dartmouth, North Dartmouth, MA 02747

VITA

Name Jong-Ping Hsu

Address Physics Department, University of Massachusetts Dartmouth,
North Dartmouth, MA 02747.
(FAX (508)999-9115, e-mail: jhsu@umassd.edu).

Experience

2010 Fall to 2014 <u>(Chair)</u> 2008 Fall to 2010 <u>(Acting Chair)</u>	(Physics Department, UMass Dartmouth, North Dartmouth, MA 02747) Investigate gauge identity and conserved energy-momentum tensor in Yang-Mills gravity in flat space-time with symbolic computations. (Using xAct, Tensorial 5, and MathTensor) Study angular momenta of gauge fields and their quantization. The S matrix and quantization of Yang-Mills gravity.
2007 Fall <u>(Visiting Professor)</u>	(Chinese Academy of Sciences, Beijing and Beijing Normal University) Gravitational Radiations, Accelerated Cosmic Expansion and Accelerated Frames of Reference, Pseudo-Group and Accelerated Transformations.
2004 Summer <u>Center Scientist</u>	(National Center for Theoretical Sciences, Taiwan) A Yang-Mills gravity based on translation gauge symmetry
2000 to present	(Physics Department, UMass Dartmouth, North Dartmouth, MA 02747)
<u>Chancellor Professor</u>	Investigate (a) Yang-Mills gravity in flat spacetime within a general frames, inertial and non-inertial, (b) Cosmic Lee-Yang repulsive force, (c) Broader View of Relativity, and (d) classical limit of quantum mechanics and quantum computing.
1999 Fall <u>Visiting Professor</u>	Chinese Academy of Science, and Beijing Normal University General implications of Lorentz and Poincare invariance and field theory in accelerated frames of references (with limiting 4-dimensional symmetry).
1987 to 2000	(Physics Department, UMass Dartmouth, North Dartmouth, MA 02747)
<u>Professor</u>	Investigate (a) quark confinement, (b) hybrid gauge symmetry breaking and additional Z boson coupled to lepton and baryon numbers, (c) quantum mechanics as the large mass limit of quantum mechanics (in path integrals).

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1977-78 (NASA/Space Sciences Laboratory, Marshall Space Flight Center,
Huntsville, AL 35812)

National Research Council Senior Research Associate

Proposed and conducted a research program investigating the property of atomic clock in non-inertial frames. Also studied gauge theory of quantum gravity and its experimental tests.

1972-77 (Physics Department, University of Texas at Austin, Austin, TX
78712)

Education

1957-62 National Taiwan Univ., Taipei, Taiwan. (B.S.)
1963-65 National Tsing-Hua Univ., Hsin-Chu, Taiwan. (M.S.)
1965-69 University of Rochester, Rochester, N.Y. (Ph.D.)

Professional Activities

Serve as a member of the International Organizing Committee and International Advisory Committee of the 2017 ICGAC-13.
Serve as a member of the International Organizing Committee and International Advisory Committee of the 2015 ICGAC-12. (Co-editor of the Conf. Proceedings, Published by World Scientific.)
Invited to present two papers in The 12th Asia-Pacific International Conference on Gravitation, Astrophysics and Cosmology (ICGAC) (Jun. 28-July 4, 2015, Moscow, Russia).
Serve as a member of the International Organizing Committee of ICGA9.
Invited to give a talk in The 9th Asia-Pacific International Conference on Gravity and Astrophysics (Jun. 28-July 2, 2009, Wu Han, China).
Invited to give seminars at the Institute of Theoretical Physics (the Chinese Academy of Sciences), Tsing Hua University, Beijing Normal University, Northwest University (Xian), National Taiwan University, The National Center of Theoretical Science and Academia Sinica (Taipei) in the Fall of 2007.
Invited to present a paper in The VIII Asia-Pacific International Conference on Gravity and Astrophysics (ICGA8, Aug-Sept, 2007, Japan).
Serve as a member of the International Organizing Committee of ICGA8.
Serve as a member of the International Organizing Committee of the VII Asia Pacific International Conference on Gravitation and Astrophysics, and as a co-editor of the Proceedings of the Conference (published in 2006 by the World Scientific).

Referee for

Phys. Rev. Lett., Opt. Letters, Phys. Rev. A & D, Phys. Letters,
Found. Phys., Nuovo Cimento B, and J. of the Optical Society of America,
International Journal of Modern Physics A.

SCIENTIFIC PAPERS

150. 'A Unified Gravity-Electroweak Model Based on a Generalized Yang-Mills Framework' (Mod. Phys. Letts. A 26,1707 (2011)).
151. "[The physical basis of natural units and truly fundamental constants](#)" (L Hsu, JP Hsu, The European Physical Journal Plus 127 (1), 1-9 (2012).
152. '[The S-matrix and graviton self-energy in quantum Yang-Mills gravity](#)' (JP Hsu, SH Kim, Eur. Phys. J. Plus 127, 146 (2012).
153. '[Quantum Yang-Mills gravity in flat space-time and effective curved space time for motion of classical objects](#)' (JP Hsu, The European Physical Journal Plus 126 (3), 1-11 (2012)).
154. 'Space-Time Translational Gauge Identities in Abelian Yang-Mills Gravity' (Euro. Phys. J.-Plus, 127:35 (2012)). <http://arxiv.org/abs/1203.4546>.
155. '[Experimental tests on Yang-Mills gravity with accurate measurements of the deflection of light](#)' (JP Hsu, Eur. Phys. J. Plus 128, 31(2013)).
156. '[A model of unified quantum chromodynamics and Yang-Mills gravity](#)' (HSU Jong-Ping, Chinese physics C 36 (5), 403 (2013)).
157. '[Exact rotational space-time transformations, Davies-Jennison experiments and limiting Lorentz-Poincaré invariance](#)' (J. P. Hsu and L. Hsu, The European Physical Journal Plus **128** (7), 74, (2013)).
158. '[Exact Space-Time Gauge Symmetry of Gravity, Its Couplings and Approximate Internal Symmetries in a Total-Unified Model](#)' (J. P. Hsu, Chinese J. Phys., {**52**, No. 2, 692 (2014), arXiv:1309.4445).
159. '[Thim's experiment and exact rotational space-time transformations](#)' (L. Hsu and J. P. Hsu, The European Physical Journal Plus **129** (1), 16 (2014)).
160. '[A Generalization of Gauge Symmetry, Fourth-Order Gauge Field Equations and Accelerated Cosmic-Expansion](#)' (J. P. Hsu, Modern Physics Letters A **29** (6), 1450031, (2014)).
161. '[A confining model for charmonium and new gauge-invariant field equations](#)'(Eur. Phys. J. Plus, **129**, 108 (2014)).
162. 'A Confining Quark Model and New Gauge Field Equations' (Modern Phys. Letters A **29**, 1450120, (2014)).
163. 'Erratum and Addendum: A confining quark model and new gauge symmetry.' (Modern Phys. Letters A **29**, 1491001, 2014).
164. 'Unified Model with a Generalized Gauge Symmetry and Its Cosmological Implications'(JP Hsu and KO Cottrell, Chinese Physics C 39, 105101 (2015)).
165. 'A Confining Quark Model and New Gauge Symmetry'(Mod. Phys. Letts. A 29 (22), 1450120 (2015)).
166. '[A test of an alternative origin of the cosmic microwave background anisotropy](#)'(JP Hsu, L Hsu, Proc. of the 12th Asia-Pacific Int. Conf. on Gravitation, Astrophysics, and Cosmology, World Scientific, (2016)) p. 3.
167. '[New perspectives on an old problem: The bending of light in Yang-Mills gravity](#)' (KO Cottrell, JP Hsu, Proc. of the International Conf. on Gravitation, Astrophysics and Cosmology, World Scientific, (2016)) p. 378.

168. 'Experiments on Invariance of Planck's Law and a new View of Anisotropy of Cosmic Microwave Background' (L Hsu, JP Hsu, Proc. of the International Conf. on Gravitation, Astrophysics and Cosmology (World Scientific, 2016) p. 369.
169. 'Neutrino oscillation, finite self-mass and general Yang–Mills symmetry' (Modern Physics Letters A 31 (34), 1650200 (2016)).
170. 'Quark confinement, new cosmic expansion and general Yang-Mills symmetry (Chinese Physics C $\{bf 41\}$, 015101 (2017)).

MONOGRAPHS AND BOOKS**

1. *Einstein's Relativity and Beyond--New Symmetry Approaches* (pp. xviii+415, World Scientific, 2000.)***
2. *Lorentz and Poincaré Invariance---100 Years of Relativity* (Ed. J. P. Hsu and Y. Z. Zhang, pp. Xxxi+583, World Scientific, 2001.)
3. *JingShin Theoretical Physics Symposium in Honor of Professor Ta-You Wu* (Ed. Jong-Ping Hsu [UMassD] and Leonardo Hsu [Carnegie Mellon Univ.], pp. xvii + 460, World Scientific, N.J., 1998)
4. *JingShin Physics Symposium in Memory of Prof. Wolfgang Kroll* (Ed. J. P. Hsu and G. Leung, UMass Dartmouth, pp. xxx + 394, World Scientific, N.J. 1997)
5. *Symposium on the Frontiers of Physics at Millennium* (Ed. W. L. Wu and J. P. Hsu, pp. xvii+435, World Scientific, 2001)
6. *The Proceedings of the Fourth International Workshop on GRAVITATION and ASTROPHYSICS* (Ed. L. Liu, J. Luo, X.Z. Li, J. P. Hsu, pp. x+378,World Scientific, 2000)
7. *100 Years of Gravity and Accelerated Frames--The Deepest Insight of Einstein and Yang-Mills* (Ed. J. P. Hsu and D. Fine, pp. xxxix+623, World Scientific, 2005 Fall).
8. *A Broader View of Relativity: General Implications of Lorentz and Poincare Invariance* (with L. Hsu, 2nd ed., in Advanced Series on Theoretical Physical Science; pp. xii+512, World Scientific, 2006 Fall).
9. *Proc. of the VII Asia-Pacific International Conference on Gravitation and Astrophysics*, (Ed. J. Nester, C. M. Chen and J. P. Hsu, World Scientific, 2007).
10. *Einsteins Relativitätstheorie und darüber hinaus—neue Symmetrieansätze* (Tectum Verlag, Translated by Andreas Ernst. With a new Appendix E by A. Ernst and J. P. Hsu, 2007).
11. *Proceedings of the 9th Asia-Pacific International Conference on Gravitation and Astrophysics*, (Ed. Jun Luo, Zebing Zhou, Hsien-Chi Yeh and Jong-Ping Hsu, World Scientific, May, 2010.)
12. *Space-Time Symmetry and Quantum Yang-Mills Gravity* (with Loenardo Hsu, U. of Minnesota, World Scientific, 2013, vii-xxxi, 1-253.
13. *Proceedings of the 12th Asia-Pacific International Conf. on Gravitation, Astrophysics and Cosmology, Dedicated to the Centenary of Einstein's General Relativity.* (Ed. V. Melnikov and J. P. Hsu, World Scientific, 2016)

***This book was reviewed by international physicists for the Mathematical Review, and translated into German. It was on the best-seller list in theoretical physics,

**Some of the books are available at:

<http://www.google.com/search?tbs=bks%3A1&tbo=1&q=Jong-Ping+Hsu&btnG=Search+Books>

David Kagan

Curriculum Vitae

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EDUCATION

- 2007 UNIVERSITY OF CAMBRIDGE
Doctor of Philosophy in Theoretical Physics, August 2007
- 2003 UNIVERSITY OF CAMBRIDGE
Certificate in Advanced Mathematics with Merit, June 2003
Euretta J. Kellett Scholar
- 2002 COLUMBIA UNIVERSITY
Bachelor of Arts in Physics and Mathematics, May 2002
Summa Cum Laude
Phi Beta Kappa

ACADEMIC POSITIONS

- 2012– Full-time Lecturer in Physics, UMass-Dartmouth
- 2011–12 Adjunct Lecturer for Frontiers of Science, Columbia University
- 2007–12 Postdoctoral Research Scientist, Institute for String, Cosmology, and Astroparticle Physics (ISCAP) at Columbia University
- 2007–11 Frontiers of Science Fellow, Columbia University

TEACHING EXPERIENCE

- 2018 Lecturer, *Introduction to Quantum Field Theory*, UMass-Dartmouth
· Course number PHY 410/510
- 2017 Lecturer, *Undergraduate Seminar in Advanced Physics Methods*, UMass-Dartmouth
· Course number PHY 300
- 2017 Supervisor, *Directed Studies in the Philosophy of Quantum Theory*, UMass-Dartmouth
· Course number PHY 296
- 2016 Lecturer, *Undergraduate Seminar in Advanced Physics Methods*, UMass-Dartmouth
· Course number PHY 300
- 2015 Lecturer, *Special Topics: Elementary Particle Physics*, UMass-Dartmouth
· Course number PHY 510/652
- 2015 Lecturer, *Special Topics: String Theory*, UMass-Dartmouth
· Course number PHY 510
- 2015 Instructor, *Science, Technology, and Society*
· Course number PHY 161; general education course

TEACHING EXPERIENCE CONTINUED

- 2013–18 Lecturer and recitation leader, *Physics I: Classical Mechanics*, UMass-Dartmouth
· Course numbers PHY 111 and PHY 113; 70 to 90 undergraduates per section
- 2013–17 Lecturer and recitation leader, *Physics II: Electricity and Magnetism*, UMass-Dartmouth
· Course numbers PHY 112 and PHY 114; 50 to 100 undergraduates per section
- 2014 Lecturer, *Modern Physics IV: Special Relativity*, UMass-Dartmouth
· Course numbers PHY 212/495/695
- 2014 Lecturer, *Special Topics: Quantum Black Holes*, UMass-Dartmouth
· Course number PHY 510
- 2012–14 Lecturer, *Undergraduate Seminar in Advanced Physics Methods*, UMass-Dartmouth
· Course number PHY 300
- 2012–13 Lecturer and lab instructor, *IMPULSE Physics I: Mechanics*, UMass-Dartmouth
· Course number PHY 111; 50–100 undergraduates per section
- 2012–13 Lecturer and lab instructor, *IMPULSE Physics II: Electricity and Magnetism*, UMass-Dartmouth
· Course number PHY 112; 50–100 undergraduates per section
- 2007–12 Instructor, *Frontiers of Science*, Columbia University
- 2007–12 Lecturer, *Relativity, Quantum Mechanics, and String Theory*, Science Honors Program at Columbia University
· Special course for advanced high school students
- 2008–09 Supervisor, *Readings in String Theory*, Columbia University
· Undergraduate independent study
- 2005 Supervisor, *Principles of Quantum Mechanics*, University of Cambridge Math Tripos Part II
· Undergraduate tutorial/recitation sessions
- 2003 *Mathematica* Lab Instructor, *Introduction to Modern Mathematics*,
Columbia University Summer High School Program

COURSE DEVELOPMENT

- *Introduction to Quantum Field Theory*
 - Developed and implemented new graduate level course introducing quantum field theory. This was cross-listed for upper-level undergraduates. Developed novel, typeset lecture notes, tests, and problems.
- *Directed Studies in Philosophy of Quantum Theory*
 - Established a new reading and discussion based course laying out the basic technical aspects of quantum theory for *non*-physicists as well as exploring the philosophical foundations of the theory.
- *Special Topics: Elementary Particle Physics*
 - Developed original, typeset lecture notes and problem sets.
- *Special Topics: String Theory*
 - Developed original, typeset lecture notes, problem sets, and research projects for the course.

COURSE DEVELOPMENT CONTINUED

- *Physics I and II (Introductory Physics Sequence)*
 - Developed “mini-testing” to replace traditional midterms and final for the introductory physics sequence. Mini-tests occur every other week and are graded rapidly so as to provide students with fast feedback about their stronger and weaker areas in the course. They are structured so as to discourage cramming. They also allow for a more accurate assessment of student understanding in key topic areas.
 - Developed supplementary readings on problem solving strategies that have been integrated into the course through group problem solving sessions during our recitation periods.
 - Developed interactive clicker questions to facilitate active student engagement during lectures.
 - Developed online system integrating various components of the course.
 - Developed new conceptual and quantitative problems.
- *Science, Technology, and Society*
 - Developed a new General Studies course focusing on the interplay of science and technology and their impact on modern life. The central thread of this course is the physical concept of energy and the ways in which it many aspects of society. The course will allow students to grapple with the major issues that face our society: from the use of nuclear power, to climate change. We will also explore how science and technology allow us to deepen our understanding of our place in the Cosmos.
- *Advanced Physics Methods*
 - Developed an extensive set of typeset lecture notes and original exercises for the course.
- *Modern Physics IV: Special Relativity*
 - Piloted this new course with a flipped-classroom structure working with Brian Greene and the World Science University on integration with online special relativity lectures.
- *Special Topics: Quantum Black Holes*
 - Developed this new advanced undergraduate/graduate level course, including an extensive set of typeset lecture notes and original exercises. The course involves integration of topics from general relativity, quantum mechanics, thermodynamics, and quantum field theory, providing a novel view of the interplay of these core areas in physics and the conceptual paradoxes that the field continues to grapple with.
- *Frontiers of Science*
 - Co-developed units on quantum mechanics, particle physics, astronomy, climate change, and evolutionary biology. This involved preparing materials and activities for seminars in these topics as well as novel exercises aimed at improving students use of scientific habits of mind.

UNDERGRADUATE AND GRADUATE ADVISING

- 2017– Graduate advisor for masters student Nur-E-Mohammed Rifat.
- 2016–17 Graduate supervisor for masters student Dominic Gastaldo.
- 2016–17 Graduate advisor for masters student Matthew Witherell.
- 2015–16 Research advisor for undergraduate physics major Tia Martineau.
- 2015–16 Research advisor for undergraduate physics major Connor Kenyon.
- 2015 Honors project advisor for UMass-Dartmouth undergraduate, Matthew Sherman (project: magnetic accelerator).
- 2015 Honors project advisor for UMass-Dartmouth undergraduate, Qzedell Bautista (project: magnetic accelerator).
- 2014– Faculty advisor for UMass-Dartmouth Society of Physics Students (SPS).
- 2014– Research advisor for masters student Jianyang Li.
- 2014–15 Research advisor for masters student David Tondorf-Dick.
- 2014 Honors project advisor for UMass-Dartmouth undergraduate, Jason Vaccaro (project: a report on tests for special and general relativistic deviations from Newtonian mechanics).
- 2014 Honors project advisor for UMass-Dartmouth undergraduate, Daniel White, (project: interactive computer simulation demonstrating special and general relativistic time dilation effects).
- 2013– Faculty advisor for the Unified Science Alliance, a UMass-Dartmouth graduate student science society.
- 2008–12 Undergraduate research advisor for Simon Cho, Michael Kennelly, and James Nugent at Columbia University.

RESEARCH GRANTS

- 2018–19 \$4000 FQXi Mini-grant (Foundational Questions Institute <http://www.fqxi.org>) for project on Physics of the Observer.
- 2014–15 \$2000 FQXi Mini-grant (Foundational Questions Institute <http://www.fqxi.org>) for project on Black Holes and Quantum Mechanics.

HONORS AND AWARDS

- 2015 UMass-Dartmouth Faculty Federation Scholar of the Year Award
- 2003–06 NSF Graduate Research Fellowship
- 2002–03 Eureka J. Kellett Fellowship
- 2002 Alfred Moritz Michaelis Prize in Physics
- 2002 Phi Beta Kappa Honors Society
- 2002 Summa Cum Laude
- 2000 Asher and Ethel Spector Scholarship

HONORS AND AWARDS CONTINUED

1998–02 I. I. Rabi Scholarship

1998–02 Columbia University Dean’s List

REFEREED PAPERS

B. R. Greene, D. Kagan, A. Masoumi, D. Mehta, E. J. Weinberg, and X. Xiao, *Tumbling through a landscape: Evidence of instabilities in high-dimensional moduli spaces*, Phys. Rev. D **88** (2013) 2, 026005 [arXiv:1308.0538]

P. Ahlqvist, B. R. Greene, and D. Kagan, *Warped Vacuum Statistics*, JHEP 1207 (2012) 066 [arXiv:1202.3172]

P. Ahlqvist, B. R. Greene, D. Kagan, E. A. Lim, S. Sarangi, and I-S. Yang, *Conifolds and Tunneling in the String Landscape*, JHEP 1103 (2011) 119 [arXiv:1011.6588]

D. Kagan and C. A. S. Young, *Multiplicity in Supersymmetric Spin Chains*, Nucl. Phys. B **801** 207 (2008) [arXiv:0708.3687]

D. Kagan and C. A. S. Young, *Conformal Sigma Models on Supercoset Targets*, Nucl. Phys. B **745** 109 (2006) [arXiv:hep-th/0512250]

J. M. Evans, D. Kagan, N. J. MacKay, and C. A. S. Young, *Quantum, higher-spin, local charges in symmetric space sigma models*, JHEP 0501 (2005) 020 [arXiv:hep-th/0408244]

J. M. Evans, D. Kagan, and C. A. S. Young, *Non-local charges and quantum integrability of sigma models on the symmetric spaces $SO(2n)/SO(n) \times SO(n)$ and $Sp(2n)/Sp(n) \times Sp(n)$* , Phys. Lett. B **597** 112 (2004) [arXiv:hep-th/0404003]

PREPRINTS

J. A. Barandes and D. Kagan, *Measurement and Quantum Dynamics in the Minimal Modal Interpretation of Quantum Theory*, [arXiv:1807.07136]

J. A. Barandes and D. Kagan, *A Synopsis of The Minimal Modal Interpretation of Quantum Theory*, [arXiv:1405.6754]

J. A. Barandes and D. Kagan, *The Minimal Modal Interpretation of Quantum Theory*, [arXiv:1405.6755]

P. Ahlqvist, B. R. Greene, and D. Kagan, *Exploring Spiral Inflation in String Theory*, [arXiv:1308.0538]

M. J. Faux, D. Kagan, and D. Spector, *Central Charges and Extra Dimensions in Supersymmetric Quantum Mechanics*, [arXiv:hep-th/0406152]

INVITED LECTURES

- 2017 *The Only Game In Town? String Theory: Past and Present*, Bard College Physics Dept. Seminar Invited Lecture
- 2017 *The Minimal Modal Interpretation of Quantum Theory*, New York City College of Technology Physics Seminar
- 2016 *Lessons from the Minimal Modal Quantum Theory*, co-presented with Jacob Barandes at the Metro-Area Philosophy of Science Group
- 2015 *Minimal Modal Quantum Theory*, Hampden-Sydney Invited Lecture
- 2014 *The Minimal Modal Interpretation of Quantum Theory*, Perimeter Institute Theory Seminar
- 2014 *Interpreting Quantum Theory*, UMass-Dartmouth Physics Department Seminar
- 2014 *The Minimal Modal Interpretation of Quantum Theory*, co-presented with Jacob Barandes at the Harvard/MIT Philosophy of Science Group
- 2013 *On Aaronson's "The Ghost in the Quantum Turing Machine"*, invited lecture and discussion at the Harvard/MIT Philosophy of Science Group
- 2012 *Complementarity and the Quantum Mechanics of Black Holes*, UMass-Dartmouth Physics Department Seminar
- 2011 *Warping and the Landscape of Flux Vacua*, String Vacuum Project Spring 2011 Meeting
- 2011 *Conifolds and Tunneling on the String Landscape*, Cornell University Physics Theory Seminar
- 2006 *Generalizing the Hubbard Model and the AdS/CFT Correspondence*, Columbia University and CUNY Theory Seminars
- 2006 *The Nested Bethe Ansatz*, Special Cambridge University DAMTP String Seminar
- 2006 *New Superconformal Backgrounds*, Eurostrings 2006 Gong-Show
- 2006 *New Backgrounds for 2D CFT's*, Cambridge/Columbia/UPenn Theory Seminars
- 2005 *Supersymmetric Quantum Mechanics: Central Extensions and Extra Dimensions*, University of York Theory Seminar
- 2005 *Quantum Non-local Charges in Symmetric Space Sigma Models*, Columbia University Theory Seminar

ACADEMIC GROUPS

- 2018– Visiting Scholar at Brown University Physics Department.
- 2018– Member of the American Physical Society (APS).
- 2016– Member of the Metro-Area Philosophy of Science Group (MAPS).
- 2013– Member of the Harvard/MIT Philosophy of Science Group
- 2011–12 Columbia University Seminar on Global and Interdisciplinary Core Curricula
(<http://universityseminars.columbia.edu/seminars/interdisciplinary-curricula/>)

DEPARTMENTAL AND UNIVERSITY SERVICE

- 2016 *Science of Interstellar*, speaker and panelist at UMass-Dartmouth.
- 2013 *Information and the 2nd Law*, guest lecture delivered to first-year prospective physics majors in PHY 115
- 2012– Graduate student recruitment for UMass-Dartmouth physics MS program
- 2012 *What is a Theoretical Physicist*, guest lecture delivered to first-year prospective physics majors in PHY 109
- 2005 *Conserved Charges in 2D Integrable Field Theory*, lecture for Cambridge University DAMTP Student Seminar
- 2004 *Quantum Integrability and Yangian Symmetry in Symmetric Space Sigma Models*, lecture for Cambridge University DAMTP Student Seminar
- 2004 *An Introduction to the Large N Expansion*, lecture for Cambridge University DAMTP Student Seminar
- 2004 *OPE's in QFT's*, lecture for Cambridge University DAMTP Student Seminar
- 2001 *Deformations of Frobenius Algebras, Classification of Solutions to the WDVV Equations, and the Generation of Surfaces with Orthogonal Metrics*, guest lecture for Columbia University graduate course G6511 Spectral Theory, Linear Operators and Their Applications

PUBLIC OUTREACH AND SERVICE

- 2017 *A Guide to the Perplexing: Is Physics One? A History of Unification in Physics*, popular talk for Temple Habonim Synagogue Adult Education Series.
- 2016 *Journey into a Black Hole*, invited popular talk for Temple Habonim's *TBD talk* evening.
- 2016 *A Guide to the Perplexing: Physics and Free Will*, seminar for Temple Habonim Synagogue Adult Education Series.
- 2015– Trustee for Temple Habonim Synagogue in Barrington, RI
- 2015 *A Guide to the Perplexing: Cosmology, Philosophy, and Jewish Thought*, seminar for Temple Habonim Synagogue Adult Education Series.
- 2014 *Why Interpret Quantum Mechanics?*, SPS invited lecture.
- 2014 *One World is Not Enough! Why Physicists Think About Multiverses*, Unified Science Alliance Meeting invited lecture.

PUBLIC OUTREACH AND SERVICE CONTINUED

- 2014 Participated in strategy session for initiating a pilot program connecting UMass-Dartmouth science undergraduates with middle schoolers at local high schools.
- 2013 *What is String Theory?*, Unified Science Alliance Inaugural Meeting lecture.
- 2013 *The Expanding Universe*, talk and hubble expansion activity for middle school students visiting from Our Sister's School (<http://www.oursistersschool.org/>).
- 2013 *What is Quantum Theory About? A Talk About The 2012 Nobel in Physics*, Society of Physics Students invited popular lecture.
- 2012 *Are We Alone in the Multiverse?*, Columbia University Astronomy Stargazing Lecture.
- 2009 *What is String Theory a Theory of?*, Hampden-Sydney College Invited Lecture.
- 2006 *The Flip Sides of the Universe*, SUNY Oneonta Department of Physical Sciences Invited Lecture.
- 2006 *On Henri Poincaré*, Motivate: Videoconferences for Schools, Cambridge UK.
- 2005 *Renormalization and Quantum Field Theory*, University of Cambridge SU(2) Seminar.
- 1999 *Applications of Algebro-Geometric Methods to the Generation of Real Surfaces with Orthogonal Metrics*,
co-presented with Darya Krym at Columbia University VIGRE undergraduate research program seminar.

POPULAR ARTICLES

- 2011 *Reflections on Frontiers of Science*, Columbia University Spectator
(<http://columbiaspectator.com/2011/12/08/reflections-frontiers-science>)

PERSONAL INTERESTS

I love theater (performed in the chorus for *The Mikado* in 2003 while attending Cambridge), music (Bach, Beethoven, Mozart, Nirvana, and Modest Mouse), and have been a Doctor Who aficionado since age 3 (possibly cementing my passion for transdimensional physics at that tender age). Like much of the nation, I've recently been enjoying the soundtrack to *Hamilton: An American Musical*.

Recent fiction and non-fiction literature that I've enjoyed: *The Hunger Games Trilogy*, by Suzanne Collins; *American Gods*, by Neil Gaiman *Uncle Tungsten*, by Oliver Sacks; *Alice's Adventures in Wonderland*, by Lewis Carroll; *Plato at the Googleplex*, by Rebecca Goldstein; *Wolf Hall* and *Bring Up the Bodies*, by Hilary Mantel; *100 Years of Solitude*, by Gabriel Garcia Marquez; *A Tale of Love and Darkness*, by Amos Oz; *The Graveyard Book*, by Neil Gaiman.

GAURAV KHANNA

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Education

- Pennsylvania State University, University Park, PA 16802
The Institute for Gravitation and the Cosmos,
Department of Physics.
Advisor: Prof. Jorge Pullin.
Degree: Ph.D. August 2000 (GPA: 3.95)
- Indian Institute of Technology, Kanpur, India.
Electrical Engineering (Minor in Physics),
Degree: B.Tech. May 1995 (GPA: 3.56)

Awards & Grants

1. NSF *Gravitational Theory* research grant (2017-2019): \$60K.
2. NSF *Gravitational Theory* research grant (2016-2017): \$20K.
3. NSF *Computational Physics* research grant (2014-2017): \$90K.
4. *Fundamental Questions Institute* (FQXi) research mini-grant (2014-2015): \$2K.
5. DoD *HPC PETTT* research grant (2014): \$43K.
6. NSF *Gravitational Theory* research grant (2013-2015): \$78K.
7. NSF *Computational Physics* research grant (2011-2012): \$48K.
8. *Fundamental Questions Institute* (FQXi) research mini-grant (2011-2012): \$4K.
9. NSF GOALI *Computational Physics* research grant (2010-2014): \$166K.
10. AFRL CRADA for equipment share/transfer (2010-2019).
11. Air Force (AFOSR DURIP) equipment research grant (2010-2011): \$200K.
12. NSF *Major Research Instrumentation* (MRI) research grant (2010-2011): \$200K.
13. IBM QS series BladeCenter S.U.R. grant (2010): \$76K.
14. NSF *Computational Physics* research grant (2009-2011): \$160K.
15. *Fundamental Questions Institute* (FQXi) research grant (2008-2010): \$19K.

16. NSF *Computational Physics* research grant (2008-2009): \$30K.
17. *Fund for Astrophysics Research Inc.*, research grant (2008): \$3K.
18. Sony America & others, for *PS3 Gravity Grid* (2007): \$9K + \$17K (in-kind).
19. UMass Dartmouth *Research Seed Initiative Fund* (2006-2007): \$20K.
20. Apple Inc. hardware donation for *OpenMacGrid* (2006): \$10K (in-kind).
21. *Glaser Trust* of New York research grant (2004-2008): \$50K.
22. UMass Dartmouth Chancellor's *Innovations in Teaching Award* (2005-2006): \$3K.
23. UMass Dartmouth *Healey Fund* research grant (2004-2005): \$4K.
24. NSF *Gravitational Theory* research grant (2002-2004): \$45K.
25. Physics Department Teaching Award at Penn State (1997-1998).
26. Several (*Braddock, Duncan, Roberts, T. Das*) Fellowships at Penn State (1995-2000).

Research Experience

- Full Professor at University of Massachusetts, Dartmouth (since 2016).
- Associate Professor (with tenure) at University of Massachusetts, Dartmouth (since 2009).
- Assistant Professor at University of Massachusetts, Dartmouth (2003-2009).

I work on different problems in theoretical and computational physics: Coalescence of binary black hole systems using black hole perturbation theory and estimation of the properties of the emitted gravitational radiation (this project is of relevance to the recently established NSF LIGO laboratory and the upcoming ESA LISA Mission that will be attempting to make a direct observation of this radiation); Loop quantum cosmology (a study of cosmological and black hole models in the context of loop quantum gravity wherein space-time is considered discrete at a very fundamental level); Computational physics and high-performance computing (scientific supercomputing).

- PI of several research grants (listed above). Continuously funded since 2002.
- Nearly seventy-five (75) publications in peer-reviewed journals.
- Reviewer for ten (10) international leading research journals in the field.
- Currently advisor (thesis/project) of five (5) UMass Dartmouth graduate students.
- Over thirty-five (35) completed Master's Theses/Projects advised at UMass Dartmouth.
- Assistant Professor, Natural Science Division, Long Island University NY (2000-2004).

- Ph. D. Thesis (Summer 2000).

Technical Experience

- Extensive programming experience in several languages and software.
- Expertise in high-performance and grid computing. Developer of open-source software for scientific computing for the Apple Macintosh platform <http://hpc.sf.net/>. Creator of the *OpenMacGrid* and *PlayStation 3 Gravity Grid*.

Teaching Experience

- Research advisor of several graduate and undergraduate students at UMass Dartmouth.
- Teaching wide variety of undergraduate and graduate Physics courses at UMass Dartmouth.
- Received awards and honors for teaching ability.
- Taught Physics and Mathematics at Long Island University, Southampton. Advised several Technology Co-op projects at the on-campus Technology Center.
- Teaching Assistant in the Physics Department at Penn State.

Administrative Experience

- Currently serving the Co-Director of the newly established Center for Scientific Computation and Visualization Research.
- Currently Graduate Program Director at UMass Dartmouth (Engineering and Applied Sciences Ph. D. Program).
- Official member (invitation only) of Apple Inc.'s *AppleSeed* group.
- Active participation on several academic committees in the Physics Department, the College of Engineering and the University, at UMass Dartmouth.
- Served as Math-Physics Coordinator for the Natural Science Division at Long Island University, Southampton.
- Served as Technology Center Coordinator for Long Island University, Southampton.

Publications - Gravitational Physics only

1. G. Khanna, S. Mukhopadhyay, R. Simon, N. Mukunda: "*Geometric Phases for $SU(3)$ Representations and Three Level Quantum Systems*", Annals of Physics Vol. 253, No. 1, January 1, 1997.

2. M. Campanelli, C. O. Lousto, J. Baker, G. Khanna, J. Pullin: “*The imposition of Cauchy data to the Teukolsky equation III: The rotating case*”, gr-qc/9803058, Phys. Rev. D 58, 084019 (1998).
3. G. Khanna, J. Baker, R. Gleiser, P. Laguna, C. Nicasio, H. P. Nollert, R. Price, J. Pullin: “*Inspiralling black holes: The close limit*”, gr-qc/9905081, Phys. Rev. Lett. 83, 3581 (1999).
4. G. Khanna, R. Gleiser, R. Price, J. Pullin: “*Close limit of grazing black hole collisions: non-spinning holes*”, New Journal of Physics 2, 3.1 - 3.17 (2000).
5. M. Campanelli, G. Khanna, P. Laguna, J. Pullin, M. Ryan: “*Perturbations of the Kerr spacetime in horizon penetrating coordinates*”, gr-qc/0010034, Class. Quant. Grav. 18, 1543 (2001).
6. G. Khanna: “*Collision of spinning black holes in the close limit*”, gr-qc/0101015, Phys. Rev. D 63, 124007 (2001).
7. D. Cartin, G. Khanna: “*Self-regulated model of galactic spiral structure formation*”, astro-ph/0105392, Phys. Rev. E 65, 016120 (2002).
8. R. Gleiser, G. Khanna, J. Pullin: “*Evolving the Bowen-York initial data for boosted black holes*”, gr-qc/9905067, Phys. Rev. D 66, 024035 (2002).
9. G. Khanna: “*Evolution of Kerr-Schild-type initial data for binary black holes using the horizon penetrating Teukolsky equation*”, gr-qc/0201052, Phys. Rev. D 65, 124018 (2002).
10. G. Khanna: “*Collision of spinning black holes in the close limit: The parallel spin case*”, gr-qc/0206010, Phys. Rev. D 66, 064004 (2002).
11. R. Lopez-Aleman, G. Khanna, J. Pullin: “*Perturbative evolution of particle orbits around Kerr black holes: time domain calculation*”, Class. Quant. Grav. 20, 3259 (2003).
12. L. M. Burko, G. Khanna: “*Radiative falloff in the background of rotating black hole*”, gr-qc/0209107, Phys. Rev. D 67, 081502 (2003) (Rapid Communication).
13. G. Khanna: “*Teukolsky evolution of particle orbits around Kerr black holes in the time domain: elliptic and inclined orbits*”, gr-qc/0309107, Phys. Rev. D 69, 024016 (2004).
14. L. M. Burko, G. Khanna: “*Universality of massive scalar field late-time tails in black-hole spacetimes*”, gr-qc/0403018, Phys. Rev. D. 70, 044018 (2004).
15. D. Cartin, G. Khanna, M. Bojowald: “*Generating function techniques for loop quantum cosmology*”, gr-qc/0405126, Class. Quant. Grav. 21, 4495 (2004).
16. M. J. Strafuss, G. Khanna, “*Massive scalar field instability in Kerr spacetime*”, gr-qc/0412023, Phys. Rev. D 71, 024034 (2005).
17. D. Cartin, G. Khanna, “*Absence of pre-classical solutions in Bianchi I loop quantum cosmology*”, gr-qc/0501016, Phys. Rev. Lett. 94, 111302 (2005).

18. D. Cartin, G. Khanna, “*Separable sequences in Bianchi I loop quantum cosmology*”, gr-qc/0506024, Phys. Rev. D 72, 084008 (2005).
19. D. Cartin, G. Khanna, “*Wave functions for the Schwarzschild black hole interior*”, gr-qc/0602025, Phys. Rev. D 73, 104009 (2006).
20. S. Connors, G. Khanna, “*Approximate pre-classical solutions in loop quantum cosmology*”, gr-qc/0509081, Class. Quant. Grav. 23, 2919 (2006).
21. J. Rosen, J. Jung, G. Khanna, “*Instabilities in numerical loop quantum cosmology*”, gr-qc/0607044, Class. Quant. Grav. 23, 7075 (2006).
22. L. M. Burko, G. Khanna, “*Accurate time-domain gravitational waveforms for extreme-mass-ratio binaries*”, gr-qc/0609002, Europhysics Letters 78, 60005 (2007).
23. P. Sundararajan, G. Khanna, S. Hughes, “*Towards adiabatic waveforms for inspiral into Kerr black holes: I. A new model of the source for the time domain perturbation equation*”, gr-qc/0703028, Phys. Rev. D 76, 104005 (2007).
24. M. Bojowald, D. Cartin, G. Khanna, “*Lattice refining loop quantum cosmology, anisotropic models and stability*”, arXiv:0704.1137, Phys. Rev. D 76, 064018 (2007).
25. S. Sabharwal, G. Khanna: “*Numerical solutions to lattice-refined models in loop quantum cosmology*”, arXiv:0711.2086, Class. Quantum Grav. 25, 085009 (2008).
26. P. Sundararajan, G. Khanna, S. Hughes, S. Drasco: “*Towards adiabatic waveforms for inspiral into Kerr black holes: II. Dynamical sources and generic orbits*”, arXiv:0803.0317, Phys. Rev. D 78, 024022 (2008).
27. J. L. Barton, D. J. Lazar, D. J. Kennefick, G. Khanna, L. M. Burko: “*Computational Efficiency of Frequency- and Time-Domain Calculations of Extreme Mass-Ratio Binaries: Equatorial Orbits*”, arXiv:0804.1075, Phys. Rev. D 78, 064042 (2008).
28. L. M. Burko, G. Khanna: “*Late-time Kerr tails revisited*”, arXiv:0711.0960, Class. Quant. Grav. 26, 015014 (2009).
29. J. Jung, G. Khanna, I. Nagle: “*A spectral collocation approximation of one-dimensional head-on collisions of black-holes*”, arXiv:0711.2545, International Journal of Modern Physics C (IJMPC) 20, 1827 (2009).
30. J. Breitbart, G. Khanna: “*An exploration of CUDA and CBEA for a gravitational wave data-analysis application (Einstein@Home)*”, arXiv:0904.1826, International Conference on Parallel Processing and Applied Mathematics (PPAM 2009); accepted for publication in the Open Astronomy Journal (2010).
31. G. Khanna, J. McKennon: “*An exploration of CUDA and CBEA for a gravitational wave source-modelling application*”, arXiv:0909.4039, Parallel and Distributed Computing and Systems, Cambridge, MA (PDCS 2009).

32. G. Khanna: “*The CBE hardware accelerator for numerical relativity: a simple approach*”, arXiv:0911.1565, International Journal of Modeling, Simulation, and Scientific Computing (IJMSSC) 1, 147 (2010).
33. G. Khanna, J. McKennon: “*Numerical modeling of gravitational wave sources accelerated by OpenCL*”, arXiv:1001.3631, Comp. Phys. Comm. 181, 1605 (2010).
34. R. Gajopalli, G. Khanna: “*High-Precision Numerical Simulations of Rotating Black Holes Accelerated by CUDA*”, arXiv:1006.0663, 2010 International Conference on High Performance Computing Systems, Orlando, FL.
35. P. Sundararajan, G. Khanna and S. Hughes, “*Binary black hole merger gravitational waves and recoil in the large mass ratio limit*”, arXiv:1003.0485, Phys. Rev. D 81, 104009 (2010).
36. L. M. Burko, G. Khanna: “*Late-time Kerr tails: generic and non-generic initial data sets, “up” modes, and superposition*”, arXiv:1001.0541, Class. Quant. Grav. 28, 025012 (2011).
37. E. Barausse, V. Cardoso and G. Khanna: “*Test bodies and naked singularities: is the self-force the cosmic censor?*”, arXiv:1008.5159, Phys. Rev. Lett. 105, 261102 (2010).
38. N. K. Choudhary, R. Gajopalli, S. Navada and G. Khanna: “*An Exploration of OpenCL for a Numerical Relativity Application*”, arXiv:1010.3816, Proceedings of the Parallel and Distributed Computing Systems Conference (PDCS), Dallas, TX (2011).
39. D. Falta, R. T. Fisher and G. Khanna: “*Gravitational Wave Emission from the Single-Degenerate Channel of Type Ia Supernovae*”, arXiv:1011.6387, Phys. Rev. Lett. 106, 201103 (2011).
40. D. Chakraborty, J. Jung and G. Khanna: “*A multi-domain hybrid method for head-on collision of black holes in particle limit*”, arXiv:1103.1551, Int. J. Mod. Phys. C22, 517 (2011).
41. R. Price, G. Khanna and S. Hughes: “*Systematics of black hole binary inspiral kicks and the slowness approximation*”, Phys. Rev. D 83, 124002 (2011).
42. E. Barausse, V. Cardoso and G. Khanna: “*Testing the Cosmic Censorship Conjecture with point particles: the effect of radiation reaction and the self-force*”, arXiv:1106.1692, Phys. Rev. D 84, 104006 (2011).
43. A. Zenginoglu and G. Khanna: “*Null infinity waveforms from extreme-mass-ratio inspirals in Kerr spacetime*”, arXiv:1108.1816, Phys. Rev. X 1, 021017 (2011).
44. D. Brizuela, D. Cartin and G. Khanna: “*Numerical Techniques in Loop Quantum Cosmology*”, arXiv:1110.0646, SIGMA 8, 001 (2012).
45. E. Barausse, A. Buonanno, S. Hughes, G. Khanna, S. O’Sullivan, Y. Pan: “*Modeling multipolar gravitational-wave emission from small mass-ratio mergers*”, arXiv:1110.3081, Phys. Rev. D 85, 024046 (2012).

46. J. McKennon, G. Forrester, G. Khanna: “*High Accuracy Gravitational Waveforms from Black Hole Binary Inspirals Using OpenCL*”, arXiv:1206.0270, Proceedings of NSF XSEDE12, Chicago IL (2012).
47. A. Taracchini, A. Buonanno, S. Hughes, G. Khanna: “*Modeling the horizon-absorbed gravitational flux for equatorial-circular orbits in Kerr spacetime*”, arXiv:1305.2184, Phys. Rev. D 88, 044001 (2013).
48. L. Burko, G. Khanna: “*Self-force gravitational waveforms for extreme and intermediate mass ratio inspirals. II: Importance of the second-order dissipative effect*”, arXiv:1304.5296, Phys. Rev. D 88, 024002 (2013).
49. G. Khanna: “*High-Precision Numerical Simulations on a CUDA GPU: Kerr Black Hole Tails*”, J. of Sci. Comp. 56, 366 (2013)
50. R. Price, G. Khanna and S. Hughes: “*Black hole binary inspiral and trajectory dominance*”, arXiv:1306.1159, Phys. Rev. D 88, 1004004 (2013).
51. A. Zenginoglu, G. Khanna and L. Burko: “*Intermediate behavior of Kerr tails*”, arXiv:1208.5839, Gen. Rel. Grav. 46, 1672 (2014).
52. L. Burko, G. Khanna: “*Mode coupling mechanism for late-time Kerr tails*”, arXiv:1312.5247, Phys. Rev. D 89, 044037 (2014).
53. A. Taracchini, A. Buonanno, G. Khanna, S. Hughes: “*Small mass plunging into a Kerr black hole: Anatomy of the inspiral-merger-ringdown waveforms*”, arXiv:1404.1819, Phys. Rev. D 90, 084025 (2014).
54. J. Buckley, G. Khanna: *Parallel Scaling Performance and Higher-Order Methods*, Proceedings of the 2014 International Conference on Scientific Computing, Las Vegas, NY (2014).
55. T. Spilhaus, J. Buckley, G. Khanna: *Parallel Performance of Higher-Order Methods on GPU Hardware*, Proceedings of the HPC/SpringSim 2015 Conference, Washington DC (2015).
56. V. Cardoso, G. Khanna: *Black holes in anti-de Sitter: quasinormal modes, tails and tales of flat spacetime*, Phys. Rev. D 91, 024031 (2015).
57. L. Burko, G. Khanna: *Self-force gravitational waveforms for extreme and intermediate mass ratio inspirals. III: Spin-orbit coupling revisited*, Phys. Rev. D 91, 104017 (2015).
58. R. Price, S. Nampalliwar, G. Khanna: *Black hole binary inspiral: Analysis of the plunge*, Phys. Rev. D 93, 044060 (2016).
59. L. Burko, G. Khanna, A. Zenginolu: *Cauchy-horizon singularity inside perturbed Kerr black holes*, Phys. Rev. D 93, 041501(R) (2016).
60. R. Price, G. Khanna: *Arrival Times of Gravitational Radiation Peaks for Binary Inspiral*, Phys. Rev. D 94, 104026 (2016).
61. L. Burko, G. Khanna: *Gravitational waves from a plunge into a nearly extremal Kerr black hole*, Phys. Rev. D 94, 084049 (2016).

- 62. G. Khanna, R. Price: *Black Hole Ringing, Quasinormal Modes, and Light Rings*, Phys. Rev. D 95, 081501 (2017).
- 63. R. Price, G. Khanna: *Gravitational wave sources: reflections and echoes*, Class. Quant. Grav. 34, 225005 (2017).
- 64. I. Thuestad, G. Khanna, R. Price: *Scalar Fields in Black Hole Spacetimes*, Phys. Rev. D 96, 024020 (2017).
- 65. S. L. Liebling, G. Khanna: *Scalar collapse in AdS with an OpenCL open source code*, Class. Quant. Grav. 34, 205012 (2017).
- 66. A. Yonika, G. Khanna, P. Singh: *Von-Neumann Stability and Singularity Resolution in Loop Quantized Schwarzschild Black Hole*, Class. Quant. Grav. 35, 045007 (2018).
- 67. L. Burko, G. Khanna: *Linearized Stability of Extreme Black Holes*, Phys. Rev. D 97, 061502 (2018).
- 68. V. Baibhav, E. Berti, V. Cardoso, G. Khanna: *Black Hole Spectroscopy: Systematic Errors and Ringdown Energy Estimates*, Phys. Rev. D 97, 044048 (2018).

Curriculum Vitæ

Grant V. O’Rielly
Associate Professor

College of Engineering
Department of Physics

HIGHER EDUCATION

University of Melbourne, Australia 1986 – 1996 Ph.D. Physics 1997
Dissertation: “*Experimental Investigation of the $^4\text{He}(\gamma, \text{dd})$ Reaction*”

University of Melbourne, Australia 1982 – 1985 B.Sc. (Honours) Physics 1986

EXPERIENCE

Teaching

Univ. of Massachusetts Dartmouth	2008 – Present	Associate Professor	Physics
Univ. of Massachusetts Dartmouth	2002 – 2008	Assistant Professor	Physics
George Washington University	Fall 2001	adjunct instructor	Physics
University of Saskatchewan, Canada	1990 – 1994	graduate TA	Physics
University of Melbourne, Australia	1985 – 1989	graduate TA	Physics

Other

George Washington University	1998 – 2002	Research Scientist	Physics
University of Northern BC, Canada	1995 – 1998	Post-doctoral researcher	Physics
University of Saskatchewan, Canada	1990 – 1994	graduate RA	Physics
University of Melbourne, Australia	1986 – 1989	graduate RA	Physics

AWARDS & HONORS

Provost’s Best Practices Award for Innovative Use of Technology in Teaching

For use of a student response system in the introductory physics courses
to improve student learning outcomes

May 2007

Assigned Classroom and non-Classroom Activities					
Academic Semester	Course Name & Number	Enrol.	Contract Course Inst.	Units Graduate Advising	Student Credit Hours
Spring 2018	PHY 114 <i>Classical Physics II</i>	87	3	—	261
	PHY 442 <i>Intro. to Solid State Physics</i>	5	3	—	15
	PHY 495 <i>Independent Study</i>	1	—	—	3
Fall 2017	PHY 225 <i>Intro. Experimental Physics I</i>	12	5	—	36
	PHY 296 <i>Independent Study</i>	1	—	—	3
	PHY 421 <i>Advanced Physics Laboratory</i>	10	—	—	30
	PHY 480 <i>Undergraduate Research</i>	1	—	—	3
	PHY 490 <i>Undergraduate Thesis</i>	1	—	—	3
	PHY 496 <i>Independent Studies</i>	2	—	—	6
Academic Year (2017 - 2018) Totals:			17	0	330
Spring 2017	PHY 551 <i>Intro. to Nuclear Physics</i>	21	3	—	63
	PHY 396 <i>PHY 322 Elec. Dev. & Circuits</i>	3	—	—	9
Fall 2016	PHY 225 <i>Intro. Experimental Physics I</i>	15	5	—	45
	PHY 363 <i>Intermediate Astrophysics</i>	8	3	—	24
	PHY 480 <i>Undergraduate Research</i>	1	—	—	3
Academic Year (2016 - 2017) Totals:			15	0	144

Assigned Classroom and non-Classroom Activities					
Academic Semester	Course Name & Number	Enrol.	Contract Course Inst.	Units Graduate Advising	Student Credit Hours
Spring 2016	PHY 227 <i>Intro. Experimental Physics II</i>	2	3	—	2
	PHY 102 <i>Intro. Physics I</i>	71	3	—	213
	PHY 480 <i>Undergraduate Research</i>	1	—	—	3
Fall 2015	PHY 225 <i>Intro. Experimental Physics I</i>	9	5	—	27
	PHY 490 <i>Senior Thesis (Honors)</i>	1	—	—	3
Academic Year (2015 - 2016) Totals:			11	0	248
Spring 2015	PHY 227 <i>Intro. Experimental Physics II</i>	6	3	—	6
	PHY 480 <i>Undergraduate Research</i>	1	—	—	3
Fall 2014	PHY 225 <i>Intro. Experimental Physics I</i>	7	5	—	21
	PHY 363 <i>Intermediate Astrophysics</i>	7	3	—	21
	PHY 490 <i>Senior Thesis (Honors)</i>	1	—	—	3
Academic Year (2014 - 2015) Totals:			11	0	54
Spring 2014	PHY 196 <i>PHY 103 Gen. Phys II Lab.</i>	1	—	—	—
	PHY 227 <i>Intro. Experimental Physics II</i>	6	3	—	6
	PHY 685 <i>Graduate Research</i>	1	—	2	3
Fall 2013	PHY 225 <i>Intro. Experimental Physics I</i>	7	5	—	21
	PHY 685 <i>Graduate Research</i>	1	—	2	3
Academic Year (2013 - 2014) Totals:			8	4	33

Assigned Classroom and non-Classroom Activities					
Academic Semester	Course Name & Number	Enrol.	Contract Course Inst.	Units Graduate Advising	Student Credit Hours
Spring 2013	PHY 322 <i>Elec. Dev. & Circuits</i>	5	5	—	15
	PHY 442/635 <i>Intro. Solid State Physics</i>	11	3	—	33
	PHY 490 <i>Senior Thesis</i>	2	—	—	6
	PHY 680 <i>Graduate Research</i>	1	—	2	3
	PHY 685 <i>Graduate Research</i>	1	—	1	3
Fall 2012	PHY 113 <i>Classical Physics I</i>	110	3	—	330
	PHY 363 <i>Intermediate Astrophysics</i>	11	3	—	33
	PHY 480 <i>Undergraduate Research</i>	1	—	—	3
	PHY 490 <i>Senior Thesis</i>	1	—	—	3
	PHY 596 <i>PHY 551 Intro. Nuclear Physics</i>	1	—	—	3
	PHY 680 <i>Graduate Research</i>	1	—	2	3
	PHY 685 <i>Graduate Research</i>	2	—	2	6
Academic Year (2012 - 2013) Totals:			14	7	441
Spring 2012	PHY 113 <i>Classical Physics I</i>	44	3	—	132
	PHY 685 <i>Graduate Research</i>	1	—	2	3
Fall 2011	PHY 113 <i>Classical Physics I</i>	103	3	—	309
	PHY 421 <i>Advanced Physics Laboratory</i>	6	—	—	—
	PHY 480 <i>Undergraduate Research</i>	3	—	—	9
	PHY 690 <i>Graduate Thesis</i>	1	—	2	3
Academic Year (2011 - 2012) Totals:			6	4	456

Assigned Classroom and non-Classroom Activities					
Academic Semester	Course Name & Number	Enrol.	Contract Course Inst.	Units Graduate Advising	Student Credit Hours
Spring 2011	PHY 113 <i>Classical Physics I</i>	38	3	—	114
	PHY 490 <i>Senior Thesis</i>	1	—	—	3
	PHY 685 <i>Graduate Research</i>	3	—	2	9
	PHY 690 <i>Graduate Thesis</i>	1	—	2	3
Fall 2010	PHY 113-01 <i>Classical Physics I</i>	58	3	—	174
	PHY 113-02 <i>Classical Physics I</i>	58	3	—	174
	PHY 442/635 <i>Intro. Solid State Physics</i>	17	3	—	51
	PHY 685 <i>Graduate Research</i>	3	—	4	9
Academic Year (2010 - 2011) Totals:			12	8	537
Spring 2010	PHY 110 <i>Freshman Seminar II</i>	16	2	—	16
	PHY 114 <i>Classical Physics II</i>	25	3	—	75
	PHY 227 <i>Intro. Experimental Physics II</i>	6	3	—	6
	PHY 421 <i>Advanced Physics laboratory</i>	8	—	—	—
	PHY 690 <i>Graduate Thesis</i>	1	—	2	3
Fall 2009	PHY 225 <i>Intro. Experimental Physics I</i>	6	4	—	12
	PHY 442/635 <i>Intro. Solid State Physics</i>	16	3	—	48
	PHY 490 <i>Senior Thesis (Honors)</i>	1	—	—	3
	PHY 690 <i>Graduate Thesis</i>	1	—	2	3
Academic Year (2009 - 2010) Totals:			15	4	166

Assigned Classroom and non-Classroom Activities					
Academic Semester	Course Name & Number	Enrol.	Contract Course Inst.	Units Graduate Advising	Student Credit Hours
Spring 2009	PHY 227 <i>Intro. Experimental Physics II</i>	11	3	—	11
	PHY 421 <i>Advanced Physics Laboratory</i>	10	—	—	—
	PHY 551 <i>Intro. to Nuclear Physics</i>	11	3	—	33
Fall 2008	PHY 225 <i>Intro. Experimental Physics I</i>	14	4	—	28
	PHY 322 <i>Elec. Dev. & Circuits</i>	8	4	—	24
	PHY 490 <i>Senior Thesis</i>	1	—	—	3
	PHY 690 <i>Graduate Thesis</i>	3	—	4	9
Academic Year (2008 - 2009) Totals:			14	4	108
Spring 2008	PHY 227 <i>Intro. Experimental Physics II</i>	8	4	—	8
	PHY 363 <i>Intermediate Astrophysics</i>	10	3	—	30
Fall 2007	PHY 113 <i>Classical Physics I</i>	51	3	—	153
	PHY 115 <i>Classical Physics III (rec.)</i>	12	1	—	—
	PHY 225 <i>Intro. Expterimental Physics I</i>	9	4	—	18
	PHY 685 <i>Graduate Research</i>	2	—	2	6
	PHY 690 <i>Graduate Thesis</i>	1	—	2	3
Academic Year (2007 - 2008) Totals:			14	4	218

Assigned Classroom and non-Classroom Activities					
Academic Semester	Course Name & Number	Enrol.	Contract Course Inst.	Units Graduate Advising	Student Credit Hours
Spring 2007	PHY 113 <i>Classical Physics I</i>	26	3	—	78
	PHY 421 <i>Advanced Physics laboratory</i>	2	—	—	—
	PHY 651 <i>Nuclear Physics II</i>	10	3	—	30
	PHY 690 <i>Graduate Thesis</i>	1	—	2	3
Fall 2006	PHY 113 <i>Classical Physics I</i>	69	3	—	207
	PHY 225 <i>Intro. Expterimental Physics I</i>	3	4	—	6
	PHY 685 <i>Graduate Research</i>	1	—	2	3
Academic Year (2006 - 2007) Totals:			14	4	327
Spring 2006	PHY 227 <i>Intro. Expterimental Physics II</i>	9	3	—	9
	PHY 685 <i>Graduate Research</i>	1	—	2	3
Fall 2005	PHY 111 <i>Physics for Appl. Sci. & Eng. I</i>	42	5	—	168
	PHY 225 <i>Intro. Experimental Physics I</i>	9	4	—	18
	PHY 551 <i>Intro. to Nuclear Physics</i>	5	3	—	15
	PHY 685 <i>Graduate Research</i>	1	—	2	3
Academic Year (2005 - 2006) Totals:			19	4	216

Assigned Classroom and non-Classroom Activities					
Academic Semester	Course Name & Number	Enrol.	Contract Course Inst.	Units Graduate Advising	Student Credit Hours
Spring 2005	PHY 114 <i>Classical Physics II</i>	53	3	—	159
	PHY 252 <i>Elementary Astrophysics II</i>	6	3	—	18
	PHY 480 <i>Undergraduate Research</i>	1	—	—	3
Fall 2004	PHY 113 <i>Classical Physics I</i>	64	3	—	192
	PHY 113 <i>Classical Physics I (rec.)</i>	28	1	—	—
	PHY 113 <i>Classical Physics I (lab.)</i>	28	2	—	28
	PHY 225 <i>Intro. Experimental Physics I</i>	3	4	—	6
	PHY 480 <i>Undergraduate Research</i>	1	—	— 3	
Academic Year (2004 - 2005) Totals:			16	—	409
Spring 2004	PHY 114 <i>Classical Physics II</i>	85	3	—	255
	PHY 114 <i>Classical Physics II (rec.)</i>	28	1	—	—
	PHY 114 <i>Classical Physics II (lab.)</i>	28	2	—	28
	PHY 227 <i>Intro. Experimental Physics II</i>	7	3	—	7
Fall 2003	PHY 113 <i>Classical Physics I</i>	103	3	—	309
	PHY 113 <i>Classical Physics I (rec.)</i>	35	1	—	—
	PHY 225 <i>Intro. Experimental Physics I</i>	5	4	—	10
Academic Year (2003 - 2004) Totals:			17	—	609

Assigned Classroom and non-Classroom Activities					
Academic Semester	Course Name & Number	Enrol.	Contract Course Inst.	Units Graduate Advising	Student Credit Hours
Spring 2003	PHY 114 <i>Classical Physics II</i>	58	3	—	174
	PHY 114 <i>Classical Physics II (rec.)</i>	21	1	—	—
	PHY 227 <i>Intro. Expterimental Physics II</i>	7	3	—	7
Fall 2002	PHY 113 <i>Classical Physics I</i>	65	3	—	195
	PHY 225 <i>Intro. Expterimental Physics I</i>	10	4	—	20
Academic Year (2002 - 2003) Totals:			14	—	389

Student Classroom Rating Scores					
Academic Semester	Course Name & Number	Enrol.	Student Rating Scores		
			Number of Responses	Common Questions Q.1 – Q.12	Dept. Question Q.13
Spring 2018	PHY 114 <i>Classical Physics II</i>	87	24	3.95	3.79
	PHY 442 <i>Intro. to Solid State Physics</i>	5	4	4.67	4.75
Fall 2017	PHY 225 <i>Intro. Experimental Physics I</i>	12	10	4.28	4.00
	PHY 363 <i>Intermediate Astrophysics</i>	8	3	4.39	4.25
Academic Year (2017 - 2017)		Weighted Average:		4.11	3.95
Spring 2017	PHY 551 <i>Intro. to Nuclear Physics</i>	21	16	4.27	4.32
	PHY 396 <i>PHY 322 Elec. Dev. & circuits</i>	3	–	–	–
Fall 2016	PHY 225 <i>Intro. Experimental Physics I</i>	15	5	4.30	4.32
	PHY 363 <i>Intermediate Astrophysics</i>	8	3	4.39	4.25
Academic Year (2016 - 2017)		Weighted Average:		4.29	4.31
Spring 2016	PHY 227 <i>Intro. Experimental Physics II</i>	2	2	4.42	4.50
	PHY 102 <i>Intro. Physics I</i>	71	48	4.02	3.87
Fall 2015	PHY 225 <i>Intro. Experimental Physics I</i>	9	6	4.41	4.67
	PHY 421 <i>Advanced Physics Lab.</i>	6	4	4.96	5.00
Academic Year (2015 - 2016)		Weighted Average:		4.14	4.05

Student Classroom Rating Scores					
Academic Semester	Course Name & Number	Enrol.	Student Rating Scores		
			Number of Responses	Common Questions Q.1 – Q.12	Dept. Question Q.13
Spring 2015	PHY 227 <i>Intro. Experimental Physics II</i>	6	–	–	–
	PHY 480 <i>Undergraduate Research</i>	1	–	–	–
Fall 2014	PHY 225 <i>Intro. Experimental Physics I</i>	7	–	–	–
	PHY 363 <i>Intermediate Astrophysics</i>	7	–	–	–
Academic Year (2014 - 2015)		Weighted Average:		–	–
Spring 2014	PHY 196 <i>PHY 103 Gen. Phys II Lab.</i>	1	–	–	–
	PHY 227 <i>Intro. Experimental Physics II</i>	5	5	4.52	4.60
Fall 2013	PHY 225 <i>Intro. Experimental Physics I</i>	7	5	4.60	4.60
	PHY 685 <i>Graduate Research</i>	1	–	–	–
Academic Year (2013 - 2014)		Weighted Average:		4.56	4.60
Spring 2013	PHY 322 <i>Elec. Dev. & Circuits</i>	5	5	4.52	4.80
	PHY 442/635 <i>Intro. Solid State Physics</i>	11	10	4.50	4.55
Fall 2012	PHY 113 <i>Classical Physics I</i>	110	68	3.89	3.61
	PHY 363 <i>Intermediate Astrophysics</i>	11	11	4.49	4.70
	PHY 596 <i>PHY 551 Intro. Nuclear Phys.</i>	1	–	–	–
Academic Year (2012 - 2013)		Weighted Average:		4.06	3.90

Student Classroom Rating Scores					
Academic Semester	Course Name & Number	Enrol.	Student Rating Scores		
			Number of Responses	Common Questions Q.1 – Q.12	Dept. Question Q.13
Spring 2012	PHY 113 <i>Classical Physics I</i>	44	25	4.49	4.27
Fall 2011	PHY 113 <i>Classical Physics I</i>	103	65	4.00	3.84
	PHY 421 <i>Advanced Physics Laboratory</i>	6	6	4.00	4.50
Academic Year (2011 - 2012)		Weighted Average:		4.13	3.99
Spring 2011	PHY 113 <i>Classical Physics I</i>	38	18	4.47	4.35
Fall 2010	PHY 113-01 <i>Classical Physics I</i>	58	41	4.29	4.08
	PHY 113-02 <i>Classical Physics I</i>	58	31	4.08	4.07
	PHY 442/635 <i>Intro. Solid State Physics</i>	17	16	4.42	4.67
Academic Year (2010 - 2011)		Weighted Average:		4.40	4.34
Spring 2010	PHY 110 <i>Freshman Seminar II</i>	16	13	–	4.23
	PHY 114 <i>Classical Physics II</i>	25	12	–	4.55
	PHY 227 <i>Intro. Experimental Physics II</i>	6	6	–	4.83
	PHY 421 <i>Advanced Physics laboratory</i>	8	8	–	5.00
Fall 2009	PHY 225 <i>Intro. Experimental Physics I</i>	6	4	–	3.75
	PHY 442/635 <i>Intro. Solid State Physics</i>	16	16	–	4.57
Academic Year (2009 - 2010)		Weighted Average:		–	4.44

Student Classroom Rating Scores					
Academic Semester	Course Name & Number	Enrol.	Student Rating Scores		
			Number of Responses	Common Questions Q.1 – Q.12	Dept. Question Q.13
Spring 2009	PHY 227 <i>Intro. Experimental Physics II</i>	11	11	–	4.89
	PHY 421 <i>Advanced Physics Laboratory</i>	10	10	–	4.20
	PHY 551 <i>Intro. to Nuclear Physics</i>	11	11	–	4.22
Fall 2008	PHY 225 <i>Intro. Experimental Physics I</i>	14	11	–	4.60
	PHY 322 <i>Elec. Dev. & Circuits</i>	8	5	–	4.80
Academic Year (2008 - 2009)		Weighted Average:		–	4.61
Spring 2008	PHY 227 <i>Intro. Experimental Physics II</i>	8	8	–	5.00
	PHY 363 <i>Intermediate Astrophysics</i>	10	9	–	5.00
Fall 2007	PHY 113 <i>Classical Physics I</i>	51	37	–	4.24
	PHY 115 <i>Classical Physics III (rec.)</i>	12	8	–	4.57
	PHY 225 <i>Intro. Expterimental Physics I</i>	9	7	–	4.87
Academic Year (2007 - 2008)		Weighted Average:		–	4.52
Spring 2007	PHY 113 <i>Classical Physics I</i>	26	11	–	4.68
	PHY 421 <i>Advanced Physics laboratory</i>	2	–	–	–
	PHY 651 <i>Nuclear Physics II</i>	10	9	–	4.32
Fall 2006	PHY 113 <i>Classical Physics I</i>	69	45	–	4.33
	PHY 225 <i>Intro. Expterimental Physics I</i>	3	3	–	3.14
Academic Year (2006 - 2007)		Weighted Average:		–	4.34

Student Classroom Rating Scores					
Academic Semester	Course Name & Number	Enrol.	Student Rating Scores		
			Number of Responses	Common Questions Q.1 – Q.12	Dept. Question Q.13
Spring 2006	PHY 227 <i>Intro. Expterimental Physics II</i>	9	8	–	4.80
Fall 2005	PHY 111 <i>Physics for Appl. Sci. & Eng. I</i>	42	35	–	4.33
	PHY 225 <i>Intro. Experimental Physics I</i>	9	9	–	4.48
	PHY 551 <i>Intro. to Nuclear Physics</i>	5	4	–	4.35
Academic Year (2005 - 2006)		Weighted Average:		–	4.42
Spring 2005	PHY 114 <i>Classical Physics II</i>	53	35	–	4.50
	PHY 252 <i>Elementary Astrophysics II</i>	6	6	–	3.63
Fall 2004	PHY 113 <i>Classical Physics I</i>	64	36	–	4.41
	PHY 113 <i>Classical Physics I (rec.)</i>	28	14	–	4.45
	PHY 113 <i>Classical Physics I (lab.)</i>	28	4	–	4.56
	PHY 225 <i>Intro. Experimental Physics I</i>	3	3	–	4.61
Academic Year (2004 - 2005)		Weighted Average:		–	4.41

Student Classroom Rating Scores					
Academic Semester	Course Name & Number	Enrol.	Student Rating Scores		
			Number of Responses	Common Questions Q.1 – Q.12	Dept. Question Q.13
Spring 2004	PHY 114 <i>Classical Physics II</i>	85	54	–	4.10
	PHY 114 <i>Classical Physics II (rec.)</i>	28	26	–	3.97
	PHY 114 <i>Classical Physics II (lab.)</i>	28	15	–	4.37
	PHY 227 <i>Intro. Experimental Physics II</i>	7	6	–	3.91
Fall 2003	PHY 113 <i>Classical Physics I</i>	103	68	–	4.22
	PHY 113 <i>Classical Physics I (rec.)</i>	35	22	–	4.10
	PHY 225 <i>Intro. Experimental Physics I</i>	5	4	–	4.06
Academic Year (2003 - 2004)		Weighted Average:		–	4.14
Spring 2003	PHY 114 <i>Classical Physics II</i>	58	39	–	4.12
	PHY 114 <i>Classical Physics II (rec.)</i>	21	12	–	3.47
	PHY 227 <i>Intro. Expterimental Physics II</i>	7	6	–	4.44
Fall 2002	PHY 113 <i>Classical Physics I</i>	65	45	–	4.09
	PHY 225 <i>Intro. Expterimental Physics I</i>	10	8	–	4.35
Academic Year (2002 - 2003)		Weighted Average:		–	4.07

Record of Advising Activity**Student Advisees**

undergraduate student	M.S. student	Ph.D. student	M.S. Committee	Ph.D. Committee
32	11	0	7	0

Graduate Project, Thesis or Dissertation

Name	Thesis or Project Title	Completion Date
Ms. Rita Roy	<i>Investigation of the Metrology Uncertainties on a Four-axis Machine Tool Calibration using Extrapolation Techniques</i>	January 2015
Mr. Joseph Gaulin	<i>DIANA (NaI) Detector Calibration for Pion Photoproduction</i>	May 2013
Ms. Lori Kinsman-Smith	<i>The Search for Exoplanet Transits</i>	December 2011
Mr. Jason Lemrise	<i>A GEANT Simulation of the xSAL Counters at MAX-lab</i>	—
Mr. Corey Sleep	<i>The Tagging Efficiency for Experiment NP014 at MAX-lab</i>	—
Ms. Heather Brightman	<i>Particle Identification Techniques for $\gamma p \rightarrow n\pi^+$ at MAX-lab</i>	Summer 2011
Mr. Robert Coyne	<i>Polarization Observables for the Reaction $\gamma p \rightarrow n\pi^+$ at JLAB</i>	Summer 2011
Mr. Casca Adjepong	<i>Determination of Charged Pion Yield from a Measurement of $\gamma + p \longrightarrow n + \pi^+$</i>	January 2011
Mr. Daniel Veillette	<i>Observation Control Software for the Dual Speckle Survey Instrument</i>	Fall 2008
Mr. Kenneth Magno	<i>Generation of Pions via Photoproduction Near Threshold</i>	Fall 2007
Mr. Sagar Shah	<i>Optical Analysis and Applications of Simultaneous Two-Color Speckle Imaging</i>	Fall 2007

Senior or Honors Theses

Name	Thesis Title	Completion Date
Ms. Aurora White	<i>Materials Science: An Investigation</i>	May 2018
Ms. Amanda Prescott	<i>Vertical Axis Wind Turbine Generator Subsystem</i>	December 2017
Mr. Kyle O’Connor	<i>Improvements to the Energy Calibration Procedures for the DIANA Detector at MAX-lab</i>	May 2016
Ms. Kelsey Buggelli	<i>Calibration Procedures for Large Sodium Iodide Detectors</i>	May 2015
Ms. Olivia Campbell	<i>Gain Calibration for the BUNI Large-Volume NaI(Tl) Detector</i>	May 2013
Ms. Khayla England	<i>Calibration of the DIANA Photon Detector for a Measurement of Pion Photoproduction from the Neutron</i>	May 2013
Mr. Daniel Kelleher	<i>Analysis of Photonuclear Data to Identify π^+ Candidate Events</i>	May 2011
Ms. Colleen Allen	<i>Identification of Pions from the $\gamma p \rightarrow \pi^+ n$ Reaction</i>	May 2010
Ms. Rita Denomme	<i>Artificial Quicksand: Its Behavior and Characteristics</i>	December 2009

Supported Students

Student Name	Program	Semester	Funding Source
Ms. Kelsey Buggelli	undergraduate Univ. of Mass. Dartmouth		
Mr. David Elofson	undergraduate Bridgewater State Univ.		
Mr. Cody Lewis	undergraduate James Madison Univ.	Summer 2014	NSF OISE/IRES
Mr. Nevin Miller	undergraduate Univ. of Mass. Dartmouth	(research at MAXLab)	award 1261150
Ms. Erin O’Brien	undergraduate James Madison Univ.		
Mr. Kyle O’Connor	undergraduate Univ. of Mass. Dartmouth		
Ms. Oliva A. Campbell	undergraduate Univ. of Mass. Dartmouth		
Ms. Khayla N. England	undergraduate Univ. of Mass. Dartmouth		
Ms. Jennifer Kuczynski	undergraduate George Washington Univ.	Summer 2011	NSF OISE/IRES
Mr. Samuel Lipschutz	undergraduate George Washington Univ.	(research at MAXLab)	award 0553467
Mr. Christopher Seymour	undergraduate Univ. of Mass. Dartmouth		
Mr. Hugo Caceares	undergraduate George Washington Univ.		
Ms. Kristina DiBenedetto	undergraduate George Washington Univ.		
Ms. Khayla N. England	undergraduate Univ. of Mass. Dartmouth	Summer 2010	NSF OISE/IRES
Mr. Daniel Kelleher	undergraduate Univ. of Mass. Dartmouth	(research at MAXLab)	award 0553467
Mr. Brian Smith	undergraduate George Washington Univ.		
Ms. Colleen Allen	undergraduate Univ. of Mass. Dartmouth		
Mr. Jason Lemrise	undergraduate Univ. of Mass. Dartmouth	Summer 2009	NSF OISE/IRES
Mr. Matty Litwack	undergraduate Montgomery College	(research at MAXLab)	award 0553467

Supported Students

Student Name	Program	Semester	Funding Source
Mr. Sagar Shah	graduate MS thesis candidate Univ. of Mass. Dartmouth	Fall 2007	NSF OISE/IRES award 0553467
Mr. Daniel Veillette	graduate MS thesis candidate Univ. of Mass. Dartmouth	Fall 2007 Spring 2008	NSF OISE/IRES award 0553467
Mr. Kenneth Magno	graduate MS thesis candidate Univ. of Mass. Dartmouth	Fall 2006 Spring 2007	UMassD College of Engineering Seed Fund

SCHOLARSHIP AND PROFESSIONAL ACTIVITIES

Publications in peer-reviewed journals

Measurements in experimental nuclear physics take many years to perform and analyze before publications are forthcoming. Once a request for beam-time at an accelerator facility have been successfully defended, it is often necessary to wait for previously approved experiments to finish and for new apparatus to be built. The complexity of the detectors and data acquisition electronics, together with the man-power needed to monitor the detector and experiments during the data acquisition phase necessitates the use of collaborations, often large, to perform experiments in nuclear physics research.

In order to produce final results with sufficiently small and well-understood uncertainties to be useful contributions to the field, the analysis of the data from these measurements is a long, intricate process. This analysis, particularly for large, complicated detector systems, with the required calibrations, computer simulations to determine detector efficiencies and other normalization issues associated with nuclear physics measurements, is complicated and requires inputs from experts in the various aspects of the detector system.

The author list for publications in nuclear physics reflects the contributions from all the members of the collaboration in the successful completion an experimental measurement.

Journals These research publications have appeared in peer-reviewed journals that are the premier journals for nuclear physics research. *Physical Review Letters* and *Physical Review C* are published by the American Physics Society. *Physical Review C* publishes papers that “report results of research in nuclear physics and related fields such as nuclear astrophysics”. *Physical Review Letters* publishes “papers of broad interest, those that report a substantial advance in a field of physics or have significant implications across subfield boundaries”. It is the policy of the American Physical Society that “the Physical Review accept for publication those manuscripts that significantly advance physics and have been found to be scientifically sound, important to the field, and in satisfactory form”. *Physics Letters B* is produced by Elsevier, and publishes papers on Experimental High Energy Physics and “ensures the rapid publication of important new results in nuclear and particle physics. Specialised editors are responsible for contributions in experimental nuclear physics, theoretical nuclear physics, experimental high-energy physics, theoretical high-energy physics, and astrophysics”

Research Impact Analysis of the citations, produced by the INSPIRE database of nuclear and particle physics publications ([http:// www.slac.stanford.edu/spires/](http://www.slac.stanford.edu/spires/)) provides the following summary for my publication history. Of 53 published papers (those after 2002) analysed from the INSPIRE database there were a total of 3608 citations for an average of 68.1 citations per paper.

Eligible (published) papers	53
Renowned papers (500+ cites)	1
Famous papers (250 - 499 cites)	1
Very well-known papers (100 - 249 cites)	7
Well-known papers (50 - 99 cites)	11
Known papers (10 - 49 cites)	26
Less known papers (1 - 9 cites)	6
Unknown papers (0 cites)	1

INSPIRE is managed and maintained by the Stanford Linear Accelerator Laboratory (SLAC) library, in cooperation with other major nuclear physics research facilities around the world including DESY in Germany, Fermi National Accelerator Laboratory (FNAL) in the US, Kyoto University in Japan, Durham University in the UK, IHEP in Russia, the KEK laboratory in Japan, and the high-energy physics (HEP) community.

Publications in peer-reviewed journals

Compton Scattering from the Deuteron above Pion-Production Threshold

B. Strandberg, J.R.M. Annand, W. Briscoe, J. Brudvik, F. Cividini, L. Clark, E.J. Downie, K. England, G. Feldman, K.G. Fissum, D.I. Glazier, K. Hamilton, K. Hansen, L. Isaksson, R. Al Jebali, M.A. Kovash, S. Lipschutz, M. Lundin, M. Meshkian, D.G. Middleton, L.S. Myers, D. ODonnell, G. O’Rielly¹, B. Oussena, M.F. Preston, B. Schröder

Physical Review C **98**:012201, (2018)

<https://doi.org/10.1103/PhysRevC.98.012201>

Clickers can promote fact retention but impede conceptual understanding: The effect of the interaction between clicker use and pedagogy on learning

Amy M. Shapiro, Judith Sims-Knight, Grant V. O’Rielly, Paul Capaldo, Teal Pedlow, Leamarie Gordon, and Kristina Monteiro

Computers & Education **111**, 44–59, (2017) Elsevier.

<http://dx.doi.org/10.1016/j.compedu.2017.03.017>

Compton scattering from ^{12}C using tagged photons in the energy range 65 - 115 MeV

L.S. Myers, K. Shoniyozov, M.F. Preston, M.D. Anderson, J.R.M. Annand, M. Boselli, W.J. Briscoe, J. Brudvik, J.I. Capone, G. Feldman, K.G. Fissum, K. Hansen, S.S. Henshaw, L. Isaksson, R. Jebali, M.A. Kovash, K. Lewis, M. Lundin, I.J.D. MacGregor, D.G. Middleton, D.E. Mittelberger, M. Murray, A.M. Nathan, S. Nutbeam, G.V. O’Rielly¹, B. Schröder, B. Seitz, S.C. Stave, and H.R. Weller

Physical Review C **89**:035202, (2014).

A Measurement of the differential cross section for the two-body photodisintegration of He-3 at $\theta_{lab} = 90^\circ$ using tagged photons in the energy range 14 – 31 MeV.

M. Karlsson, J.-O. Adler, L.E.M. Andersson, V. Avdeichikov, B.L. Berman, M.J. Boland, W.J. Briscoe, J. Brudvik, J.R. Calarco, G. Feldman, K.G. Fissum, K. Hansen, D.L. Hornidge, L. Isaksson, N.R. Kolb, A.A. Kotov, P. Lilja, M. Lundin, B. Nilsson, D. Nilsson, G.V. O’Rielly¹, G.E. Petrov, B. Schröder, I.I. Strakovsky and L.A. Vaishnena

Physical Review C **80**:044001, (2009).

Beam Spin Asymmetries in DVCS with CLAS at 4.8-GeV.

G. Gavalian *et al.* [CLAS Collaboration]

Physical Review C **80**:035206, (2009).

A Precise Measurement of the Neutron Magnetic Form Factor G_M^n in the Few-GeV² Region.

J. Lachniet *et al.* [CLAS Collaboration]

Physical Review C **79**:015204, (2009).

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G.V. Fedotov *et al.* [CLAS Collaboration]

Physical Review C **79**:015204, (2009).

¹major contributor to research

Measurement of unpolarized semi-inclusive π^+ electroproduction off the proton.M. Osipenko *et al.* [CLAS Collaboration]*Physical Review D* **80**:032004 (2009).***Exclusive ρ^0 electroproduction on the proton at CLAS.***S.A. Morrow *et al.* [CLAS Collaboration]*European Physics Journal A* **39**:5-31 (2009).***Search for the photo-excitation of exotic mesons in the $\pi + \pi + \pi^-$ system.***M. Nozar *et al.* [CLAS Collaboration]*Physical Review Letters* **102**:102002 (2009).***Electroexcitation of the Roper resonance for $1.7 < Q^2 < 4.5\text{-GeV}^2$ in $\bar{e}p \rightarrow en\pi^+$.***I.G. Aznauryan *et al.* [CLAS Collaboration]*Physical Review C* **78**:045209 (2008).***Electroproduction of $\Phi(1020)$ mesons at $1.4 \leq Q^2 \leq 3.8\text{-GeV}^2$ measured with the CLAS spectrometer.***J.P. Santoro *et al.* [CLAS Collaboration]*Physical Review Letters* **78**:025210 (2008).***Moments of the Spin Structure Functions g_1^p and g_1^d for $0.05 < Q^2 < 3.0\text{-GeV}^2$.***Y. Prok *et al.* [CLAS Collaboration]*Physics Letters B* **672**:12-16 (2009).***Pion emission in ^2H , ^{12}C , $^{27}\text{Al}(\gamma, \pi^+)$ Reactions at Threshold***P. Golubev, V. Avdeichikov, K.G. Fissum, B. Jakobsson, I.A. Pshenichnov, W.J. Briscoe, G.V. O’Rielly¹, J.

Annand, K. Hansen, L. Isaksson, H. Jäderström, M. Karlsson, M. Lundin, B. Schröder and L. Westerberg

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Single π^+ electroproduction on the proton in the first and second resonance regions at 0.25-GeV^2 ; Q^2 ; 0.65-GeV^2 using CLAS

H. Egiyan *et al.* [CLAS Collaboration],
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R. Bradford *et al.* [CLAS Collaboration],
Physical Review C **73**, 035202 (2006) [arXiv:nucl-ex/0509033].

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K. S. Egiyan *et al.* [CLAS Collaboration],
Physical Review Letters **96**, 082501 (2006) [arXiv:nucl-ex/0508026].

Measurement of the deuteron structure function F_2 in the resonance region and evaluation of its moments

M. Osipenko *et al.* [CLAS Collaboration],
Physical Review C **73**, 045205 (2006) [arXiv:hep-ex/0506004].

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K. Joo *et al.* [CLAS Collaboration],
Physical Review C **72**, 058202 (2005) [arXiv:nucl-ex/0504027].

Deeply virtual and exclusive electroproduction of ω mesons

L. Morand *et al.* [CLAS Collaboration],
European Physical Journal A **24**, 445 (2005) [arXiv:hep-ex/0504057].

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D. Protopopescu *et al.* [CLAS Collaboration]
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A.K. Opper, E. Korkmaz, D.A. Hutcheon, R. Abegg, C.A. Davis, R.W. Finlay, P.W. Green,

L.G. Greeniaus, D.V. Jordan, J.A. Niskanen, G.V. O’Rielly², T.A. Porcelli, S.D. Reitzner, P.L. Walden, S. Yen*Physical Review Letters* **91**, 212302, (2003) [arXiv:nucl-ex/0306027].***Measurement of the proton spin structure function $g_1(x, Q^2)$ for Q^2 from 0.15-GeV² to 1.6-GeV² with CLAS,***R. Fatemi *et al.* [CLAS Collaboration],*Physical Review Letters* **91**, 222002, (2003) [arXiv:nucl-ex/0306019].***Hyperon photoproduction in the nucleon resonance region,***J.W. McNabb *et al.* [CLAS Collaboration],*Physical Review C* **69**, 042201, (2004) [arXiv:nucl-ex/0305028].***A kinematically complete measurement of the proton structure function F_2 in the resonance region and evaluation of its moments,***M. Osipenko *et al.* [CLAS Collaboration],*Physical Review D* **67**, 092001 (2003)***Measurement of the polarized structure function $\sigma(LT')$ for $p(\vec{e}, e'p)\pi^0$ in the $\Delta(1232)$ resonance region,***K. Joo *et al.* [CLAS Collaboration],*Physical Review C* **68**, 032201 (2003) [arXiv:nucl-ex/0301012].***Observation of nuclear scaling in the $A(e, e')$ reaction at $x_B > 1$,***K.S. Egiyan *et al.* [CLAS Collaboration],*Physical Review C* **68**, 014313 (2003) [arXiv:nucl-ex/0301008].

²major contributor to research

Measurement of beam-spin asymmetries for deep inelastic π^+ electroproduction,

H. Avakian *et al.* [CLAS Collaboration],
Physical Review D **69**, 112004 (2004) [arXiv:hep-ex/0301005].

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D.S. Carman *et al.* [CLAS Collaboration],
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Measurement of $ep \rightarrow e'p\pi^+\pi^-$ and baryon resonance analysis,

M. Ripani *et al.* [CLAS Collaboration],
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D.A. Hutcheon, R. Abegg, E.G. Auld, R.M. Churchman, C.A. Davis, R.M. Finlay, P.W. Green,
 L.G. Greeniaus, R. Henderson, D.V. Jordan, W. Kellner, E. Korkmaz, A.K. Opper, G.V. O’Rielly¹,
 T.A. Porcelli, S.D. Reitzner, G. Sheffer, P.L. Walden and S. Yen
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S. Stepanyan *et al.* [CLAS Collaboration],
Physical Review Letters **87**, 182002 (2001) [arXiv:hep-ex/0107043].

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S.P. Barrow *et al.* [CLAS Collaboration]
Physical Review C **64**, 044601 (2001) [arXiv:hep-ex/0105029].

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¹major contributor to research

Quasi-free Compton scattering from the deuteron and nucleon polarizabilities

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Measurement of the $\gamma p \rightarrow \pi^+ n$ reaction near threshold

E. Korkmaz, N.R. Kolb, D.A. Hutcheon, G.V. O’Rielly¹ J.C. Bergstrom, G. Feldman, D. Jordan, A.K. Opper, R.E. Pywell, B. Sawatzky, and D.M. Skopik

Physical Review Letters **83**, 3609 (1999).

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R.G. Pleydon, W.R. Falk, M. Benjamintz, S. Yen, P.L. Walden, D. Hutcheon, C.A. Miller, M. Hartig, K. Hicks, and G.V. O’Rielly¹

Physical Review C **59**, 3208 (1999).

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E. Korkmaz, G.V. O’Rielly¹, D.A. Hutcheon, G. Feldman, D. Jordan, N.R. Kolb, R.E. Pywell, G.A. Retzlaff, B.D. Sawatzky, D.M. Skopik, J.M. Vogt, E. Cairns, U. Giesen, L. Holm, A.K. Opper, F.M. Rozon, and J. Soukup

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Final state interactions in $D(\gamma, pp\pi^-)$ near the $\Delta(1232)$ resonance

M.A. Quraan, E.D. Hackett, E. Korkmaz, W.J. McDonald, A.K. Opper, N.L. Rodning, G. Feldman, N.R. Kolb, G.V. O’Rielly¹, R.E. Pywell, and D.M. Skopik

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 $^3\text{He}(\gamma, pp)n$ cross sections with tagged photons below the Δ resonance energy

N.R. Kolb, G. Feldman, G.V. O’Rielly¹, R.E. Pywell, D.M. Skopik, E.D. Hackett, M.A. Quraan, and N.L. Rodning

Physical Review C **54**, 2175 (1996).

Inclusive positive pion photoproduction

K.G. Fissum, H.S. Caplan, E.L. Hallin, D.M. Skopik, J.M. Vogt, M. Frodyma, D.P. Rosenzweig, D.W. Storm, G.V. O’Rielly¹, and K.R. Garrow

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Reaction mechanisms in $^{12}\text{C}(\gamma, pp)$ near 200 MeV

E.D. Hackett, W.J. McDonald, A.K. Opper, M.A. Quraan, N.L. Rodning, F.M. Rozon, G. Feldman, N.R. Kolb, R.E. Pywell, D.M. Skopik, D. Tiller, J.M. Vogt, E. Korkmaz, and G.V. O’Rielly¹

Physical Review C **53**, R1047 (1996).

The response of plastic scintillator to protons and deuterons

G.V. O’Rielly¹, N.R. Kolb, and R.E. Pywell

Nuclear Instruments and Methods A **368**, 745 (1996).

¹major contributor to research

$^3\text{He}(\gamma, \text{pd})$ cross sections with tagged photons below the Δ resonance

N.R. Kolb, E.D. Hackett, E. Korkmaz, T. Nakano, A.K. Opper, M.A. Quraan, N.L. Rodning, F.M. Rozon, J. Asai, G. Feldman, E.L. Hallin, G.V. O’Rielly¹, R.E. Pywell, and D.M. Skopik
Physical Review C **49**, 2586 (1994).

De-excitation γ -rays following the photodisintegration of ^{17}O

G.V. O’Rielly¹, D. Zubanov, and M.N. Thompson
Physical Review C **40**, 59 (1989).

¹major contributor to research

Grants Received

Project Title: **IRES: Student Participation in Photonuclear Physics at MAX-lab, Sweden**

Principal Investigator: G.V. O’Rielly

Funding Agency: National Science Foundation: Office of International & Integrative Activities (IIA)
Award No.: IAA-1261150

Total award amount: \$249,695

Award Period: 06/01/2013 — 05/31/2016

Project Summary: This proposal describes a three-year program to provide undergraduate students from the University of Massachusetts Dartmouth, Bridgewater State University and Massachusetts Southcoast community colleges as well as colleges in the US North East with the opportunity to participate in an international research collaboration performing nuclear physics research using the photon tagging facility at MAX-lab located at Lund University in southern Sweden. This IRES program would support six students for a period of 8 – 10 weeks each summer to work with an international researchers studying pion photoproduction at energies near threshold. The students selected will play an important role in the collaboration efforts, and they will be involved in all aspects of the experiments including apparatus set-up, data taking to monitor the detector performance and data quality, and data analysis. The students will also be expected to undertake an individual research project based on the measurement being performed. The students will receive training and mentoring from experienced researchers that will help prepare them to work successfully in a global environment, and they will be encouraged to continue studies in science, technology, engineering and mathematics (STEM) fields. The students will complement the academic outcomes with the cultural experience stemming from living and working in a foreign country for an extended period of time. The award will provide travel, accommodation and meal expenses for the students, together with a stipend for the summer.

Project Title: **The Music of the Spheres**

Principal Investigator: G.V. O’Rielly

Funding Agency: University of Massachusetts President’s Office: Creative Economy Initiative

Total award amount: \$33,300

Award Period: 06/01/2013 — 05/31/2014

Project Summary: This proposal describes a collaboration between the Departments of Physics, Art Education and Music working with the New Bedford Symphony Orchestra to develop a year-long series of activities to engage young students in the New Bedford Schools in the exploration of music, art and astronomy building around a multimedia presentation built around Holst’s *The Planets* that was displayed in conjunction with the performance of this work by the New Bedford Symphony Orchestra in May 2014.

Project Title:	International Research Experience for Students (IRES) in Experimental Nuclear Physics in Germany at MAMI and Sweden at MAX-lab
Principal Investigator:	W.J. Briscoe (The George Washington University)
Co-Principal Investigator:	G.V. O’Rielly
Funding Agency:	National Science Foundation: Office of International Science and Engineering (OISE) Award No.: OISE-0553467
Total award amount:	\$150,000
Award Period:	06/01/2009 — 05/31/2012

Project Summary: This proposal describes a three-year program to involve undergraduate and graduate students with an international collaborations performing research MAX-lab in Sweden and MAMI at Mainz University in Germany. The two collaborations are undertaking research in intermediate energy photonuclear physics studying meson photoproduction at intermediate energies. The students will be integrated into the collaboration activities, and will play an important role in the collaboration efforts. The students will participate in the set-up for these measurements including detectors and electronics. They will be required to run shifts during the data acquisition periods, and they will also be expected to contribute to the analysis of the data obtained. The students will complement the academic outcomes with the cultural experience stemming from living and working in a foreign country for an extended period of time. The grant will support travel and accommodation costs together with a stipend to allow 2–3 students from UMass Dartmouth to participate in this program each year.

Project Title:	Weaving the Rainbow: Pathways to the Sciences
Principal Investigator:	G.V. O’Rielly
Funding Agency:	University of Massachusetts President’s Office: Creative Economy Initiative
Total award amount:	\$39,000
Award Period:	06/01/2009 — 05/31/2010

Project Summary: This proposal describes a collaboration between the Physics Department at UMass Dartmouth and the Ocean Explorium in New Bedford to present astronomy, and more generally physics, to the local community through observations, a speakers series and other events making use of the Dartmouth campus observatory and the Science on a Sphere display system at the Ocean Explorium in downtown New Bedford. These events will provide opportunities for members of the public to explore astronomy through guided observations and other activities, will showcase the educational and research activities at UMass Dartmouth, and will encourage young learners to pursue education and career options in science, technology, engineering and mathematics (STEM) fields.

Project Title: **Differential Speckle Survey Instrument**

Principal Investigator: E.P. Horch (Southern Connecticut State University)

Co-Investigator: G.V. O’Rielly

Funding Agency: National Science Foundation: Advanced Technology and Instrumentation
Award No.: ATC-0751361

Total award amount: \$38,294

Award Period: 09/01/2006 — 05/31/2008

Project Summary: This project describes a research program to design and build a new astronomical imaging system that will enable speckle-images of binary star systems to be recorded in two different colours simultaneously. The design component uses optical modelling to confirm that the device will operate as designed. A second project to develop and test the software to control the instrument and record the data in a standard format for analysis.

Project Title: **Pion Photoproduction at Jefferson Lab**

Principal Investigator: G.V. O’Rielly

Funding Agency: University of Massachusetts Dartmouth, College of Engineering
Solicitation: Research Seed Initiative Fund, March 2006

Total award amount: \$20,000

Award Period: 09/01/2006 — 08/31/2008

Approved experiment proposals

Research in experimental nuclear physics is typically performed at large national accelerator facilities. The demand for time and resources at these facilities far exceeds what is available. Consequently, to allocate laboratory resources, which includes equipment, manpower and time on the accelerator, all requests for beam time require that an experiment proposal be presented and defended by the principal investigator. This proposal and defense outline the physics that will be explored, the likely impact of the results, and the methods (experimental and analysis) that will be used. These proposals are reviewed by members of the Physics Advisory Committee (PAC). The PAC members are respected nuclear physics researchers, both theorists and experimentalists, with extensive experience in the field. The proposals are rated according to the merit of the physics research and the likelihood of success of the planned measurements. The proposals submitted to the PAC are typically 15-20 pages in length, with citations to previous work, and are comparable to proposals submitted to national funding agencies such as the National Institutes of Health, the National Science Foundation and the Office of Science at the Department of Energy.

Project Title: **Pion Photoproduction from a Polarized Target**

Principal Investigator: S. Strauch (University of South Carolina)

Co-Investigator: G.V. O’Rielly (University of Massachusetts Dartmouth)

Co-Investigator: N. Benmouna (The George Washington University)

Co-Investigator: I.I. Strakovsky (The George Washington University)

Research Facility: Jefferson Lab Physics Advisory Committee (PAC) 24
 Proposal No.: 03-105 submitted: 04/28/2003

PAC rating: B+ priority 18 days assigned

Project Title: **Charged Pion Photoproduction from
Threshold up to the First-Resonance Region**

Principal Investigator: G.V. O’Rielly (University of Massachusetts Dartmouth)

Co-Investigator: K.G. Fissum (Lund University)

Research Facility: MAX-lab Physics Advisory Committee (PAC)
 Proposal No.: NP-014 submitted: 11/05/2004

PAC rating: A priority

Project Title: **Near Threshold Photoproduction of π^-**

Principal Investigator: K.G. Fissum (Lund University)

Co-Investigator: G.V. O’Rielly (University of Massachusetts Dartmouth)

Research Facility: MAX-lab Physics Advisory Committee (PAC)
Proposal No.: E08-01 submitted: 10/11/2008

PAC rating: A priority 135 shifts assigned

Conference and Workshop Presentations

The IRES Program at MAX-lab: Student Involvement in Experimental Nuclear Physics

G.V. O’Rielly

Fall Meeting of the APS New England Section, North Adams, MA, October 28 – 29, 2016,

Bulletin of the American Physical Society, vol. 61, no. 11, (2016)

<http://meetings.aps.org/link/BAPS.2016.NEF.B1.22>

Tagging Efficiency for Nuclear Physics Measurements at MAX-lab

Nevin Miller, David Elofson, Codie Lewis, Erin O’Brien, Kelsey Buggelli, Kyle O’Connor, and Grant O’Rielly

4th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan Waikoloa, Hawaii, Oct. 7 – 11, 2014,

Bulletin of the American Physical Society, vol. 59, no. 10, BAPS.2014.HAW.GB.77 (2014).

Characterization of Lead Glass Cherenkov Detectors Using Cosmic-Ray Muons

David Elofson, Codie Lewis, Erin O’Brien, Kelsey Buggelli, Nevin Miller, Kyle O’Connor, and Grant O’Rielly

4th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan Waikoloa, Hawaii, Oct. 7 – 11, 2014,

Bulletin of the American Physical Society, vol. 59, no. 10, BAPS.2014.HAW.GB.79 (2014).

Calibration Procedures for Large Sodium Iodide Detectors

Kelsey Buggelli, David Elofson, Codie Lewis, Erin O’Brien, Nevin Miller, Kyle O’Connor, and Grant O’Rielly

4th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan Waikoloa, Hawaii, Oct. 7 – 11, 2014,

Bulletin of the American Physical Society, vol. 59, no. 10, BAPS.2014.HAW.GB.81 (2014).

DIANA NaI-Detector Energy Calibration

Kyle O’Connor, David Elofson, Codie Lewis, Erin O’Brien, Kelsey Buggelli, Nevin Miller, and Grant O’Rielly

4th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan Waikoloa, Hawaii, Oct. 7 – 11, 2014,

Bulletin of the American Physical Society, vol. 59, no. 10, BAPS.2014.HAW.GB.82 (2014).

Near-Threshold Measurement of $\gamma n \rightarrow p\pi^-$ at MAX-lab

G.V. O’Rielly

APS April Meeting, Savannah GA, April. 6 – 8, 2014,

Bulletin of the American Physical Society, vol. 59, no. 5, BAPS.2014.APR.R7.8 (2014).

Undergraduate Student Involvement in International Research – The IRES Program at MAX-lab, Sweden

W.J. Briscoe, K.G. Fissum, and G.V. O’Rielly

APS April Meeting, Savannah GA, April. 6 – 8, 2014,

Bulletin of the American Physical Society, vol. 59, no. 5, BAPS.2014.APR.D1.22 (2014).

Clickers don’t always help: Classroom context and goals can mitigate clicker effects on student learning

A. Shapiro, G.V. O’Rielly, and J. Sims-Knight

APS April Meeting, Savannah GA, April. 6 – 8, 2014,

Bulletin of the American Physical Society, vol. 59, no. 5, BAPS.2014.APR.R9.3 (2014).

The Benefits and Pitfalls of Learning with Classroom Clickers: A Large-Scale, Multidisciplinary, Empirical Study

Amy Shapiro, Judith Sims-Knight, Paul Capaldo, Grant O’Rielly C. Teal Pedlow, Leamarie Gordon, and Kristina Monteiro

American Educational Research Assoc. Ann. Meeting, Philadelphia PA, April 3 – 7, 2014.

Gain Calibration for the BUNI Large-Volume NaI(Tl) Detector at MAX-lab

Olivia A. Campbell, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, G. Feldman, M. Kovash, K.N. England, J. Kuczyński, S. Lipschutz, J. Park, S. Roche, C. Seymour, J. Brudvik, L. Isaksson, K. Hansen, M. Lundin, and B. Schröder

Fall Meeting of the APS Division of Nuclear Physics, Newport Beach CA, Oct. 24 – 27, 2012,

Bulletin of the American Physical Society, vol. 57, no. 9, BAPS.2012.DNP.EA.45, (2012).

Measurement of the Total Cross Section for $\gamma n \rightarrow p\pi^-$ Near Threshold at MAX-lab

Khayla N. England, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, G. Feldman, M. Kovash, O.A. Campbell, J. Kuczyński, S. Lipschutz, J. Park, S. Roche, C. Seymour, J. Brudvik, L. Isaksson, K. Hansen, M. Lundin, and B. Schröder

Joint Meeting of the APS New England Section and the AAPT, Williams College MA, Nov. 9 – 10, 2012,

Bulletin of the American Physical Society, vol. 57, no. 15, BAPS.2012.NEF.C1.18, (2012).

Gain Calibrations for the BUNI Large-Volume NaI(Tl) Detector at MAX-lab

Olivia A. Campbell, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, G. Feldman, M. Kovash, K.N. England, J. Kuczyński, S. Lipschutz, J. Park, S. Roche, C. Seymour, J. Brudvik, L. Isaksson, K. Hansen, M. Lundin., and B. Schröder

Joint Meeting of the APS New England Section and the AAPT, Williams College MA, Nov. 9 – 10, 2012,

Bulletin of the American Physical Society, vol. 57, no. 15, BAPS.2012.NEF.C1.19, (2012).

Large Acceptance Detector Systems for a Laser Back Scattering Facility at MAX-IV ,

G.V. O’Rielly

Forum on a Laser Back Scatter Facility at the MAX-IV Ring, MAX-Lab Users Group Meeting, Lund, Sweden, Nov. 15 – 16, 2011.

The Near-Threshold Measurement of $\gamma n \rightarrow p\pi^-$ at MAX-lab

G.V. O’Rielly

Fall Meeting of the APS Division of Nuclear Physics, East Lansing MI, Oct. 26 – 29, 2011,

Bulletin of the American Physical Society, vol. 56, no. 12, BAPS.2011.DNP.GE.1, (2011).

Gain Calibration for the BUNI Large-Volume NaI(Tl) Detector at MAX-lab

Olivia A. Campbell, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, G. Feldman, M. Kovash, K.N. England, J. Kuczyński, S. Lipschutz, J. Park, S. Roche, C. Seymour, J. Brudvik, L. Isaksson, K. Hansen, M. Lundin, and B. Schröder

Fall Meeting of the APS Division of Nuclear Physics, East Lansing MI, Oct. 26 – 29, 2011,
Bulletin of the American Physical Society, vol. 56, no. 12, BAPS.2011.DNP.EA.22, (2011).

Measurement of the Total Cross Section for $\gamma n \rightarrow p\pi^-$ Near Threshold at MAX-lab

Khayla N. England, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, G. Feldman, M. Kovash, O.A. Campbell, J. Kuczyński, S. Lipschutz, J. Park, S. Roche, C. Seymour, J. Brudvik, L. Isaksson, K. Hansen, M. Lundin, and B. Schröder

Fall Meeting of the APS Division of Nuclear Physics, East Lansing MI, Oct. 26 – 29, 2011,
Bulletin of the American Physical Society, vol. 56, no. 12, BAPS.2011.DNP.EA.42, (2011).

Photon Beam Monitors at MAX-lab

Chris J. Seymour, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, G. Feldman, M. Kovash, O.A. Campbell, K.N. England, J. Kuczyński, S. Lipschutz, J. Park, S. Roche, J. Brudvik, L. Isaksson, K. Hansen, M. Lundin, and B. Schröder

Fall Meeting of the APS Division of Nuclear Physics, East Lansing MI, Oct. 26 – 29, 2011,
Bulletin of the American Physical Society, vol. 56, no. 12, BAPS.2011.DNP.EA.118, (2011).

Pion Identification Methods in Pion Photoproduction Measurements at MAX-lab

Daniel Kelleher, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, H. Caceares, K. DiBenedetto, K.N. England, M. Litwack, B. K. Smith, J. Brudvik, K. Hansen, L. Isaksson, M. Lundin, B. Schröder

Joint Meeting of the APS New England Section and the AAPT, Lowell MA, April 8 – 9, 2011,
Bulletin of the American Physical Society, vol. 55, no. 1, BAPS.2011.NES.C1.25, (2011).

Gain Calibrations for Scintillation Counters in Pion Photoproduction Measurements at MAX-lab

Khayla England, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, H. Caceares, K. DiBenedetto, D. Kelleher, M. Litwack, B. Smith, J. Brudvik, L. Isaksson, B. Jakobsson, M. Lundin, and B. Schröder

Joint Meeting of the APS New England Section and the AAPT, Lowell MA, April 8 – 9, 2011,
Bulletin of the American Physical Society, vol. 56, no. 2, BAPS.2011.NES.C1.26, (2011).

The Near-Threshold Pion Photoproduction Program at MAX-lab

G.V. O’Rielly

APS Spring Meeting, Washington, DC, February 13 – 16, 2010
Bulletin of the American Physical Society, vol. 55, no. 1, BAPS.2010.APR.K7.2, (2010).

Student Involvement in International Research – The IRES Program at MAMI and MAX-lab

W.J. Briscoe, N. Benmouna, K.G. Fissum, and G.V. O’Rielly

APS Spring Meeting, Washington, DC, February 13 – 16, 2010
Bulletin of the American Physical Society, vol. 55, no. 1, BAPS.2010.APR.R1.3, (2010).

Proton Identification using Plastic Scintillator Counters at MAX-lab

J. Lemrise, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, C.M. Allen, M. Litwack, L. Myers, M. Boselli, J. Brudvik, L. Isaksson, B. Jakobsson, M. Lundin, D. Middleton, and B. Schröder
APS Spring Meeting, Washington, DC, February 13 – 16, 2010
Bulletin of the American Physical Society, vol. 55, no. 1, BAPS.2010.APR.M1.11, (2010).

Pion Identification in Photonuclear Measurements at MAX-lab

C.M. Allen, G.V. O’Rielly, K.G. Fissum, W.J. Briscoe, J. Lemrise, M. Litwack, L. Myers, M. Boselli, J. Brudvik, L. Isaksson, B. Jakobsson, M. Lundin, D. Middleton, and B. Schröder
APS Spring Meeting, Washington, DC, February 13 – 16, 2010
Bulletin of the American Physical Society, vol. 55, no. 1, BAPS.2010.APR.M1.12, (2010).

The Near-Threshold Pion Photoproduction Program at MAX-lab

G.V. O’Rielly
APS April Meeting, Denver, CO, May 2009
Bulletin of the American Physical Society, vol. 54, no. 4, BAPS.2009.APR.Q10.5 (2009).

Near-threshold pion photoproduction at MAX-lab

G.V. O’Rielly¹, K.G. Fissum, W.J. Briscoe, B. Jakobsson, B. Schröder, V. Avdeichikov, P. Golubev, E. Aghassi, A. Al-Katib, J. Annand, K. Hansen, R. Hoffman, L. Isaksson, H. Jäderström, M. Lundin, K. Magno², L. Westerberg
11th International Conference on Meson-Nucleon Physics and the Structure of the Nucleon, MENU 2007, Institut für Kernphysik, Jülich, Germany September 2007.

Status of the MAX-lab (γ, π^+) program

G.V. O’Rielly¹ [for the PIONS@MAX-lab Collaboration]
MAX-lab Physics Advisory Committee meeting, Lund University, Sweden, October 2006.

Charged pion photoproduction from threshold up to the first-resonance region

G.V. O’Rielly¹
MAX-lab Physics Advisory Committee meeting, Lund University, Sweden, December 2004.

Photoproduction of charged pions close to threshold

G.V. O’Rielly¹
MAX-lab Nuclear Physics Users Group meeting, Lund University, Sweden, November 2003.

Measurement of the low-energy photodisintegration of tritium and helium-3

G.V. O’Rielly¹, G. Feldman, J.R. Calarco, N.M. Karlsson, B.L. Berman, W.J. Briscoe, R. Igarashi, N.R. Kolb, R.E. Pywell, and D.M. Skopik
Gordon Research Conference on Photonuclear Reactions, Tilton, NH, August 2002.

Threshold charged pion photoproduction

G.V. O’Rielly¹
MAX-lab Physics Advisory Committee meeting, Lund University, Sweden, May 2002.

¹major contributor to research

²Univ. Mass. Dartmouth graduate student

Simultaneous measurement of the two-body photodisintegration of ^3H and ^3He

G.V. O’Rielly¹, G. Feldman, J.R. Calarco, N.M. Karlsson, B.L. Berman, W.J. Briscoe, R. Igarashi, N.R. Kolb, R.E. Pywell, and D.M. Skopik

International Symposium on Electromagnetic Interactions in Nuclear and Hadron Physics, EMI 2001, Osaka University, Japan, December 2001.

Simultaneous measurement of the two-body photodisintegration of ^3H and ^3He

G.V. O’Rielly¹, G. Feldman, J.R. Calarco, N.M. Karlsson, B.L. Berman W.J. Briscoe, D.L. Hornidge, R. Igarashi, N.R. Kolb, R.E. Pywell, and D.M. Skopik

1st Workshop on Electromagnetic Nuclear Reactions at Low Momentum Transfer, LOWq01, St. Marys University, Halifax, Canada, July 2001.

Triplet polarimeter for photons in the GeV range

G.V. O’Rielly¹, G. Feldman, B.L. Berman W.J. Briscoe, K.S. Dhuga, N.R. Kolb, R.E. Pywell, D.M. Skopik, S.D. Hobblit, A.M. Sandorfi, M.A. Khandaker, and F. Klein

APS April Meeting, Long Beach, CA, April 2000

Bulletin of the American Physical Society 45, 174 (2000)

Simultaneous measurement of the photodisintegration of ^3H and ^3He

G.V. O’Rielly¹, G. Feldman, B.L. Berman W.J. Briscoe, R. Igarashi, N.R. Kolb, R.E. Pywell, D.M. Skopik, G.A. Retzlaff, D.S. Lowe, A.M. Mader, D.V. Wiebe, D.L. Hornidge, J.R. Calarco, N.M. Karlsson

APS Centennial Meeting, Atlanta, GA, March 1999

Bulletin of the American Physical Society 44, 1010 (1999)

Measuring charge symmetry breaking in inelastic np scattering

G.V. O’Rielly¹, E. Korkmaz, A.K. Oppen, K. Hicks, D.A. Hutcheon, R. Abbeg, C.A. Davis, C.A. Miller, P. Walden, S. Yen, P.W. Green, L.G. Greeniaus J. Niskanen

Canadian Association of Physics meeting, Ottawa, Canada 1996.

Measuring charge symmetry breaking in $np \rightarrow d\pi^0$

G.V. O’Rielly¹, E. Korkmaz, A.K. Oppen, K. Hicks, D.A. Hutcheon, R. Abbeg, C.A. Davis, C.A. Miller, P. Walden, S. Yen, P.W. Green, L.G. Greeniaus, J. Niskanen

Western Regional Nuclear and Particle Physics Conference, Lake Louise, Canada 1996.

Threshold measurement of the $\gamma p \rightarrow n\pi^+$ reaction

G.V. O’Rielly¹, E. Korkmaz, J.C. Bergstrom, G. Feldman, D. Jordan, N.R. Kolb, R.E. Pywell,

G.A. Retzlaff, B. Sawatzky, D.M. Skopik, J.M. Vogt, E.B. Cairns, L. Holm, N.L. Rodning, F.M. Rozen, J. Soukup, A.K. Oppen

Western Regional Nuclear and Particle Physics Conference, Lake Louise, Canada 1996.

Light response of plastic scintillator to protons and deuterons

G.V. O’Rielly¹, N.R. Kolb, R.E. Pywell

Western Regional Nuclear and Particle Physics Conference, Lake Louise, Canada 1994.

 $^4\text{He}(\gamma, dd)$ with tagged photons at $E_\gamma = 180$ to 220 MeV

G.V. O’Rielly¹, G. Feldman, E.L. Hallin, R.E. Pywell, D.M. Skopik, D.E. Tiller, J.M. Vogt, E.D. Hackett, N.R. Kolb, E.J. Korkmaz, W.J. McDonald, A.K. Oppen, M.A. Quraan, N.L. Rodning, F.M. Rozen

Western Regional Nuclear and Particle Physics Conference, Lake Louise, Canada 1993.

Preliminary data from an experimental investigation of ${}^4\text{He} + \gamma \rightarrow \text{d} + \text{d}$

G.V. O’Rielly¹, J.C. Bergstrom, H.S. Caplan, G. Feldman, R.E. Pywell, D.M. Skopik, J.M. Vogt,
 E.D. Hackett, N.R. Kolb, E.J. Korkmaz, W.J. McDonald, N.L. Rodning
Western Regional Nuclear and Particle Physics Conference, Lake Louise, Canada 1991.

Laboratory Project Reports**International Research Experience for Students (IRES)**

MAX-lab Activity Report 2014–2015, May 2016

Compton Scattering and π^- Photoproduction on the Deuteron

MAX-lab Activity Report 2014–2015, May 2016

Experiment NP-014 “Charged Pion Photoproduction from Threshold up to the First-Resonance Region”

MAX-lab Nuclear Science Physics Advisory Committee Report, October 2012

Positive Pion Photoproduction from the Proton: Experiment NP-014

MAX-lab Activity Report 2011, May 2012

International Research Experience for Students (IRES)

MAX-lab Activity Report 2011, May 2012

Positive Pion Photoproduction from the Proton: Experiment NP-014

MAX-lab Activity Report 2010, May 2011

International Research Experience for Students (IRES)

MAX-lab Activity Report 2010, May 2011

Positive Pion Photoproduction from the Proton: Experiment NP-014

MAX-lab Activity Report 2009, May 2010

International Research Experience for Students (IRES)

MAX-lab Activity Report 2009, May 2010

Studies of Pion Photoproduction from the Nucleon: Experiment NP-014

MAX-lab Activity Report 2008, May 2009

¹major contributor to research

Seminar Presentations

Threshold measurement of the $\gamma p \rightarrow n\pi^+$ reaction

Seminar at the Physics Department *Lund University*, Sweden, November 2003

Simultaneous Measurement of the two-body photodisintegration of ^3H and ^3He

Seminar at the Department of Physics

University of Saskatchewan, November 2001

Simultaneous measurement of the two-body photodisintegration of ^3H and ^3He

Seminar at the Institute of Nuclear and Particle Physics

Ohio University, October 2001

Measurement of the $\gamma + p \rightarrow n + \pi^+$ reaction very close to threshold

Seminar at the Physics Department

The George Washington University, March 1998

Testing the fundamental symmetries of the strong interaction

Seminar at the Physics Department

University of Northern British Columbia, November 1996

Nuclei and nucleon in Saskatoon: Physics on the prairies

Seminar at the Physics Department

University of Northern British Columbia, April 1995

OTHER PROFESSIONAL ACTIVITIES

Scholarly Consultation Activities

Served as a proposal reviewer for the Major Research & Instrumentation (MRI) program with the Intermediate Energy Physics program of the Division of Mathematics and Physics at the National Science Foundation, May 2018.

- i. performed detailed evaluation of proposal in areas of intellectual merit and broader impacts
- ii. made overall recommendation regarding funding for proposal

Served on the review panel for funding requests submitted to the International Research Experience for Students (IRES) program in the Mathematics & Physics Sciences (MPS) directorate at the National Science Foundation, Arlington, VA October 17 – 19, 2017.

- i. reviewed 25 proposals
- ii. performed detailed evaluation of eight proposals and the individual reviewer evaluations for these proposals
- iii. participated in panel discussion regarding each proposal
- iv. wrote panel summary for four proposals
- v. made recommendations of *FUND*, *FUND IF POSSIBLE* or *DO NOT FUND* for each proposal

Served as the external reviewer for the graduate M.S. program in Physics at the University of Houston Clear Lake located in Texas in 2016.

- i. reviewed the department’s self-study report, the program’s curriculum and instructional resources
- ii. evaluated the acceptance procedures and graduation requirements
- iii. made recommendations as a part of a report submitted to the Dean’s Office at the School of Science and Computer Engineering, University of Houston Clear Lake

Served as an ad-hoc proposal reviewer for the Intermediate Energy Physics program of the Division of Mathematics and Physics at the National Science Foundation, February 2015.

- i. performed detailed evaluation of proposal in areas of intellectual merit and broader impacts
- ii. made overall recommendation regarding funding for proposal

Professional Society Activities

2017: Elected as Vice-President of the New England Section of the American Physical Society.

- i. Attended executive board meetings at NE section meetings, October 2017 & March 2018.
- ii. Attended the American Physical Societys Leadership Convention in Washington DC, January 31 – February 3, 2018.

2015: Elected as member of executive board of the New England Section of the American

Professional Conference and Workshop Attendance

Attended the *New England Section meeting of the APS* at Suffolk University, Boston, MA
March 16 – 17, 2018.

Attended the *New England Section meeting of the APS* at the University of Rhode Island, Kingston, RI,
October 20 – 21, 2017

Attended the *PICUP Workshop* held at the Univesity of Wisconsin River Falls, WI,
July 9 – 14, 2017.

Attended the *AAPT Winter Meeting* in Atlanta, GA
February 18 – 21, 2017.

Participated in the *APS PhysTEC Workshop* in Atlanta, GA
February 16 – 18, 2017.

Attended the *Workshop of the APS Topical Group on Hadronic Physics* in Washington, DC
February 1 – 3, 2017.

Attended the *April meeting of the APS Div. of Nuc. Phys.: Q2C – Quarks to Cosmos* in Washington, DC
January 28 – 31, 2017.

Served as chair for contributed session ***S12: Light Mesons and Baryons.***

Attended the *New England Section meeting of the APS* at MCLA, North Adams, MA
November 8 – 9, 2016.

Participated in the *APS Research Experience for Undergraduates (REU) Workshop* in Houston, TX
October 19 – 21, 2016.

Attended the *AAPT Summer Meeting* in Sacramento, CA
July 15 – 22, 2016.

Attended the *APS/AAPT Physics Department Chairs Conference* in College Park, MD
June 2 – 4, 2016.

Attended the *New England Section meeting of the APS* at Wheaton College, MA
April 1 – 2, 2016.

Attended the *New England Section meeting of the APS* at Dartmouth College, NH
October 6 – 7, 2015.

Attended the *APS/AAPT Physics Department Chairs Conference* in College Park, MD
June 5 – 7, 2015.

Attended the *2015 PhysTEC Conference* in Seattle, WA
February 5-7, 2015

Attended a workshop “*Building a Thriving Undergraduate Physics Program*” Workshop in Seattle, WA February 7-9, 2015

Attended the *April meeting of the APS Division of Nuclear Physics* in Savannah, GA April 6-8, 2014

Attended an all-day *Workshop on Photonuclear Research at the Intensity Frontier — Discussions of Nuclear Physics Research with Intense Gamma-ray Beams* held in Savannah, GA April 5, 2014

Attended the *New England Section meeting of the APS* at Bridgewater State University, MA October 11 – 12, 2013.

Attended the *Association of Nuclear Physics Users* Working Group meeting at MAX-lab in Lund, Sweden December 7 –12, 2012.

Attended the *New England Section meeting of the APS* at Williams College, MA November 9 – 10, 2012.

Attended the *Association of Nuclear Physics Users* meeting at the MAX-lab Users Group Meeting at Scandic Star in Lund, Sweden November 15 – 16, 2011.

Attended the *Fall Meeting of the APS Division of Nuclear Physics* at Michigan State University, MI October 26 – 29, 2011.

Attended the *Association of Nuclear Physics Users* meeting at the MAX-lab Users Group Meeting at Scandic Star in Lund, Sweden November 6 – 12, 2010.

Attended the *New England Section meeting of the APS* in Lowell MA, April 8 – 9, 2011.

Attended the *Spring meeting of the APS* in Washington, DC, February 13 – 16, 2010.

Attended the *Association of Nuclear Physics Users* meeting at the MAX-lab Users Group Meeting at Scandic Star in Lund, Sweden November 1 – 5, 2009.

Attended the *April meeting of the APS Division of Nuclear Physics* in Denver, CO May 1 – 6, 2009.

Attended the *Physics Advisory Committee* meeting and the *Association of Nuclear Physics Users* meeting at the MAX-lab Users Group Meeting at MAX-lab in Lund, Sweden October 11 – 18, 2008.

Attended the *CLAS Collaboration Meeting*, at Jefferson Lab in Newport News, VA in March 2007.

Attended the *Users Group for Nuclear Physics at MAX-lab* meeting at Lund University in Sweden, October 2006.

Attended the *2005 Assessment Institute* at Indiana University-Purdue University Indianapolis, IN October 29 – 31, 2006.

Attended the *MAX-lab Nuclear Physics Advisory Committee* meeting at Lund University in Sweden in December 2004.

Attended the *Users Group for Nuclear Physics at MAX-lab* meeting at Lund University in Sweden in November 2003.

Attended the *2nd Workshop on Electromagnetic Nuclear Reactions at Low Momentum Transfer, LOWq-03*, at St. Mary’s University in Halifax, Canada in July 2003.

Attended the *Crystal Ball Collaboration at MAMI* meeting at Mainz University in Germany in January 2003.

Attended the *Gordon Research Conference on Photonuclear Reactions*, in Tilton, NH in August 2002.

Attended the *MAX-lab Nuclear Physics Advisory Committee* meeting at Lund University in Sweden in

April 2002.

Attended the *International Symposium on Electromagnetic Interactions in Nuclei and Hadron Physics, EMI 2001*, at Osaka University, Japan in December 2001.

Attended the *9th International Symposium on Meson-Nucleon Physics and the Structure of the Nucleon, MENU 2001*, at the George Washington University, Washington DC in July 2001.

Attended the *1st Workshop on Electromagnetic Nuclear Reactions at Low Momentum Transfer, LOWq-01*, at St. Mary’s University, Halifax, Canada in July 2001.

Attended the *April Meeting of the APS Division of Nuclear Physics*, in Washington, DC, in April 2001.

Attended the *Gordon Research Conference on Photonuclear Reactions*, in Tilton, NH in August 2000.

Attended the *April Meeting of the APS Division of Nuclear Physics*, in Long Beach, CA, in April 2000.

Attended the *APS Centennial Meeting*, in Atlanta, GA, in March 1999.

Attended the *Fall Meeting of the APS Division of Nuclear Physics*, in Whistler, BC, Canada in October 1997.

Attended the *Canadian Association of Physics* meeting in Ottawa, Canada in March 1996.

Attended the *Gordon Research Conference on Photonuclear Reactions*, in Tilton, NH in August 1996.

Attended the *Gordon Research Conference on Photonuclear Reactions*, in Tilton, NH in August 1994.

Attended the *Thirteenth International Conference on Few Body Problems in Physics, Few Body XIII*, in Flinders University, Adelaide, Australia in January 1992.

Other Research Activities

I am a member of two large research collaborations, the CLAS collaboration at Jefferson Lab in Newport News VA, and am the spokesperson for the PIONS@MAX-lab collaboration at MAX-lab in Lund, Sweden. Research at these international user facilities often requires travel to work on the set-up for the measurements or for discussions and meetings with other collaboration members.

A. MAX-lab Program (*PIONS@MAXLAB*) &

International Research Experience for Students (*IRES*)

I am the spokesperson or co-spokesperson for two research proposals to measure charged pion photoproduction using the tagged photon facility at MAX-lab in Lund, Sweden. These experiments involve new measurements of the charged pion channels; $\gamma p \rightarrow n\pi^{+2}$, and $\gamma n \rightarrow p\pi^{-3}$. These two approved experiments are considered a high priority by the MAX-lab Users Group, and were both approved by the external Physics Advisory Committee (PAC) as A rated experiments. In addition to these experiments, as a member of the MAX-TAGG Collaboration, I participated in the data acquisition periods for experiments being lead by other collaboration members.

As a spokesperson and program leader for these experiments, I was responsible for assisting with the set-up of the detector systems, target, trigger electronics and data acquisition systems. I addressed problems with the detectors and electronics, the data analysis software and display, and online data monitoring. I also coordinated with the MAX-lab accelerator operators to set the required beam characteristics and with the other experimental groups in the PIONS@MAXLAB Collaboration involved in the run periods.

²MAX-lab experiment NP-014 “Charged Pion Photoproduction from Threshold up to the First-Resonance Region”

³MAX-lab experiment E08-01 “Near Threshold Photoproduction of π^{-} ”

- i. April 15 – 27, 2015
Traveled to MAX-lab/Lund University to participate in data acquisition shifts for the Compton Scattering and (γ, π^-) measurements.
- ii. May 26 – June 16 & July 7 – 16, 2014
Traveled to MAX-lab to as the program leader for the (γ, π^-) experimental run period and the IRES project. Lead the set-up efforts, calibration work and production data taking for the measurements.
- iii. May 26 – June 16 & July 7 – 16, 2014
Supervised six undergraduate students; Ms. Kelsey Buggelli, Mr. Nevin Miller and Mr. Kyle O’Connor from UMass Dartmouth, Mr. David Elofson from Bridgewater State University, and Mr. Codie Lewis and Ms. Erin O’Brien from James Madison University as a part of the IRES program.
- iv. December 7 – 17, 2012
Traveled to MAX-lab/Lund University to present an analysis update on the (γ, π^-) measurements at the Nuclear Physics Users Group meeting.
- v. June 27 – July 8, 2012
Supervised two undergraduate students; Ms. Khayla England, from UMass Dartmouth, and Mr. S Lipschutz, from The George Washington University, DC at MAX-lab on data analysis projects for the (γ, π^-) measurements.
- vi. November 11 – 15, 2011
Presented an invited talk on *Large Acceptance Detector Systems for a Laser Back Scattering Facility at MAX-IV* at the MAX-lab Annual Users Meeting and associated Nuclear Physics Users Group meeting.
- vii. November 15 – 19, 2011
Participated in data acquisition for a measurement of the total photoabsorption cross section of ^6Li and ^7Li below the pion threshold⁴.
- viii. September 30 – October 9, 2011
Traveled to MAX-lab/Lund University to participate in data acquisition shifts for the (γ, π^-) measurements.
- ix. June 1 – 27, 2011
Traveled to MAX-lab/Lund University as the program leader for the (γ, π^-) experimental run period and the IRES project.
- x. June 1 – 27, 2011
Supervised five undergraduate students; Ms. Olivia Campbell, Ms. Khayla England and Mr. Chris Seymour, from UMass Dartmouth, and Ms. Jennifer Kuczynski and Mr. S Lipschutz, from The George Washington University, DC as a part of the IRES project and the (γ, π^-) measurement.
- xi. March 4 – 14, 2011
Traveled to MAX-lab/Lund University to participate in a facility development run period. These tests made use of large NaI photon detectors and CsI charged particle detectors in measurements of kinematically over-defined reactions. The results from these measurements will provide an

⁴MAX-lab experiment NP-02 *Total Photoabsorption Cross Section of $^6,^7\text{Li}$ Below π -Threshold*

independent determination of the electron beam energy provided by the MAX-lab accelerator and pulse-stretcher ring system.

xii. November 6 – 12, 2010

Traveled to MAX-lab/Lund University to attend the MAX-lab Annual Users Meeting and associated Nuclear Physics Users Group meeting. I presented a status report on the $(\gamma\pi^+)$ program, “*Status of the π^+ Analysis Using the xSAL Counters*”.

xiii. June 2 – 26, 2010

Traveled to MAX-lab/Lund University as program leader for the $(\gamma\pi^+)$ experimental run period. Responsible for final set-up of electronics and detector systems, addressing any problems with the detectors and electronics, the data analysis software and display, and online data monitoring. As run leader for the xSAL group, I co-coordinated with the other experimental groups in the PIONS@MAXLAB Collaboration involved in the same run period.

xiv. June 2 – 26, 2010

Supervised six undergraduate students; Ms. Khayla England and Mr. Daniel Kelleher, from UMass Dartmouth, Mr. Hugo Caceres, Ms. Kristina DiBenedetto and Mr. Brian Smith from The George Washington University, DC, and Mr. M. Litwack from the Georgia Institute of Technology, GA, as a part of the IRES project and the $(\gamma\pi^+)$ measurement.

xv. March 14 – 27, 2010

Traveled to MAX-lab/Lund University to set-up and debug the data acquisition and trigger electronics in preparation for the Summer 2010 production data taking for the $\gamma p \rightarrow n\pi^+$ measurements.

xvi. November 1 – 5, 2009

Attend the 2009 MAX-lab Annual Users Meeting and associated Nuclear Physics Users Group meeting. I presented a status report on the $\gamma p \rightarrow n\pi^+$ program, “*Status of the π^+ analysis from the xSAL detectors*”⁵ and participated in a *Workshop on Future Plans for Nuclear Physics at the new MAX-IV Facility*.

xvii. May 27 – 1, 2009

Traveled to MAX-lab to lead production data taking for the $(\gamma\pi^+)$ experimental run period. While at MAX-lab I was responsible for the final set-up of electronics and detector systems, addressing any problems with the detectors and electronics, the data analysis software and display, and online data monitoring. As run leader for the xSAL group, I co-coordinated with the other experiment groups involved in the same run period

xviii. May 27 – 1, 2009

Supervised two undergraduate students, Ms. Colleen Allen and Mr. Jason Lemrise from UMass Dartmouth, and assisted with the supervision of Mr. Matty Litwack from Montgomery College, MD, who were involved with this measurement as a part of the IRES program and the $(\gamma\pi^+)$ measurement.

xix. March 16 – 23 & March 31 – April 6, 2009

Traveled to MAX-lab/Lund University to set-up and debug the data acquisition and trigger electronics in preparation for the Summer 2009 production data taking for the $(\gamma\pi^+)$ measurements.

⁵http://www.maxlab.lu.se/kfoto/Publications/Talks/Lund_NPUG_2009.pdf

- xx. October 11 – 18, 2008
 Attended the 2008 Physics Advisory Committee meeting and associated Nuclear Physics Users Group meeting where I gave a status report and presentation on the $(\gamma\pi^+)$ program, “ π^+ production from the proton”⁶.
- xxi. March 4 – 12, 2008
 Traveled to MAX-lab/Lund University to collect preliminary data $(\gamma\pi^+)$ measurements.
- xxii. February 12 – 21, 2008
 Traveled to MAX-lab/Lund University to set-up and debug the data acquisition and trigger electronics in preparation for preliminary data taking for the $(\gamma\pi^+)$ measurements with new detectors systems.
- xxiii. June 7 – 18, 2007
 Traveled to MAX-lab/Lund University to set-up and test new detector systems for the $(\gamma\pi^+)$ measurements.
- xxiv. October 1 – 9, 2006
 Attended the 2006 Physics Advisory Committee meeting and associated Nuclear Physics Users Group meeting where I gave a status report on the $(\gamma\pi^+)$ program, “ π^+ production from the proton”.
- xxv. March 2 – 9, 2006
 Traveled to MAX-lab/Lund University to set-up electronics and xSAL detectors to collect preliminary data for the $(\gamma\pi^+)$ measurements.
- xxvi. December 4 – 12, 2005
 Traveled to MAX-lab/Lund University to set-up electronics and xSAL detectors to collect preliminary data for the $(\gamma\pi^+)$ measurements.
- xxvii. November 30 – December 9, 2004
 Attended the 2004 Physics Advisory Committee meeting and associated Nuclear Physics Users Group meeting to defend the proposal to measure π^+ production from the proton.
- xxviii. November 18 – 24, 2003
 Attended the 2003 Nuclear Physics Users Group meeting. Began development of the (γ, π^+) proposal

B. Jefferson Lab. Program (*CLAS at Hall B*)

I am a co-spokesperson for Jefferson Lab. experiment E03-105 *Pion Photoproduction from a Polarized Target* to study charged pion photoproduction from polarized targets with a polarized photon beam using the CEBAF Large-Acceptance Spectrometer CLAS in Hall B at Jefferson Lab. These experiments will provide new data with which to study the properties of high-energy resonances ($E_\gamma > 1$ GeV) of the proton. These results will be compared with predictions for the resonance properties from various quark-based models.

As a member of the CLAS collaboration, I traveled to Jefferson Lab. to assist with the staffing of the experiment run periods conducted by the collaboration. This involved shifts in the Hall B data acquisition control room as either a shift leader/expert or shift worker. I also served as the Run Coordinator for part of the g9a-FROST experiment.

⁶<http://www.maxlab.lu.se/kfoto/ExperimentalProgram/PAC/2008/talks/orielly.pdf>.

- The responsibilities of a shift worker included monitoring the CLAS detector and target systems, checking the data quality, and reporting any problems with the detectors or data acquisition to the shift leader/expert.
 - As a shift leader/expert I worked with the shift worker to monitor the detector, target and data quality and address any problems identified, calling the system expert if required. In addition, as shift leader, I coordinated the experiment requirements and requests with the two other experimental halls operating at Jefferson Lab. and the Machine Control Center which operates the CEBAF accelerator.
 - As a Run Coordinator I was responsible for the experiment during this period. This included coordinating all work with the detector systems and target experts, being available *on-call* to the shift workers to address any problems that arose with the target, detectors or data acquisition system that they could not handle. I also was responsible for daily briefing reports on the experiment to the Jefferson Lab. machine control group and the Hall B physics group.
- i. Summer 2012 – present
Jefferson Lab. was shutdown to install new detectors and equipment as a part of an energy upgrade. I undertook no travel to Jefferson Lab. during this period.
 - ii. March 3 – 9, 2012
Traveled to Jefferson Lab. for the *HD-ICE* run period to serve as shift leader/expert during data acquisition shifts in the Hall B control room.
 - iii. January 24 – 31, 2012
Traveled to Jefferson Lab. for the *HD-ICE* run period to serve as shift leader/expert during data acquisition shifts in the Hall B control room.
 - iv. July 24 – 31, 2010
Traveled to Jefferson Lab. for the *g9a-FROST* run period to serve as Run Coordinator for the *g9a-FROST* measurement.
 - v. April 27 – May 1, 2010
Traveled to Jefferson Lab. for the *g9a-FROST* run period to serve as shift leader/expert during data acquisition shifts in the Hall B control room.
 - vi. August 19 – 25, 2009
Traveled to Jefferson Lab. for the *g9a-FROST* run period to serve as shift worker during data acquisition shifts in the Hall B control room.
 - vii. February 8 – 13, 2009
Traveled to Jefferson Lab. for the *eg1-dvcs* run period to serve as shift leader/expert during data acquisition shifts in the Hall B control room.
 - viii. January 21 – 25, 2009
Traveled to Jefferson Lab. for the *eg1-dvcs* run period to serve as shift worker during data acquisition shifts in the Hall B control room.
 - ix. November 19 – 30, 2008
Traveled to Jefferson Lab. for the *eg1-dvcs* run period to serve as shift leader/expert during data acquisition shifts in the Hall B control room.

- x. September 15 – 18, 2008
Traveled to Jefferson Lab. to meet with colleagues and collaborators for detailed discussions regarding the analysis of the data from existing experiments and preparation of new research proposals.
- xi. July 27 – 31, 2008
Traveled to Jefferson Lab. for the *eg1-dvcs* run period to serve as shift expert during data acquisition shifts in the Hall B control room.
- xii. May 16 – 20, 2008
Traveled to Jefferson Lab. for the *g12* run period to serve as shift worker during data acquisition shifts in the Hall B control room.
- xiii. April 7 – 13, 2008
Traveled to Jefferson Lab. for the *g12* run period to serve as shift leader/expert during data acquisition shifts in the Hall B control room.
- xiv. January 13 – 16, 2008
Traveled to Jefferson Lab. to meet with collaborators on the *g9-FROST* experiment. University of Massachusetts Dartmouth graduate student, Mr. Robert Coyne, also attended.
- xv. December 9 – 16, 2007
Traveled to Jefferson Lab. for the *g9-FROST* run period to serve as shift leader/expert during data acquisition shifts in the Hall B control room.
- xvi. October 18 – 24, 2007
Traveled to Jefferson Lab. to meet with collaborators on the *g9-FROST* experiment. University of Massachusetts Dartmouth graduate student, Mr. Robert Coyne, also attended.
- xvii. March 21 – 25, 2007
Traveled to Washington DC to meet with collaborators from the George Washington University to discuss research plans.
- xviii. February 27 – March 4, 2007
Traveled to Jefferson Lab. VA to attend the CLAS collaboration meeting. University of Massachusetts Dartmouth graduate student, Mr. Ken Magno, also attended.
- xix. July 17 – 24, 2004
I traveled to Brookhaven National Laboratory NY to participate in a test measurements of a *photon polarimeter for high-energy γ -rays* using the tagged photon beam at the LEGS facility.
- xx. March 12 – 16, 2003
Traveled to Washington DC to meet with collaborators from the George Washington University to discuss research plans.

UNIVERSITY SERVICE

Service to the Department

1. Elected Chair the Physics Department 2014 – 2018

- i. Represented the department in both individual and Administrative Council meetings with College of Engineering Dean
- ii. Chaired department meetings and retreats each semester; created and distributed agenda for these meetings
- iii. Created teaching roster and assigned faculty to these course for the Fall and Spring semesters based on department needs for major, graduate and service course offerings.
- iv. Identified instructors for the physics courses offered by University Extension, Pathways/College Now and Navitas
- v. Appointed faculty members as chair of the department committees and charged these committees with appropriate tasks
- vi. Reviewed and approved department expenditures from major fee and research indirect accounts
- vii. Reviewed and approved payroll for department staff, undergraduate student graders and work-study students
- viii. Reviewed and approved faculty and student travel authorizations
- ix. Reviewed and approved internal routing forms for grant applications
- x. Distributed information from the Dean and Provost’s Office to faculty, staff and graduate TAs as appropriate
- xi. Professional Development
 - (a) Attended the *APS/AAPT PhysTEC Workshop* in Atlanta, GA February 16 – 18, 2017
 - (b) Attended the *APS/AAPT Physics Department Chairs Conference* in College Park, MD June 2 – 3, 2016.
 - (c) Attended the *APS/AAPT Physics Department Chairs Conference* in College Park, MD June 5 – 7, 2015.
 - (d) Attended the *2015 APS/AAPT PhysTEC Workshop* and “*Building a Thriving Undergraduate Physics Program*” Workshop in Seattle, WA February 5 – 9, 2015
- xii. Reviewed Personnel Actions

For each of these items I would review the evaluation from the department’s Faculty Evaluation Committee, write a Chair’s evaluation and submit this with the complete package to the next level of the evaluation process. For promotion actions I would also solicited external reviewers to comment on the applicant’s scholarship.

 - (a) Annual: Wrote Chair’s evaluation letter for all faculty members and Professional Staff members and submitted to the Dean’s Office and the Faculty Federation.
 - (b) Annual: Completed evaluation of department clerical assistant and submitted to the Dean’s Office and Human Resources Office.
 - (c) 2017: Periodic Multi-Year Review (PMYR) package from Dr. Jianyi (Jay) Wang
 - (d) 2016: application for sabbatical leave from Dr. Robert Fisher

- (e) 2016: Periodic Multi-Year Review (PMYR) package from Dr. Alan Hirshfeld
- (f) 2015: application for promotion to Professor from Dr. Gaurav Khanna
- xiii. Served as chair of Search & Screen committee for Clerk IV position in Physics Department, December 2015
 - (a) Reviewed 90+ applications
 - (b) Conducted telephone interview with 23 candidates
 - (c) Conducted in-person interviews with 9 candidates
 - (d) Provided strength and weaknesses summary to Dean Peck
- xiv. Reviewed the physics major curriculum
 - (a) 2017: Prepared and submitted new course proposal forms for three new courses. All course proposals were approved by the Dean’s Office and Provost’s Office for listing in the catalog beginning in the Fall 2017 semester.
 - A. new graduate course – PHY 565 *Black Holes, General Relativity & Gravitational Waves* with Prof. G. Khanna
 - B. two new undergraduate courses – PHY 210 & PHY 410 *Special Topics in Physics*
 - (b) 2016: Worked with Department faculty members to develop plans for a major in astronomy & astrophysics to expand the existing astrophysics option in the physics major
 - A. Reviewed curriculum for astronomy & astrophysics majors at several other universities
 - B. Identified number of, and outlined content for, the new courses that would be required to create a unique astrophysics major at the University of Massachusetts Dartmouth
 - C. Determined what instructional resources would be required to staff such a program
 - (c) 2016: Worked with faculty members from the Mathematics Department to define a dual-major in physics and applied mathematics
 - A. Identified courses in each program that could satisfy the learning outcomes for both majors
 - B. Developed the curriculum flowchart for this dual-major program of study
 - (d) Annual: Updated the curriculum flowcharts based on curriculum committee recommendations for the following degree tracks offered by the physics department
 - A. Physics major (traditional)
 - B. Physics major with Astrophysics option
 - C. Physics major with Mathematics minor
 - D. Physics BS-MAT 4+1 program for prospective physics teachers
- 2. 2013: Coordinated and submitted the Physics Department’s response to the Department Challenge Goals document issued by the Provost’s Office in March 2013.
 - i. Authored section on *Curriculum Redesign*, including data on success rates in introductory physics courses, detailed course redesign undertaken to provide curriculum flexibility, increase student retention and improve student success in post-graduate careers.
- 3. 2012: Worked with Dean’s Office to redesign the delivery of the physics courses (PHY 111 & PHY 112) in the College of Engineering *Impulse* program. This redesign resolved a structural deficit in the department’s instructional resources while also resulting in on-going annual savings of at least \$27,000.

4. Member of the Department undergraduate curriculum committee 2003 – 2014

Served as Chair of this committee 2004 – 2010 & Spring 2013

- i. Created physics department course roster and teaching assignments for each semester in academic years 2007 – 2011 and 2013.
- ii. Each year, discussed the schedule for sophomore and upper-division physics courses to meet major graduation requirements and student interests.
- iii. 2014: Worked with Chair of the STEM Education Department to create a new BS-MAT 4+1 program to enable those students interested in a K-12 teaching career to obtain both a BS in Physics and a MA in Teaching in just 5 years.
 - (a) Developed the curriculum flowchart for the Physics BS-MAT 4+1 program
- iv. 2013: Prepared application to General Education Committee to have the physics major course PHY 115 *Introduction to Classical Physics* approved for University Studies Cluster 2.B. *Science in the Engaged Community*. This included developing several new assignments to meet the requirements for student outcomes.
- v. 2013: Prepared application to General Education Committee to have the physics major course PHY 225 *Introduction to Experimental Physics* approved for University Studies Cluster 1.C. *Intermediate Writing Requirement*. This included reworking the assessment and student feedback components to meet the requirements for student outcomes.
- vi. 2012: Created curriculum flowcharts reflecting changes to the physics curriculum:
 - (a) Updated the flowchart for the Physics major.
 - (b) Developed the flowchart for the Physics major with Astrophysics option.
 - (c) Developed the flowchart for the Physics major with Mathematics minor.
- vii. 2012: Involved in discussions regarding rearrangement of the physics major curriculum in the freshman and sophomore years.
- viii. 2011: Involved in discussions regarding a new course for the physics major curriculum, PHY 334 *Advanced Mathematical Physics*.
- ix. 2011: Involved in review of the University General Catalog entries for all physics courses checking co- and pre-requisite requirements and course descriptions.
- x. 2011: Involved in discussions to propose a departmental *Environmental Physics* program initiative.
- xi. 2010: Completed reorganization of the physics undergraduate curriculum to better match the needs and interests of faculty and students.
 - (a) Changed the sequence for physics courses and for required courses from outside the physics department.
 - (b) Updated the flowchart for the Physics major to reflect these changes.
- xii. 2009: Organized two-year rotation of sophomore and upper-division physics elective courses to maximize elective options for majors while ensuring graduation requirements were met.
- xiii. 2009: Initiated and coordinated development of cross-listing between graduate and senior physics courses as a way to increase the enrollment in these courses, while also making advanced course electives available to undergraduate physics majors.

- xiv. 2009: Worked with department faculty and honors program director to develop new honors courses from existing Physics courses, ensuring that at least one Honors course is available every semester.
 - xv. 2009: Coordinated discussions regarding the development of a new track in astrophysics.
 - xvi. 2008: Coordinated discussions regarding the use of particular courses to satisfy physics major requirements. physics major
 - xvii. 2007: Codified policy regarding lab repeat for the introductory physics courses.
 - xviii. 2007: Codified policy regarding the use of non-physics courses towards the requirements for the physics major and physics minor
 - xix. 2007: Coordinated discussion to prioritize purchases for upgrades to the undergraduate physics laboratories
 - xx. 2006: Redesigned the physics curriculum to offer advanced laboratory experience to seniors.
 - xxi. 2006: Reorganized the sophomore and junior astronomy and astrophysics course sequence.
 - xxii. 2004: Prepared department plan for physics laboratory courses which:
 - (a) outlined the pedagogical requirements for undergraduate laboratory in the physics major
 - (b) described the existing laboratory experience
 - (c) suggested upgrades to existing laboratory courses
 - (d) proposed senior-level laboratory course
 - xxiii. 2004: Prepared *Outcomes Assessment for the Physics Undergraduate Program*.
 - xxiv. 2004: Reviewed and recommended new engineering courses; EGR 101 & PHY 102
 - xxv. 2004: Reviewed course description and curriculum for courses proposals; PHY 120 & PHY 121.
5. Served on search and screen committees for faculty hires in 2007 (tenure track position)
 - i. Reviewed applications.
 - ii. Involved with discussions regarding selection of candidates for telephone and on-campus interviews
 - iii. Participated in telephone and on-campus interviews
 - iv. Contributed to strengths and weaknesses summary presented to the Dean
 6. Member of the Physics Department finance committee 2007 – 2014
 - i. Reviewed and voted on department spending requests
 7. Member of the Department graduate committee 2005 – 2014
 - i. Reviewed and voted on graduate student applications
 - ii. Participated in discussions and decisions regarding allocation of graduate teaching assistantships and department-funded research assistantships
 8. Member of the seminar committee 2003 – 2005
Served as Chair of this committee 2003
 - i. arranged and scheduled seminar speaker presentations
 9. Member of the Physics Department computer committee 2009 – 2014

Service to the College

1. 2016 & 2017: Participated in MassTransfer Pathways Meetings
 - i. 2017: Meeting involving representatives from nearly all of the departments at the 2-year and 4-year state colleges & universities in Massachusetts that offer pre-requisite courses for engineering programs in Fitchburg State University, MA March 24, 2017.
 - (a) identified and discussed core course components necessary for students at 2-year colleges to transfer into engineering majors at the University of Massachusetts campuses.
 - (b) reviewed the 2-year college course description and syllabi to assess whether they address these core course components
 - (c) created a listing of courses at each 2-year college that are acceptable for transfer credits as pre-requisite courses for engineering programs at the University of Massachusetts campuses.
 - ii. 2016: Meeting involving representatives from physics departments at nearly all of the 2-year and 4-year state colleges & universities in Massachusetts in Marlborough, MA November 18, 2016
 - (a) discussed minimal curriculum content for the introductory physics lecture and laboratory courses
 - (b) reviewed the description and syllabus for courses at each institution to see if it was consistent with this minimal curriculum content
 - (c) created a listing of course equivalences for the introductory physics courses to be used by the MassTransfer program and college articulation agreements.
2. 2016: Collected syllabi for the introductory physics courses and provided these to the Dean’s Office for the self-study report required for the ABET accreditation process
3. 2014: Attended two workshops with the EAB Student Success Collaborative to identify which courses in the Physics major are predictive of student success in completing the major.
4. 2012: Attended a STEM Student Recruitment and Retention meeting at Bridgewater State University to discuss pathways for science and engineering transfer students from Massachusetts community colleges to UMass Dartmouth.
5. Served as the Physics department representative on the College of Engineering Curriculum Committee, 2006 – 2012
 - i. 2010: discussed a new Ph.D. program, *Engineering & Applied Science*.
 - ii. 2010: voted to approve the creation of a concentration in Astronomy/Astrophysics in the Physics department.
 - iii. 2009: reviewed and voted on new course, EGR 303 *Engineering Economics*
 - iv. 2006: reviewed and made recommendations regarding proposed *Masters of Science in Engineering Management* to be offered jointly by the College of Engineering and the Charlton College of Business.
6. 2003 – present: Participated in College of Engineering Open House and Discover UMassD Day events.
 - i. 2015 – present: Staffed the information table at these events for prospective and admitted students interested in the physics program

- ii. Attended the physics department presentation for students and families and answered questions about the physics program
 - iii. 2016: Wrote a promotional letter describing the physics program and sent this to all the students admitted into the physics program
7. 2005 – 2006: Participated in the College of Engineering *Freshman Summer Institute*.

Service to the University

1. Service to the Faculty Senate

- i. 2017: Elected as Engineering Academic Council representation to the Faculty Senate steering committee. Faculty Senate
- ii. 2005 – present: Continue to serve as elected member-at-large to the Faculty Senate
 - (a) Attended meetings of the Senate throughout the academic year
- iii. 2010 – 2015: Elected at the President of the Faculty Senate
 - (a) Organized and chaired monthly Faculty Senate meetings throughout each academic year.
 - (b) Scheduled and chaired special meetings of the Faculty Senate to deal with unanticipated events of interest to the faculty membership.
 - (c) Organized and chaired monthly meetings of the Faculty Senate steering committee with the Provost and members of the Provosts’ Office.
 - (d) Prepared and distributed the agenda for each meeting of the Faculty Senate and the Senate steering committee.
 - (e) Coordinated presentations on topics being considered by the Faculty Senate.
 - (f) Forwarded adopted motions to the Provost and Chancellor.
 - (g) 2012 – 2014: Coordinated the development of a new Faculty Senate Constitution
 - 2014: Prepared and distributed the ballot papers for the Senate Constitution ratification vote. Tallied, with the Senate Secretary, the returned ballots.
 - 2014: prepared this final version for review and consideration for ratification by the University of Massachusetts faculty
 - 2013: charged a working group with a mandate to create a final version of a new Constitution
 - 2012 – 2013: distributed several draft versions of a new Constitution that incorporated the comments and suggestions from previous reviews for consideration by the Senate and all faculty members
 - 2012 – 2013: scheduled discussion regarding the content of a new Constitution at several regular Senate meetings
 - 2012: Created draft of new Senate Constitution document in response to recommendations of NEASC review.
 - (h) 2014: created draft document describing a new Grade Appeal Policy and Procedures for consideration by the ad-hoc Committee to review Grade Appeal Process
 - 2015: Served as point of contact for student grade appeals. Forwarded these to appropriate Grade Appeal Facilitator

- (i) Served as Faculty Senate representative on the following committees, task forces, and groups.
 - A. Invited to participate in the Chancellor’s Senior Leadership group as the Faculty representative, 2013 – present
 - Attended bi-weekly meetings and summer retreats of the Chancellor’s Expanded Cabinet or Senior Leadership
 - Attended Strategic Planning meetings (2014).
 - B. Capital Logistics Committee (2013).
This group elicits and coordinated stakeholder input regarding the University’s construction and maintenance priorities as as part of the campus Master Planning process.
 - C. International Programs Advisory Committee (IPAC) (2010 – 2011).
This committee held meetings throughout the academic year to better engage UMass Dartmouth in international activities including; study abroad programs, exchange programs, and international research. Best practices were identified and a mission statement for international programs was developed for inclusion with the University’s strategic planning process.
 - D. UMass Dartmouth Planning Task Force (2010 – 2011).
This group held meetings throughout the academic year as a prelude to the University’s strategic planning process. The goal was to develop a vision for UMass Dartmouth in the 21st century and identify strength and weaknesses in areas such as student access, campus culture and the student experience at UMass, connecting the University with the community and creating an engaged institution.
 - E. IT Planning Council (2010 – 2012).
This group held meetings throughout each academic year to develop a 5-year plan for information technology as a part of the University’s strategic planning process.
 - F. University Foundation (2010 – 2011).
Attended meetings of this group which works to develop relationships with alumni, local philanthropists, and another fund-raising activities.
 - G. Attended multiple meetings to address the response to the 2010 NEASC review of the University.
 - H. Attended meetings of the ad-hoc Retention Committee.

2. Service to the Faculty Federation

- i. 2017: Elected to a one-year term as Vice-President of the Faculty Federation
- ii. 2010 – 2017: Elected to a one-year term as member-at-large to the Faculty Federation Executive Board
 - (a) Attended monthly meetings of the executive board during the academic year
 - (b) Discussed issues and topics impacting the faculty, librarians and professional technicians at the University.
 - (c) Voted on expenditures by the Faculty Federation.
- iii. 2016: Appointed as a member of the Faculty Federation Personnel Committee
 - (a) created updated job description for the Executive Director position

- (b) discussed and set compensation, salary and benefits, vacation and medical/personal time policies for the Executive Director position.
- 3. 2016: Served, with Professors Richard Price, Gaurav Khanna (Physics) and Sigal Gottlieb (Mathematics) on the organizing committee that brought Professor Kip Thorne from California Institute of Technology to the University of Massachusetts Dartmouth, March 29, 2016
 - i. created a program of public presentations around the movie *Interstellar* and highlighting the recent detection of gravitational waves
 - ii. worked with faculty members from physics department and SMAST to produce accessible presentations describing aspects of the science in the movie. Reviewed the speaker’s presentations for content, timing and delivery, and recommended improvements
 - iii. invited faculty from Departments of Philosophy and Art History to participate in a panel discussion about the movie
 - iv. sent an individual email invitation to this event to each student who had been accepted into the physics program
 - v. coordinated with University staff on logistical matters such as
 - (a) Obtained rights to show the movie *Interstellar* on campus
 - (b) Reserved spaces for the event
 - (c) Arranged the showing of the movie
 - (d) Made travel arrangements for Professor Thorne
 - (e) Created promotional collateral and social media entries to advertise the event
 - vi. Organized lunch for Professor Thorne to meet with students from the physics and mathematics departments and the event speakers
 - vii. Served as the MC for the panel discussion
- 4. 2014: Appointed to the University of Massachusetts President Search Committee, December 2014
 - i. Attended five meetings of the Search & Screen Committee in Boston
 - ii. Reviewed over 20 applications for the position
 - iii. Participates in interviews with several finalists
 - iv. Voted on each candidate to determine the short-list to be reviewed by the full Board of Trustees
- 5. 2009 – present: Member of the organizing committee for the *Annual Sigma Xi Research Exhibition* at the University of Massachusetts Dartmouth
 - i. 2009 – present: Coordinated set-up of the Sigma Xi registration and abstract submission website with CITS staff
 - ii. 2009 – present: Collated and edited poster abstracts submitted to the registration website to produce the Exhibition abstract booklet.
 - iii. 2014: Wrote a computer script to automate the process of preparing the Exhibition abstract booklet.
 - iv. 2009 – present: Assisted with set-up and/or tear-down of the exhibition.
 - v. 2009: Arranged invited speaker, Mr. Mark Smith from the New Bedford Ocean Explorium.

6. Contributions to the Office of Faculty Development

- i. 2011: served as Faculty Fellow with the Office of Faculty Development in Spring
 - (a) Made two presentations to the Office of Faculty Development’s *New Faculty Institute* on the use of technology in the classroom as a way to engage students in the learning process. The first of these was on the use of student response systems (“*clickers*”) in the introductory courses. The second was on the use of online homework systems.
 - (b) Organized and held a workshop involving senior faculty from various departments and colleges promoting the use of online homework systems
 - (c) Engaged with faculty from various departments regarding the use of personal response systems in the classroom.
 - (d) March 2011: Gave a presentation to the Office of Faculty Development’s *New Faculty Institute* on the use of student response systems (“*clickers*”) in introductory courses as a way to engage students in the learning process.
- ii. February 2009: Gave a presentation on my use of student response systems (“*clickers*”) in the introductory physics courses to the *New Faculty Institute*.

7. 2005 – 2012: Served as a Dartmouth campus faculty representative on the UMass system IT Council’s Subcommittee on Academic Technology (SAT)

This group is charged with *facilitating the development and implementation of a vision for effective utilization of technology in teaching, learning and scholarship at the University of Massachusetts*.

- i. 2005 – 2012: Attended and actively participated in regular SAT meetings held at the UMass Shrewsbury facility
 - ii. 2010: Meet with Dartmouth campus faculty who have been recipients of an AT grant to present this questionnaire.
 - iii. 2009 – 2010: Member of subcommittee assessing the UMass Academic Technology Grant program to determine the effectiveness of this funding program. Developed questionnaire to establish what was learned as a result of the funded project, how the project has influenced teaching of the recipient, and if other instructors have modified their teaching because of results from the project. Also elicited feedback regarding the AT Grant application process and post-awards administration.
 - iv. 2006: Co-chaired working group to study *Faculty Engagement in the Scholarship of Teaching and Learning*.
 - v. 2004 – 2006: Served on review panel for proposals submitted to the *Professional Development Grants and Strategic Initiative Grants* awarded by the University of Massachusetts President’s Office.
- ## 8. 2003: Served on the *Classroom Advisory Committee*. This committee was charged to transform the UMass Dartmouth classrooms into comfortable, easy-to-use, flexible, technology-enabled learning spaces, and to evolve and support these spaces over time
- ## 9. 2011: Faculty advisor for a *Society of Physics Students* tour of the research reactor and electrostatic particle accelerator at UMass Lowell.

PUBLIC SERVICE

Participation in Community Affairs

1. 2017: Joined the steering committee for the New Bedford chapter of Science Café. These events are free and open to the public, in an effort to attract a wide audience interested in scientific discussion in a relaxed setting.
 - i. Participated in steering committee meeting to plan next years events, March 9, 2018.
 - ii. Moderated Science Café talk by UMass Dartmouth Professor Emeritus Dr. James Griffith on the topic of *Synthetic Biology; Miracle or Monster?*, January 9, 2018.
 - iii. Gave a presentation on the topic of *Particle Colliders, the Cathedrals of Our Modern Age: Higgs Boson & Hints of a Mysterious New Particle* at Science Café, September 19, 2017.
2. Wrote four opinion pieces for the American Federation of Teachers newsletter *The Advocate*.
 - i. *Trigger Warnings*, published March 2017.
 - ii. *Unbundeling the College Degree*, published January 2017.
 - iii. *Competency-Based Education*, published November 2017.
 - iv. *Preparing Students for Jobs that Dont Exist*, published September 2017.

PROFESSIONAL MEMBERSHIPS

Professional Societies

American Physical Society, member since 1994.

American Association of Physics Teachers, member since 2012.

John D. Silva
141 Middleboro Road
East Freetown, Mass.
02717
Tel. 763-5716 (H) / 508-789-9507 (C)

Educational Experiences

Cod Community College completion of undergraduate	1964-1967
Fitchburg State College	1968-1970
Southeastern Massachusetts University 36 additional credit hours	1970-1972
Bridgewater State University completion of graduate studies in Earth Sciences	1985
Bridgewater State College additional educational credits	1985

Professional Experiences

St. Francis Elementary School	1972-1976	Instructor of Earth Sciences
Old Rochester Regional High	1976-1977	Instructor of Sciences

Southeastern Massachusetts University - University of Massachusetts at Dartmouth 1977- present

Instructor of
Evening and Day Division courses;

Planet Earth I and II
Science, Technology and Society I and II
Introduction to Astronomy
Introduction to the Weather
Introduction to Physics
Start / 120 – 121 Physics
Graduate education courses in earth science education
Graduate education courses in physical science education

Bristol Community College 1978- 2001
Instructor of Evening and Day Division courses;

Introduction to Astronomy
Introduction to Astronomy Lab
Physical Geology
Physical Geology Lab
Basic Physics
Director of Planetarium and Planetarium programs

Additional Area Past Professional Experiences

Member of New Bedford Astronomical Society;
Developed and attained copyrights for educational games;
Developed Astronomy related programs for Kaput Science Center;
Developed Planetarium programs for elementary teachers in New Bedford Public School System 1994 - 1996;
Developed 6 week instructional program for elementary teachers at Hayden-McFadden School in "hands-on" approach to teaching sciences;
Directed first Science Fair at Hayden-McFadden School 1992;
Coordinated organization of Science Fairs for Diocese of Fall River School System;
Developed 2 week Earth Science Instructional Programs at St.Mary's School in New Bedford;
Directed 4 week program at Potter School in North Dartmouth for Elementary Sciences;
Directed 4 week instructional program at Oxford School in Fairhaven;
Lectured at Old Rochester Regional High School for system-wide professional day meetings;

Past / Recent Educational Related Activities at UMass - Dartmouth

Developed all of the initial Physics department online course offerings.
Courses included the following:

Introduction to Astronomy
Planet Earth I
Planet Earth II
Introduction to the Weather

Advised Massachusetts DPW on origin of granitic rock in construction area of the Fall River region;

Revised the PHY 182 Introduction to the Weather course for use in the Honors program.

Making editor requested changes to textbooks used in PHY 151
Introduction to Astronomy;

Summer Engineering Camp instructor at UMass-Dartmouth

Summer Science Camp instructor at UMass-Dartmouth

Other Educational Experiences

Director of the Edaville Railroad Museum and Museum Programs;
Educational groups tour guide at Edaville;

Curriculum Vitae

NAME and AFFILIATION

Jay Wang

Department of Physics, College of Engineering, UMass Dartmouth

ADDRESS

Physics, UMass Dartmouth

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North Dartmouth, MA 02747, USA

Telephone: (508) 999-9136, (508) 999-8354 Fax: (508) 999-9115

E-mail: jwang@umassd.edu Web: <http://www.faculty.umassd.edu/j.wang/>

EDUCATION

Ph.D. Theoretical Atomic Physics, 1992, University of Tennessee, Knoxville.

B.Sc. Physics, 1983, Lanzhou University, P.R. China.

TEACHING and RESEARCH INTERESTS

Theory of electronic, atomic, and optical processes

Computational modeling, visualization, and interactive learning

Theory of ion-solids and ion-surface interactions

TEACHING and RESEARCH EXPERIENCE

Aug/03 - Present : Associate Professor, University of Massachusetts Dartmouth

Sep/10 - Jan/11 : Interim Graduate Program Director, University of Massachusetts Dartmouth

Sep/08 - Sep/09 : Graduate Program Director, University of Massachusetts Dartmouth

Jul/05 - Nov/05 : Visiting Professor, Vienna University of Technology, Austria

Sep/99 - Sep/05 : Graduate Program Director, University of Massachusetts Dartmouth

Aug/98 - Jul/03 : Assistant Professor, University of Massachusetts Dartmouth

Mar/94 - Jul/98 : Visiting Assistant Professor, Tulane University

Jan/92 - Feb/94: Postdoctoral Fellow and Physics Instructor, University of Missouri-Rolla

PUBLICATIONS and INVITED TALKS

One textbook, digital online companion, and a solutions manual (January 2016, Wiley)

Sixty (**60**) refereed articles; Fifty-two (**52**) contributed papers and abstracts to international and national conferences (lists attached).

Over one hundred (**120**) open-access, actively updated simulation programs and videos.

Twenty-three (**24**) invited talks and presentations (list attached).

AWARDS/HONORS

Distinguished Referee, European Journal of Physics, 2014
Certificates of Appreciation for Math.Sci.Tech. Assessment, UMD, 2001, 2002
Cottrell College Science Award recipient, 1999
Teaching Award: Tulane Teaching Excellence Awards Nominee, 1997
Invited contributor, *Encyclopedia of Physics*, Macmillan, 1996

PROFESSIONAL ASSOCIATION

American Physical Society
Division of Atomic, Molecular, and Optical Physics
South Eastern Massachusetts Association of Science Supervisors

TEACHING and ADVISING (Since 2010)

In the last seven years since 2010, I have taught courses at every level from large 100-level introductory classes to 600-level graduate courses, delivering **2,788** undergraduate student-credit-hours and **342** graduate student-credit-hours. The average was about 240 SCHs delivered per semester. I have been the academic advisor to 37 undergraduate students-academic-years (SAYs) and 32 graduate SAYs. I have also advised 5 undergraduate student-semester and 49 graduate student-semesters in research.

The courses taught are as follows.

- 2017 Spring:
 - PHY 114 – Classical physics II, 84 students, 4 credits
 - PHY 341 – Quantum mechanics I, 9 students, 3 credits
 - PHY 480 – Undergraduate research, 1 student
 - PHY 690 – Graduate thesis, 2 students
- 2016 Fall:
 - PHY 113 – Classical physics I, 101 students, 4 credits
 - PHY 396 – Directed study, 1 student, 3 credits
 - PHY 421 – Advanced Lab, 6 students, 3 credits (cohort taught)
 - PHY 441/543 – Statistical thermodynamics (cross-listed undergrad/grad class), 4 undergraduate and 13 graduate students, 3 credits
 - PHY 685 – Graduate research, 2 students
- 2016 Spring:
 - PHY 114 – Classical physics II, 126 students, 4 credits
 - PHY 342 – Quantum mechanics II, 7 students, 3 credits
 - PHY 480 – Undergraduate research, 1 student
 - PHY 490 – Undergraduate thesis, 1 student
 - PHY 690 – Graduate thesis, 1 student

- 2015 Fall:
 - PHY 341 – Quantum mechanics I, 8 students, 3 credits
 - PHY 421 – Advanced Lab, 5 students, 3 credits (cohort taught)
 - PHY 480 – Undergraduate research, 1 student, 3 credits
 - PHY 510-01 – Applied theoretical methods in physics, 13 students, 3 credits
 - PHY 685 – Graduate research, 2 students
- 2015 Spring:
 - PHY 114 – Classical physics II, 120 students, 4 credits
 - PHY 342 – Quantum mechanics II, 6 students, 3 credits
 - PHY 685 – Graduate research, 4 students
- 2014 Fall:
 - PHY 341 – Quantum mechanics I, 8 students, 3 credits
 - PHY 441/543 – Statistical thermodynamics (cross-listed undergrad/grad class), 9 undergraduate and 10 graduate students, 3 credits
 - PHY 685/690 – Graduate research, 5 students (3/2)
- 2014 Spring:
 - PHY 114 – Classical physics II, 120 students, 4 credits
 - PHY 510-02 – Applied theoretical methods of physics, 11 students, 3 credits
 - PHY 680/685/690 – Graduate research, 6 students (2/3/1)
- 2013 Fall:
 - PHY 341 – Quantum mechanics I, 11 students, 3 credits
 - PHY 510-01 – Atomic physics, 12 students, 3 credits
 - PHY 685/690 – Graduate research, 6 students (5/1)
- 2013 Spring:
 - PHY 213 – Applied modern physics, 13 students, 3 credits
 - PHY 441/543 – Statistical thermodynamics (cross-listed undergrad/grad class), 13 undergraduate and 8 graduate students, 3 credits
 - PHY 680/685/690 – Graduate research, 4 students (1/1/2)
- 2012 Fall (Sabbatical leave):
 - PHY 596 – Independent study (Math methods), 1 student, 3 credits
 - PHY 685/690 – Graduate research, 2 students (1/1)
- 2012 Spring:
 - PHY 342 – Quantum mechanics II, 10 students, 3 credits
 - PHY 521 – Computational physics, 14 students, 3 credits
 - PHY 480 – Undergraduate research, 1 student
 - PHY 685/690 – Graduate research, 4 students (2/2)

- 2011 Fall:
 - PHY 341 – Quantum mechanics I, 12 students, 3 credits
 - PHY 621 – Advanced mathematical methods of physics, 11 students, 3 credits
 - PHY 685/690 – Graduate research, 4 students (2/2)
- 2011 Spring:
 - PHY 111 – Impulse physics I (plus recitation), 45 students, 4 credits
 - PHY 510-01 – Atomic physics, 13 students, 3 credits
 - PHY 685/690 – Graduate research, 4 students (3/1)
- 2010 Fall:
 - PHY 313 – Mechanics, 6 students, 3 credits
 - PHY 441/543 – Statistical thermodynamics (cross-listed undergrad/grad class), 15 undergraduate and 8 graduate students, 3 credits
 - PHY 685/690 – Graduate research, 4 students (3/1)

PUBLICATIONS

TEXTBOOK

4. *Computational modeling and visualization of physical systems with Python*, J Wang, (Wiley, New York, Twelve Chapters, 492 pages), January 2016.
<http://www.wiley.com/WileyCDA/WileyTitle/productCd-1119179181.html>
<http://www.wileystudentchoice.com/>
<http://www.faculty.umassd.edu/j.wang/>
3. *Computational modeling and visualization of physical systems with Python*, **Digital Online Companion**, J Wang, (291 pages), October 2015. Openly available at <http://www.faculty.umassd.edu/j.wang/> and at Wiley Instructor Companion Site <http://bcs.wiley.com/he-bcs/Books?action=index&itemId=1119179181&bcsId=10152>
2. *Computational modeling and visualization of physical systems with Python*, **Solutions Manual**, J Wang, (50 pages), October 2015. Available at Wiley Instructor Companion Site <http://bcs.wiley.com/he-bcs/Books?action=index&itemId=1119179181&bcsId=10152>
1. *Computational modeling and visualization of physical systems with Python*, **Source Codes and Simulation Data**, J Wang, October 2015. Available at Wiley Instructor Companion Site <http://bcs.wiley.com/he-bcs/Books?action=index&itemId=1119179181&bcsId=10152>

OPEN ACCESS PUBLICATIONS

2. “Open-source computer simulation programs (Over **120** codes actively maintained, 2014–present)”.
J Wang, <https://github.com/com-py/compy>; <http://www.faculty.umassd.edu/j.wang/>
1. “Simulation movies and image gallery (2010–present)”.
J Wang, <http://www.faculty.umassd.edu/j.wang/>; <http://vpython.org/> (featured)

MAGAZINE ARTICLE

1. “The PhysTEC project at University of Massachusetts Dartmouth”.
J Wang, S Witzig, G O’Rielly, and A Hirshfeld, *APS Physics: Forum on Education*, 16–18 (Fall 2015).

PEER-REVIEWED PUBLICATIONS

2. “Interactive modeling of exoplanets” (PICUP computational exercise set).
J Wang, *Partnership for Integrating Computation into Undergraduate Physics*, accepted.
1. “Boltzmann distribution: the statistical way” (PICUP computational exercise set).
J Wang, *Partnership for Integrating Computation into Undergraduate Physics*, submitted.

REFEREED ARTICLES

60. “Comparative analysis of capacitance and electrostatics by meshfree and mesh-based methods”. N J Moniz, J Wang, and Y Hao, *Journal of Computational Physics*, submitted.
59. “Meshfree computation of electrostatics and related boundary value problems”.
J Wang and Y Hao, *American Journal of Physics* **85**, 542–549 (2017).
58. “Comparison of meshfree and mesh-based methods for boundary value problems in physics”. P Niraula, Y Han, and J Wang, *Journal of Physics: Conference Series* **640**, 26th IUPAP Conference on Computational Physics, 012067:1–6 (2015).
57. “Simulation and visualization of few-body systems and differential precession of Mercury”. B Marmaras and J Wang, *Computing in Science and Engineering* **76**, 42–50 (2014).
56. “Analytic approximations of projectile motion with quadratic air resistance”.
W H Warburton, J Wang, and J Burgdörfer, *Journal of Service Science and Management* **3**, 98 (2010).

55. “Angular and energy differential electron emission cross sections in collisions between antiprotons and helium atoms”. K Tökési, J Wang, L Gulyas, and J Burgdörfer, *Hyperfine Interactions* **194**, 45 (2009).
54. “Simulation of quantum systems with the coupled channel method”. J Wang and J D Champagne, *American Journal of Physics* **76**, 493 (2008).
53. “Angular distribution in two-photon double ionization of helium by intense attosecond soft-x-ray pulses”.
I F Barna, J Wang, and J Burgdörfer, *Physical Review A* **73**, 023402 (2006).
52. “Analysis of asymptotic projectile motion with air resistance using the Lambert W function”.
W H Warburton and J Wang, *American Journal of Physics* **72**, 1404 (2004).
51. “High resolution Compton imaging of nanostructures”.
J Wang and Y Kim, Technical Proceedings of NanoTech 2003 Conference, San Francisco, Vol. 3, 369 (2003).
50. “Ionization-excitation of H^- and He by Compton scattering”.
S Itza-Ortiz, A L Godunov, J Wang, and J H McGuire, *Journal of Physics B* **34**, 3477 (2001).
49. “Multipole relationship between collisional cross sections by photons and by charged particles”.
J Wang, *Atoms and Molecules in a New Light*, Proceedings of the Pan American Advanced Studies Institute, Angra dos Reis, Brazil, 2000, ed. C Cisneros, E Montenegro, F Schlachter, and H Bryant, p. 130.
48. “Exclusive and inclusive cross sections for Compton scattering from H^- and He”.
J H McGuire, S Itza-Ortiz, A L Godunov, D L Ederer, J Wang, and J Burgdörfer, *Physical Review A* **62**, 012702 (2000).
47. “Cross-section ratio of double to single ionization of helium by Compton scattering of 40-100-keV x rays”.
L Spielberger, H Bräuning, A Muthig, J Z Tang, J Wang, Y Qiu, R Dörner, O Jagutzki, Th Tschentscher, V Honkimäki, V Mergel, M Achler, Th Weber, Kh Khayyat, J Burgdörfer, J McGuire, and H Schmidt-Böcking, *Physical Review A* **59**, 371 (1999).
46. “Ionization of aligned Rydberg atoms by ion impact”.
K R Cornelius, J Wang and R E Olson, *Journal of Physics B* **31**, 4367 (1998).
45. “Elastic and inelastic scattering of 4d inner shell electrons in $(Y,Gd)_2O_3$ studied by synchrotron radiation excitation”.
A Moewes, T Eskildsen, D L Ederer, J Wang, J H McGuire and T A Callcott, *Physical Review B* **57**, R8059 (1998).

44. “Double photoionization of helium from threshold to high energies”.
Y Qiu, J Z Tang, J Burgdörfer and J Wang, *Physical Review A* **57**, R1489 (1998).
43. “One- and two-electron emission from H^- by high energy photons”.
Y Qiu, J Z Tang, J Burgdörfer and J Wang, *Journal of Physics B* **30**, L689 (1997).
42. “Double ionization of helium by photons and charged particles”.
J Burgdörfer, Y Qiu, J Wang, and J H McGuire, *The Physics of X-Ray and Inner-Shell Processes*, XVII International Conference, Hamburg, Germany, 1997, ed. R L Johnson, B F Sonntag and H Schmidt-Böcking, AIP Conference Proceedings **389**, p. 475.
41. “Pseudostate calculation of excitation-ionization of helium by protons and antiprotons”.
J Straton, J Wang, J H McGuire and L Nagy, *Canadian Journal of Physics* **74**, 554 (1996).
40. “Relating data for charged particle scattering, photoannihilation and Compton scattering”.
J H McGuire, J Wang and J Burgdörfer, *Physical Review A* **54**, 3668 (1996).
39. “Differential double ionization of helium by Compton photons and charged particles at large energy transfers”.
J Wang, J H McGuire, J Burgdörfer and Y Qiu, *Physical Review Letters* **77**, 1723 (1996).
38. “Slow convergence to n^4 -scaling of cross sections in electron capture from Rydberg states”.
J Wang, R E Olson, K Cornelius and K T”okési, *Journal of Physics B* **29**, L537 (1996).
37. “Independent center, independent electron approximation for dynamics of molecules and clusters”.
J H McGuire, J Straton, J Wang, Y D Wang, O L Weaver, S E Corchs and R D Rivarola, *Journal of Chemical Physics* **105**, 1846 (1996).
36. “Consistency test of double ionization of helium by photons and charged particles”.
J Wang, J H McGuire, J Burgdörfer and Y Qiu, *Physical Review A* **54**, 613 (1996).
35. “Impact-parameter dependence for collisions of atoms with projectiles carrying electrons”.
J Wang, J H McGuire and E Montenegro, *Physical Review A* **51**, 504 (1995).
34. “Semiclassical theory of elastic electron-atom scattering”.
J Burgdörfer, C O Reinhold, J Sternberg and J Wang, *Physical Review A* **51**, 1248 (1995).

33. “Target dependence of binary encounter electron peak anomalies in collisions of partially stripped heavy ions with molecular hydrogen and noble gases”.
W Wolff, J Wang, H E Wolf, J L Shinpaugh, R E Olson, S Lencinas, R Herrmann, U Bechthold, H Schmidt-Böcking, *Journal of Physics B* **28**, 1265 (1995).
32. “Relationship between the ratios of double to single ionization of helium by photons and charged particles”.
J Wang, J H McGuire and J Burgdörfer, *Physical Review A* **51**, 4687 (1995).
31. “Overview of the theory of highly charged ions”.
J H McGuire and J Wang, *Nuclear Instrument and Methods B* **98**, 104 (1995).
30. “Effects of electron-electron interaction in ionization by structured particle impact”.
K Tökési, J Wang and R E Olson, *Nuclear Instrument and Methods B* **98**, 343 (1995).
29. “Interactions of circular Rydberg atoms with charged particles”.
J Wang, R E Olson and J H McGuire, *Nuclear Instrument and Methods B* **99**, 42 (1995).
28. “Ionization-excitation of helium by fast charged particles”.
L Nagy, J Wang, J Straton and J H McGuire, *Physical Review A* **52**, R902 (1995).
27. “Recent progress on mass transfer in semiclassical systems”.
J Wang, *Modern Physics Letters B* **9**, 1333 (1995).
26. “Gauge Dependence in MBPT Amplitudes”.
J H McGuire, L Nagy, J Wang, K Hino and M Ya Amusia, *Wigner Memorial Volume of Acta Physica Hungarica, Heavy Ion Physics* **1**, 121 (1995).
25. “Atomic scattering from oriented Rydberg atoms”.
J Wang, J H McGuire and R E Olson, *The Physics of Electronic and Atomic Collisions*, XIX International Conference, Whistler, British Columbia, Canada, 1995, ed. L J Dubé, J B A Mitchell, J W McConkey and C E Brion, AIP Conference Proceedings **360**, p. 619.
24. “Projectile ionization at forward observation angles in intermediate energy H + H collisions”.
K Tökési, J Wang and R E Olson, *Nuclear Instrument and Methods B* **86**, 147 (1994).
23. “Dominance of the Thomas mechanism for electron capture from orientated Rydberg atoms”.
J Wang and R E Olson, *Physical Review Letters* **72**, 332 (1994).
22. “Orientation induced scattering asymmetry”.
J Wang and R E Olson, *Journal of Physics B* **27**, 3707 (1994).

21. “Gauge variation of many-body perturbation theory amplitudes for double ionization”.
J H McGuire, L Nagy, J Wang and M Ya Amusia, *Atomic and Molecular Physics*, Proceedings of the Fourth U.S./Mexico Symposium, San Juan del Rio, Mexico, 1994, ed. I Alvarez, C Cisneros and T J Morgan (World Scientific, Singapore), p. 424.
20. “Diffraction effects in the production of binary encounter electrons from collisions of partially stripped ions”.
H E Wolf, W Wolff, J L Shinsaugh, H Schmidt-Böcking, J Wang and R E Olson, *Nuclear Instrument and Methods B* **79**, 64 (1993).
19. “Transition from quantum to quasi-classical behaviour of the binary encounter peak in collisions of 0.6 to 3.6 MeV/u I^{23+} and Xe^{21+} ”.
J L Shinsaugh, W Wolff, H E Wolf, U Ramm, O Jagutzki, H Schmidt-Böcking, J Wang and R E Olson, *Journal of Physics B* **26**, 2869 (1993).
18. “Dependence of binary encounter electron production on the charge state of the recoil ion”.
J Wang, R E Olson, H E Wolf, J Shinsaugh, W Wolff and H Schmidt-Böcking, *Journal of Physics B* **26**, L457 (1993).
17. “Quantal and classical correspondence of double scattering”.
J Wang, R E Olson and K Tökési, *Journal of Physics B* **26**, L613 (1993).
16. “Ellipsoidal angular distributions of electrons emitted from Rydberg atoms”.
G Szabo, J Wang and J Burgdörfer, *Physical Review A* **48**, R3414 (1993).
15. “Ionic charge dependence of the zero degree binary encounter peak for partially stripped heavy ions”.
W Wolff, H E Wolf, J L Shinsaugh, J Wang, R E Olson, P D Fainstein, S Lencinas, U Bechthold, R Herrmann and H Schmidt-Böcking, *Journal of Physics B* **26**, 4169 (1993).
14. “Recent advances and challenges of heavy-particle collision theories”.
R E Olson, J Wang and J Ullrich, *The Physics of Electronic and Atomic Collisions*, XVIII International Conference, Aarhus, Denmark, 1993, ed. T Andersen, B Fastrup, F Folkmann, H Knudsen and N Andersen, AIP Conference Proceedings **295**, p. 520.
13. “Final state distributions for electron capture from orientated Rydberg atoms”.
J Wang and R E Olson, *Journal of Physics B* **26**, L817 (1993).
12. “Correlation and two-center effects in projectile ionization at backward angles”.
J Wang, C O Reinhold and J Burgdörfer, *Physical Review A* **45**, 4507 (1992).

11. “Diffraction effects in binary encounter electron production by highly charged ions”.
W Wolff, J L Shinspaugh, H E Wolf, R E Olson, J Wang, S Lencinas, D Piscevic, R Herrmann and H Schmidt-Böcking, *Journal of Physics B* **25**, 3683 (1992).
10. “Multiple ionization of atoms by energetic highly-charged ions”.
R E Olson and J Wang, *The Physics of Highly-Charged Ions*, VI International Conference, Manhattan, Kansas, 1992, ed. P Richard, M Stöckli, C L Cocke and C D Lin, AIP Conference Proceedings **274**, p. 229.
9. “Ionization by structured particle impact”.
J Wang, R E Olson, K Tökési, J Burgdörfer and C O Reinhold, *The Physics of Highly-Charged Ions*, VI International Conference, Manhattan, Kansas, 1992, ed. P Richard, M Stöckli, C L Cocke and C D Lin, AIP Conference Proceedings **274**, p. 271.
8. “Diffraction effects in the production of binary encounter electrons emitted in collisions of heavy ions with He and H₂ targets”.
J L Shinspaugh, H E Wolf, W Wolff, H Schmidt-Böcking, J Wang and R E Olson, *The Physics of Highly-Charged Ions*, VI International Conference, Manhattan, Kansas, 1992, ed. P Richard, M Stöckli, C L Cocke and C D Lin, AIP Conference Proceedings **274**, p. 347.
7. “Ionization spectrum for ion-atom collisions with short-ranged potentials in one and three dimensions”.
J Wang, J Burgdörfer and A Bárány, *Physical Review A* **43**, 4036 (1991).
6. “Estimates for cluster-impact fusion yields using the Fermi acceleration map”.
J Burgdörfer, J Wang and R Ritchie, *Physica Scripta* **44**, 391 (1991).
5. “Electron loss at backward angles”.
J Wang, C O Reinhold and J Burgdörfer, *Physical Review A* **44**, 7243 (1991).
4. “Forward electron production in antimatter-solid collisions”.
J Burgdörfer, J Wang and J Müller, *Physical Review Letters* **62**, 1599 (1989).
3. “Mechanisms for $v/2$ electron emission in ion-atom collisions”.
J Wang and J Burgdörfer, *Nuclear Instrument and Methods B* **40/41**, 65 (1989).
2. “Wake-riding electrons emitted by antiprotons traversing solid targets”.
J Burgdörfer, J Wang and J Müller, *Proceedings of the 12th Werner Brandt International Conference on the Penetration of Charged particles in Matter*, San Sebastian, Spain, Sep. 4–7, 1989. p. 239 (Prepared by the Oak Ridge National Laboratory, CONF-8909210. Available from National Technical Information Service, Department of Commerce).

1. “ $v/2$ electron emission mechanisms in ion-atom collisions with short-ranged potentials”.
J Burgdörfer, J Wang and A Bárány, *Physical Review A* **38**, 4919 (1988).

INVITED TALKS and PRESENTATIONS (Last 12 of 24)

24. “Integrating computation into physics courses”.
Workshop presenter, AAPT New England Section Spring Meeting (March 2018)
23. “Integrating computational activities vertically into the physics curriculum”.
AAPT Summer Meeting, Cincinnati (July 2017)
22. “A streamlined pathway for recruiting physics teachers”.
PhysTEC Conference, Atlanta (February 2017)
21. “A collaborative interdisciplinary model for recruiting and preparing physics teachers”.
PhysTEC Conference, Baltimore (March 2016)
20. “Bridging research and teaching with computational modeling”.
University of Dayton (November, 2015)
19. “Gaining insight with computational physics”.
Brown University (October, 2015)
18. “Scientific modeling and visualization with Python”.
Design workshop leader and presenter, Gordon Research Conference on Visualization in Science and Education, Tufts University (July, 2015)
17. “A microscopic star-planet system: the Coulomb 3-body problem”.
Department of Physics, UMass Dartmouth (November, 2009)
16. “Simply two: the two-center delta molecule in simulations”.
Gordon Research Conference on Computation and Computer-Based Instruction, Bryant University, Smithfield, RI (June 2008).
15. “Solving elementary physics problems with the Lambert-W function”.
2007 AAPT Summer Meeting, Greensboro, NC (July 2007).
14. “Computational quantum mechanics”.
Computational Physics Conference, Davidson College, NC (July 2007).
13. “Two-photon double ionization of helium”.
Institute of Theoretical Physics, Vienna University of Technology (November 2005).

**CONTRIBUTED PAPERS AND ABSTRACTS TO INTERNATIONAL
AND NATIONAL CONFERENCES (last 26 of 52)**

- 52. “Enhancing student learning with computational modeling”.
J Wang, AAPT Summer Meeting, Cincinnati (July 2017)
- 51. “Recruitment and preparation of physics teachers”.
J Wang, AAPT New England Section Meeting, Worcester, MA (March 2017)
- 50. “Comparison of meshfree and mesh-based methods for boundary value problems in physics”.
P Niraula, Y Han, and J Wang, XXVI IUPAP Conference on Computational Physics 2014, Boston University (August 2014)
- 49. “Computational modeling with meshfree methods”.
P Niraula, Y Han, and J Wang, Gordon Research Conference on Physics Research and Education, Mt Holyoke College, MA (June 2014).
- 48. “Simulation and visualization of few-body astrophysical systems”.
J Wang and B Mamaras, Gordon Research Conference on Physics Research and Education, Colby College, ME (June 2012).
- 47. “A direct, stable method for quantum mechanical simulations”.
J Wang, D Walsh, and T Hubbard, Gordon Research Conference on Physics Research and Education, Mt Holyoke College, MA (June 2010).
- 46. “Computational quantum mechanics: the coupled channel method”.
J Wang and J D Champagne, Abstracts of contributed papers, Topical conference on computational physics, Davidson College, Davidson, North Carolina (2007).
- 45. “Solving elementary physics problems with the Lambert-W function”.
J Wang, Abstracts of contributed papers, 2007 AAPT Summer Meeting, Greensboro, North Carolina (2007), BV10.
- 44. “Differential multiple ionization cross sections of H^- by Compton scattering at high photon energies”.
J Wang, J Tassinari, K Maranhas, J McGuire, S Itza-Ortiz, and J Burgdörfer, Abstracts of contributed papers, 22nd International Conference on Photonic, Electronic and Atomic Collisions (XXII ICPEAC), Santa Fe, New Mexico (2001), p. PD 04.
- 43. “Differential double ionization of H^- by Compton scattering”.
H Wang, J Wang, S Itza-Ortiz, J H McGuire and J Burgdörfer, Bull. Am. Phys. Soc. **44**, 133 (1999).
- 42. “Single ionization of He and H^- by Compton scattering”.
S Itza-Ortiz, J H McGuire and J Wang, Bull. Am. Phys. Soc. **44**, 723 (1999).

41. “Electron momentum spectroscopy for collisions of ions with aligned Rydberg targets”.
K R Cornelius, R E Olson and J Wang, *Bull. Am. Phys. Soc.* **43**, 1262 (1998).
40. “Group-theoretical approach to final-state angular correlations in double photoionization”.
Y Qiu, J Burgdörfer and J Wang, *Bull. Am. Phys. Soc.* **43**, 1284 (1998).
39. “Theoretical study of double ionization of helium by Compton scattering”.
J Z Tang, J Burgdörfer and J Wang, *Bull. Am. Phys. Soc.* **43**, 1288 (1998).
38. “Electron momentum correlation in photoionization of helium”.
J Wang, J H McGuire, J Burgdörfer, J Z Tang and Y Qiu, *Bull. Am. Phys. Soc.* **43**, 1356 (1998).
37. “Correlation: How to understand complex systems in terms of simple ones”.
J McGuire and J Wang, *Bull. Am. Phys. Soc.* **42**, 970 (1997).
36. “Double ionization of helium by photoionization, Compton scattering, and charged particles”.
J Wang, J McGuire, J Burgdörfer and Y Qiu, *Bull. Am. Phys. Soc.* **42**, 1152 (1997).
35. “Multiple ionization of helium by high energy photon impact”.
Y Qiu, J Z Tang, J Burgdörfer and J Wang, *Bull. Am. Phys. Soc.* **42**, 1152 (1997).
34. “Exchange shakeoff and retardation effects in multiple photoionization”.
J Wang, J McGuire, J Burgdörfer and Y Qiu, Abstracts of contributed papers, 20th International Conference on the Physics of Electronic and Atomic Collisions (XX ICPEAC), Vienna, Austria (1997), p. MO 067.
33. “Multiphoton ionization of helium in KFR approximation”.
S G Tolmanov, J McGuire and J Wang, Abstracts of contributed papers, 20th International Conference on the Physics of Electronic and Atomic Collisions (XX ICPEAC), Vienna, Austria (1997), p. TU 041.
32. “Electron correlation dynamics in atomic transitions”.
J McGuire and J Wang, Abstracts of contributed papers, 20th International Conference on the Physics of Electronic and Atomic Collisions (XX ICPEAC), Vienna, Austria (1997), p. TU 203.
31. “Consistency test of double ionization of helium by photons and charged particles”.
J Wang, J McGuire and J Burgdörfer, *Bull. Am. Phys. Soc.* **41**, 1116 (1996).
30. “Group-theoretical approach to final state correlations in double-photoionization”.
Y Qiu, J Wang and J Burgdörfer, *Bull. Am. Phys. Soc.* **41**, 1117 (1996).

- 29. “Electron capture from Rydberg atoms by highly-charged ions”.
J Wang, J McGuire, R E Olson and J Burgdörfer, Bull. Am. Phys. Soc. **41**, 1121 (1996).
- 28. “Electron capture from elliptical Rydberg states”.
K R Cornelius, R E Olson and J Wang, Bull. Am. Phys. Soc. **41**, 1122 (1996).
- 27. “Interaction of oriented Rydberg atoms with charged particles”.
J Wang, J McGuire and R E Olson, Bull. Am. Phys. Soc. **40**, 1283 (1995).

GRANTS and PROPOSALS

FUNDED PROPOSALS (Last 6)

6. “UMass Dartmouth PhysTEC: Establishing a collaborative interdisciplinary model for recruiting/preparing physics teachers”, NSF/APS, \$29,958, (Co-PIs: Witzig, Hirshfeld, O’Rielly), 2014-2017. Funded
5. “Computer modeling and visualization in physics”, TCR Engineering Inc, \$30,000, 2010-2013. Funded
4. “Education grant for participation of Super Computing 2010, New Orleans”, SC 10 Organizing Committee, November, 2010. Funded (equivalent of \$4,000)
3. “A junior research project on computer simulations of quantum systems”, Office of Faculty Development REU Grant, \$2,000, (Co-PI: Fine), November 2009. Funded
2. Travel Grant, Center for Teaching Excellence, \$500, June 2008, Funded.
1. “Ionization of atoms by ultra-short x-ray lasers”, Chancellor’s Research Fund, \$5,000, November 2005, Funded

PENDING PROPOSALS

1. “Master Teach! SouthCoast STEM”, NSF, \$1,409,365, (PI: Stephen Witzig, Co-PIs: Shakhnoza Kayumova, Chandra Orrill, Jay Wang), August 2017. Pending

UNFUNDED PROPOSALS (Last 16)

16. “MA Math. Sci. Part. Grant: Wareham School District Expanded STEAM Academy”, MA Dept. Elem. and Sec. Ed., \$97,890, (PI: Stephen Witzig, Co-PIs: Jay Wang and Chandra Orrill), February 2017. Unfunded
15. “SLAM! – Empowering Interdisciplinary High School Teacher Teams with Embedded Computing to create Energy Coherent Curricula”, NSF, \$1,248,897, (PI: Carol Hirschmugl, University of Wisconsin Milwaukee; Co-PIs: Emily Moore, University of Colorado; Renee Frontiera, University of Minnesota; Jay Wang, UMass Dartmouth), March 2016. Unfunded
14. “The Impact of Student-Designed Computational Modeling and Visualization on Student Learning in Physics and Engineering”, NASA Visionary grant, \$4,000, (Co-PIs: Lee, Milwaukee School of Engineering; Wilkerson-Jerde, Tufts University), August 2015. Unfunded
13. “UMass Dartmouth Noyce Scholarship Program”, NSF, \$1,049,898, (PI: Orrill), August 2015. Unfunded

12. “A comparative study of meshfree and mesh-based methods for atomic and nanostructure calculations”, NSF, \$207,528, 2014. Unfunded
11. “An adaptive meshfree method for the study of atomic dynamics with radial basis functions”, NSF, \$246,159, (co-PI, Heryudono), 2013. Unfunded
10. “An adaptive meshfree method for the study of atomic dynamics with radial basis functions”, NSF, \$246,159, (co-PI, Heryudono), 2012. Unfunded
9. “An adaptive meshfree approach to the study of physical systems”, NSF, \$179,886, (co-PIs, Heryudono, Khanna, and Fisher), 2012. Unfunded
8. “Math & Science Partnership with Elementary and Middle Schools in the South Coast and Cape Region of Massachusetts”, NSF, \$7,425,994, (PI: Hegedus), October 2011. Unfunded
7. “Integrating computer modeling and visualization into the curriculum for physics and engineering”, NSF, \$106,302, June 2011. Unfunded
6. “Study of few-body quantum systems by radial basis function methods”, NSF, \$157,814, (co-PIs, Heryudono, Khanna, and Fisher), June 2011. Unfunded
5. “A meshfree approach to the study of ionization of few-electron atoms by ultrashort laser pulses”, NSF, \$105,894, June 2010. Unfunded
4. “K-20 Regional STEM Education Partnership for the South Coast & Cape Region of Massachusetts”, NSF, \$9,902,301, (PI: Hegedus), October 2010. Unfunded
3. “Curriculum synchronization for enhanced STEM education between a university and a community college”, NSF, \$249,689, June 2010. Unfunded
2. “Few-body dynamics in two-photon double ionization of helium-like atoms by ultrashort laser pulses”, NSF, \$106,668, September 2009. Unfunded
1. “Building a sustainable integrated curriculum for STEM fellows into an existing MS graduate program”, NSF, \$1,567,886, (Co-PIs: Fisher, Heryudono, Huang, Khanna, Tandon), June 2009. Unfunded

UNIVERSITY and PUBLIC SERVICE

- Department Service
 Graduate Program Director (1999–2005, 2007–2010)
 Open House and Experience UMD Day Coordinator (2005–present)
 Other Committees: Undergraduate Curriculum, Graduate Curriculum, Faculty Evaluation, Budget and Finance, Search and Screen, Seminar, and Department Awards
 Convenor of Southeastern New England Physics Alliance (SNEPA, 1998–2005, 2014–present)

- College Service
 - BMBE (Biomedical and Bioengineering) Admissions Liaison (2008–2011)
 - COE Matlab Committee (2017–present)
 - COE Robotics Committee (2017–present)
 - COE STEM Taskforce (2015–present)
 - College Academic Council (2015–2016)
 - College Scholarship Committee (2005–present)
 - Freshman Summer Institute (2002–2005, 2012)
 - Impulse Instructor Cohort Meeting Convenor (2000–2007)
- University Service
 - Contributor and Forum Speaker to Office of Faculty Development (2009–2011)
 - Graduate Council (1999–2005, 2007–2009)
 - Math, Science&Technology Ad Hoc GenEd Assessment Committee (2000–2005)
 - Scholar of the Year Committee (2017–present)
 - Southeastern Massachusetts STEM Network CONNECT (2010–2013)
 - Student Success Collaborative Committee (2013–2014)
 - Student and Faculty Academic Affairs Committee (2004–2005)
 - Teacher of the Year Committee (2004–2006)
 - University Admission Committee (2005–2006)
 - Solar Eclipse 2017 UMD event co-organizer and -speaker. Upward of 1,500 people attended, <http://www.faculty.umassd.edu/j.wang/eclipse/>
- Public Service
 - Judge for the Massachusetts State Science Fair (2005–2010)
 - Member of South Eastern Massachusetts Association of Science Supervisors (SEMASS, 1998–2016) and Massachusetts Science Education Leadership Association (MSELA, 2012–present)

CURRICULUM VITAE

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**Professor of Transportation & Physics
University of Massachusetts Dartmouth
College of Engineering
285 Old Westport Road
North Dartmouth, MA 02747**

CURRENT TITLE & EXPERTISE:

Professor of Physics

Adjunct Professor of Civil & Environmental Engineering

Intelligent Transportation Systems, Congestion Management & Capacity Analysis

HIGHER EDUCATION:

A. Degrees:

[University of Central Florida](#), (UCF) Orlando, Florida; Ph.D. Civil and Environmental Engineering, emphasis in Intelligent Transportation Systems (ITS), August, 1998.

[University of Illinois at Urbana-Champaign](#), Illinois; M.S. Physics, May, 1981.

[Purdue University](#), West Lafayette, Indiana; B.S. Physics, December, 1978.

B. Additional Higher Education

[Brandeis University](#), Waltham, Massachusetts; Physics Graduate Program, emphasis in Radio Astrophysics, Sept 1985 – May 1990.

[Universidad Simon Bolivar](#), Caracas, Venezuela; Physics Undergraduate Program, September 1976 – May 1977.

[Cornell University](#), Department of Civil & Environmental Engineering & Physics Department, Ithaca, New York; June 1975 – May 1976.

[Florida Technological University](#), (name changed to UCF), Orlando, Florida; Department of Civil & Environmental Engineering, January 1972 – March 1975.

EXPERIENCE

A. Teaching:

[University of Massachusetts Dartmouth](#): Professor, Sept 1998 – today

Full Professor, Sept 2011 - today

Associate Professor, Sept 2004 – Sept 2011

Department Chair, June 2006 – October 2008

Assistant Professor, September 1998 - August 2004

Full-Time-Lecturer (FTL) September 1991 - August 1992

Part-Time-Lecturer (PTL) September 1986 - August 1991; Physics Department.

[Brandeis University](#): Teaching Assistant and Research Assistant, September 1985 – May 1990; Physics Department.

[Bradley University](#): Full-Time-Lecturer (FTL), September 1983 – June 1985; Physics Department.

B. Other:

[University of Central Florida](#): Transportation Research Associate, August 2005 – May 2006;

Center for Advanced Transportation Systems Simulation (CATSS) – Sabbatical Leave.

[University of Central Florida](#): Graduate Research Assistant, September 1995 – August 1998; Civil and Environmental Engineering Department.

[Michigan Public Health Department](#); Health Physicist; Radiological Division, 1994 – 1995; Lansing, Michigan.

[Boeing Company](#); 1973 – 1975 Co-op Student Engineering Assistant; Vehicle Assembly Building (VAB) Maintenance Division on Cape Kennedy, Florida.

C. Listing of courses taught at UMass Dartmouth

Alphabetical listing of courses:

CIS 600 Master's Project in Computer & Information Science
CEN 419 Advanced Undergraduate Traffic Engineering
CEN 434 (now 334) Traffic Engineering
CEN 495 Independent Studies in Civil & Environmental Engineering
CEN 519 Advanced Graduate Traffic Engineering
ECE 595 Independent Studies in Graduate Electrical & Computer Engineering
ECE 603 Pre-Dissertation Research in Electrical & Computer Engineering
ECE 701 Pre-Dissertation Research in Electrical & Computer Engineering
MNE 580 Master's Thesis in Mechanical Engineering
PHY 104 General Physics Laboratory II
PHY 110 Freshman Seminar II
PHY 111 Physics for Scientists and Engineers I – IMPULSE studio learning
PHY 112 Physics for Scientists and Engineers II – IMPULSE studio learning
PHY 112 Lab Physics for Scientists and Engineers II – IMPULSE
PHY 112 Rec Physics for Scientists and Engineers II - IMPULSE
PHY 113 Classical Physics I Lecture
PHY 114 Classical Physics II Lecture
PHY 114 Lab Classical Physics II Laboratory
PHY 114 Rec Classical Physics II Recitation
PHY 115 Introduction to Classical Physics
PHY 151 Introduction to Astronomy
PHY 213 Applied Modern Physics
PHY 313 Advanced Mechanics
PHY 314 Wave Motion
PHY 419 Advanced Undergraduate Traffic Engineering
PHY 421 Advanced Physics Laboratory
PHY 480 Undergraduate Research in Physics
PHY 510 Special Topics in Physics - Advanced Traffic Engineering
PHY 510 Special Topics in Physics - Transportation Payment Systems
PHY 510 Special Topics in Physics - Filtering Transportation Data
PHY 519 Advanced Graduate Traffic Engineering
PHY 680 Graduate Research in Physics
PHY 685 Graduate Research Project in Physics
PHY 690 Graduate Thesis Research in Physics
PHY 695 Graduate Independent Studies in Physics
SUS 450 Sustainable Transportation Engineering

Listing of courses ordered by semester/academic year:

<i>Semester</i>	<i>Course Number</i>	<i>Question 13 Evaluation (out of 5.00)</i>	<i>Number of Students</i>
SPRING 2018	PHY419		3
	CEN 419, SUS 450		6
	PHY 114 H		8
	PHY114		5
FALL 2017	PHY 113 H		8
	PHY 113		6
	PHY115		16
SPRING 2017	PHY213	3.23	18
	PHY 114 H	4.75	3
	PHY114	3.88	10
FALL 2016	PHY 113 H	4.50	6
	PHY 113	3.11	30
	PHY421	4.60	6
SPRING 2016	PHY213	4.00	10
	PHY113	4.14	7
	PHY 113 Honors	5.00	4
FALL 2015	SABBATICAL		
SPRING 2015	PHY213	3.33	10
	PHY/CEN 419/519 SUS 450	4.17/4.23	16
	PHY480		1
FALL 2014	PHY 114-01	3.00	26
	PHY 115-01	4.46	15
	PHY421	3.90	8

SPRING 2014	PHY213	4.50	6
	PHY/CEN 419/519 SUS 450	4.00/4.00	19
FALL 2013	PHY 114-01	3.94	30
	PHY 115-01	3.14	19
SPRING 2013	PHY114-01	2.96	33
	PHY 112-01	3.91	67
	PHY/CEN 419/519	3.88	13
	PHY 421		9
FALL 2012	PHY 114-01	4.00	35
	PHY 115-01	4.20	16
SPRING 2012	PHY114-01	3.74	55
	PHY/CEN 419/519	4.58	15
FALL 2011	PHY 112-03	4.20	31
	PHY 112-03R1		31
	PHY 421-01	4.17	5
SPRING 2011	ECE 701-01		1
	PHY111-04	4.00	28
	PHY 111-04R1		28
	PHY 685		2

FALL 2010	ECE 603-04		1
	PHY 114-01	4.79	22
	PHY 112-02	4.51	39
	PHY 112-02R1		39
	PHY 510-01	5.00	1
	PHY 510-02	5.00	1
	PHY 685		1
SPRING 2010	PHY 114-01	3.92	33
	PHY 421-01	4.25	8
	PHY 419/519	4.15	2
	CEN 419/519	4.15	11
	PHY 480-01		1
	PHY 685-03		1
	ECE 603-01		1
FALL 2009	PHY 112-02 IMPULSE/Rec	3.21	47
	PHY 114-01	3.78	24
	PHY 685-04		1
	ECE 595-02		1
SPRING 2009	PHY 112-01 IMPULSE/Rec	4.36	26
	PHY 114-01	3.37	39
	PHY 480-01		1
FALL 2008	PHY 510	4.33	4
	Chair's reduced Teaching Load		
SPRING 2008	PHY 112 IMPULSE/Rec	4.43	10
	PHY 421	4.00	8
	PHY 685-06		1
	Chair's reduced Teaching Load		

FALL 2007	PHY 114 PHY 685-06 Chair's reduced Teaching Load	4.12	24 1
SPRING 2007	PHY 213 PHY 480 Chair's reduced Teaching Load	4.30	32 1
FALL 2006	PHY 114 PHY 510 Chair's reduced Teaching Load	4.55 4.73	30 8
FALL 2005	Sabbatical On Leave to UCF	PHY 685	1
SPRING 2006		PHY 690	1
SPRING 2005	PHY 112-02 IMPULSE/Rec	4.08	31
	PHY 213-01/02	4.66	23
	CIS 600-05		1
FALL 2004	PHY 112-01	4.32	23
	PHY 151-01	4.19	26
	CIS 600-05		1
SPRING 2004	PHY 112-01 IMPULSE/Rec	4.67	21
	PHY 213-01	4.09	19
	PHY 213-02	3.70	23
	MNE 580		1
FALL 2003	PHY 112-01 IMPULSE/Rec	4.25	21
	PHY 151-02	4.40	26
	CEN 495		1
	MNE 580		1
SPRING 2003	PHY 112-02 IMPULSE/Rec	4.02	18
	PHY 213-01 Lec		51
	PHY 213-01 Rec	3.95	26
	PHY 213-02 Rec	3.96	25
	PHY 690		1
	MNE 580		1

FALL 2002	PHY 151-03	3.32	121
	PHY 114-01 Lec	4.63	44
	PHY 114-02 Rec	4.63	27
	PHY 680-02	3.89	1
	MNE 580		1
SPRING 2002	CEN 434-01	4.56	28
	PHY 112-01 IMPULSE	4.74	28
	PHY 112-01 Rec	4.81	28
	PHY 480-02		1
	PHY 690-08		1
FALL 2001	PHY 112-01 IMPULSE/Rec	4.25	23
	PHY 151-03	4.00	65
	PHY 690		1
	TA Graduate Student Training		4
SPRING 2001	PHY 112-01 IMPULSE/Rec	4.20	24
	PHY 112-03 IMPULSE/Rec	4.65	37
	TA Graduate Student Training		11
FALL 2000	PHY 114 Lecture	4.63	43
	PHY 114-01 Rec	4.47	15
	PHY 114-02 Rec	5.00	16
	PHY 114-03 Rec	4.56	12
	PHY 114-02 Lab	5.00	16
	PHY 480-02	4.72	2
	TA Graduate Student Training		4
SPRING 2000	PHY 213-01	4.69	29
	PHY 314-01	4.87	6

FALL 1999	PHY 114-01 Lecture	4.63	56
	PHY 114-02 Lab	4.58	18
	PHY 114-02 Rec	4.58	18
	PHY 313-01	3.47	5
	PHY 690		1
	PHY 480-01	5.00	2
	TA Graduate Student Training		5
SPRING 1999	PHY 104-07	5.00	2
	PHY 110-01	4.97	4
	PHY 213-01	4.60	16
	PHY 690		1
	TA Graduate Student Training		5
FALL 1998	PHY 114-01 Lecture		67
	PHY 114-01 Lab	3.88	13
	PHY 114-04 Lab	4.67	5
	PHY 114-06 Lab	3.81	14
	PHY 480-01 Visual Basic		5
	TA Graduate Student Training		5

PUBLICATIONS

Contributions to Books

1. Abbas, Montasir M., Marguerite Zarrillo, Traffic Control System Operations: Installation, Management and Maintenance. ITE, ISBN: 0-935403-40-X, Jan 2000.
<http://www.ite.org/emodules/scriptcontent/Orders/ProductDetail.cfm?pc=TB-009A>

Refereed Journal papers (most recent first)

2. Zarrillo, Marguerite L. What Impacts Traffic Flow Stability, [*Journal of Transportation Engineering*](#) of the American Society of Civil Engineers, pending, July 2016.
3. Deshpande, Rahul, Nathan Gartner and Marguerite Zarrillo, Urban Street Performance: Level-of-Service and Quality-of-Progression Trade off Analysis. *Transportation Research RECORD (TRR): Journal of the Transportation Research Board*, Vol. 2173, pp 57-63, 2010. <http://pubsindex.trb.org/view.aspx?id=910617>
4. Zarrillo, Marguerite L. and A. Essam Radwan, Methodology SHAKER and the Capacity Analysis of 5 Toll Plazas, [*Journal of Transportation Engineering*](#) of the American Society

of Civil Engineers, Volume 135, Issue 3, pp 83-93, March 2009.

<http://tris.trb.org/view.aspx?id=885585>

<http://tris.trb.org/view.aspx?id=913251>

<http://scitation.aip.org/getabs/servlet/GetabsServlet?prog=normal&id=JTPEDI000135000003000083000001&idtype=cvips&gifs=yes>

5. Zarrillo, Marguerite L., Using Decision Support System and Graphical User Interface to Choose Appropriate Lane Configurations at Toll Facilities. *Transportation Research RECORD (TRR): Journal of the Transportation Research Board*, Vol. 1935, p. 8-16, April 2005. <http://pubsindex.trb.org/view.aspx?id=803608>
<http://trb.metapress.com/content/a78m4mwt8t125hxt/>
6. Zarrillo, Marguerite L., A. Essam Radwan and Joseph H. Dowd. Toll Network Capacity Calculator : Operations Management and Assessment Tool for Toll Network Operators. *Transportation Research RECORDS (TRR): Journal of the Transportation Research Board*. Vol. 1781, p. 49-55, April 2002. <http://pubsindex.trb.org/view.aspx?id=722770>
<http://trb.metapress.com/content/d45p2011855t2m04/>
7. Zarrillo, M.L., A.E. Radwan and H.M. Al-Deek. Modeling Traffic Operations at Electronic Toll Collection and Traffic Management Systems. *The International Journal on Computers and Industrial Engineering*, editor Yeong-Dae Kim, special edition, December, 1997, Volume 33, Issue Numbers 3-4, pp. 857-860.
<http://www.ingentaconnect.com/content/els/03608352/1997/000000033/00000003/art00266>
[http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V27-3SN7946-87&_user=10&_coverDate=12%2F31%2F1997&_rdoc=100&_fmt=high&_orig=browse&_srch=doc-info\(%23toc%235695%231997%23999669996%238961%23FLP%23display%23Volume\)&_cdi=5695&_sort=d&_docanchor=&_view=c&_ct=100&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=2e739397135e71690dbe0cdb56073e86](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V27-3SN7946-87&_user=10&_coverDate=12%2F31%2F1997&_rdoc=100&_fmt=high&_orig=browse&_srch=doc-info(%23toc%235695%231997%23999669996%238961%23FLP%23display%23Volume)&_cdi=5695&_sort=d&_docanchor=&_view=c&_ct=100&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=2e739397135e71690dbe0cdb56073e86)

Refereed, published and presented Proceedings Papers at the Transportation Research Board (TRB) International Annual Meeting and Conference

Note: All TRB proceeding papers are peer reviewed. It is standard practice to cite TRB proceeding papers in all other major transportation journals. Papers must strictly be reviewed by TRB's conglomerate of Committees. For acceptance in TRB proceedings, papers require a minimum of 3, but often up to 5, autonomously written reviews from international experts in the related subject area. Reviewers of proceeding papers respond to 21 questions/categories and have the option of rejection as well as conditional acceptance. The acceptance rate to the proceeding can be as low as 15%. Of those, less than 5% are accepted into the Transportation Research RECORDS (TRR), Journal of the Transportation Research Board. In order for a paper to be published in the RECORDS, it must first be accepted for publication in TRB proceedings. After presentation at TRB's International Annual Meeting & Conference, a few papers are chosen by TRB Committees to be re-reviewed for possible publication in the RECORDS.

8. Zarrillo, Marguerite. *Wireless Monitoring of Road Pavement Condition*. Peer review, *Proceedings of the 96th Annual Meeting of the Transportation Research Board*, [TRB](#), Washington D.C., January 2017.
9. Zarrillo, Marguerite, Neuza Pedro, David Prairie, Tyler Spilhaus, Venkateswaran Shekar, *Sixteen Year Survey: Reported Security & Privacy Breaches in Electronic Transportation Payment Systems, ETPS*. Peer review, *Proceedings of the 93rd Annual Meeting of the Transportation Research Board*, [TRB](#), Washington D.C., paper number 14-1435, January 2014.
10. Zarrillo, Marguerite, Elia El Lazkani, David Prairie, Tyler Spilhaus, *ITPS Security & Privacy Breaches; Extent of the Problem and a Simulated Case Study*. Peer reviewed, *Proceedings of the 92nd Annual Meeting of the Transportation Research Board*, [TRB](#), Washington D.C., paper number 13-0650, January 2013. Lecture Presentation session #325. <http://amonline.trb.org/2vcdo0/2vcdo0/1>
<http://amonline.trb.org/39dnp0/1>
11. Masoud, Neda, Marguerite Zarrillo, Nathan Gartner, *Traffic Flow with Increasing Density Assuming a Simple Safe Stopping Distance Formula*. peer reviewed, the *Proceedings of the 92nd Annual Meeting of the Transportation Research Board*, [TRB](#), Washington D.C., paper number 13-1765, January 2013. Poster session #497. <http://amonline.trb.org/2vctqf/2vctqf/1>
<http://amonline.trb.org/39e27b/1>
12. Gartner, Nathan and Marguerite Zarrillo. *Alternative Level-of-Service and Quality of Progression, Models for Urban Street Analysis*. peer reviewed, published in the *Proceeding*, presented at TRB's [TFTC](#) (AHB45) and TRB HCQS Committees' Joint Midyear Meeting and Conference, *Innovations in Traffic Flow Theory, Highway Capacity, and Quality of Service Symposium*, Fort Lauderdale, FL, June 19-22, 2012.

13. Azogu, Ikechukwu, Neda Masoud, Marguerite Zarrillo, Hong Liu, *Enhancing Transportation Service in the Local Community Using Fleet Tracking and Data Management*. peer reviewed, the *Proceedings of the 90th Annual Meeting of the Transportation Research Board*, [TRB](#), Washington D.C., paper number [11-1504](#), January 2011. <http://trid.trb.org/view.aspx?id=1091974>
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17. Zarrillo, Marguerite L. and Animesh Basnet. *Providing Bottleneck Status on a Network of Highways via a Decision Support System, DSS, Website*. peer reviewed, the *Proceedings of the 85th Annual Meeting of the Transportation Research Board*, [TRB](#), Washington, D.C., paper number [06-0595](#) January 2006, 14 pages. <http://pubsindex.trb.org/view.aspx?id=776418>
18. Zarrillo, Marguerite L. *DSS and GUI, Decision Support System and Graphical User Interface to Assist in Choosing Appropriate Lane Configurations at Toll Facilities*. peer reviewed, the *Proceedings of the 84th Annual Meeting of the Transportation Research Board*, [TRB](#), Washington, D.C., January 2005. <http://trb.metapress.com/content/a78m4mwt8t125hxt/>
19. Zarrillo, Marguerite L., A. Essam Radwan, Daniel Schmitt. *Modeling Traffic at Toll Collection Facilities by Applying Vehicle Properties, Driver Perception–Reaction Time and Stop–Time to the Basic Equations of Motion from Car-Following Theory*. peer reviewed, the *Proceedings of the 83rd Annual Meeting of the Transportation Research Board*, [TRB](#), Washington, D.C., paper number 04-2240, poster session 516 HP-35, January 2004. http://onlinepubs.trb.org/onlinepubs/archive/am/2004_program_sessions.pdf
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20. Zarrillo, Marguerite L., A. Essam Radwan and Joseph H. Dowd. *TNCC : Operations*

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21. Zarrillo, Marguerite L. Capacity Calculations for Two Toll Facilities: Two Experiences in ETC Implementation. peer reviewed, the *Proceedings of the 79th Annual Meeting of the Transportation Research Board*, [TRB](#), Washington, D.C., January 2000.
22. Zarrillo, M.L. and A.E. Radwan. Modeling Electronic Toll Collection, (Doctoral Student Seminar in Transportation Modeling), peer reviewed, the *Proceedings of the 77th Annual Meeting of the Transportation Research Board* [TRB](#), Washington, D.C., January, 1998.

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23. Zarrillo, Marguerite, Venkateswaran Shekar, Lance Fiondella. Dynamic Transportation Network Vulnerability Assessment and Mitigation, 2018 NEITS Annual Interchange, Poster Session, Providence, RI, May 10, 2018.
24. Zarrillo, Marguerite, Jose Roza Cortes. Simulating the effects of Saturation Levels of Autonomous Vehicles through a Troubled Intersection, 2018 NEITS Annual Interchange, Poster Session, Providence, RI, May 10, 2018.
25. Zarrillo, Marguerite. Fleet Tracking, a Mobility Management Tool. Accepted for publication in the Proceedings of UMass Dartmouth's 1st Annual Service Learning and Student Engagement Conference, March 6, 2015.
26. O'Connor, Scott, Ramprasad Balasubramanian, Marguerite Zarrillo, Heather Miller, Honggang Wang. Modeling and Decision Support System to Determine When to Impose Seasonal Load Restriction (SLR), the *Proceedings of WAMS 2012, International Workshop on Applied Modeling and Simulation*, Rome, Italy, September 24-27, 2012. Presented by Zarrillo. <http://www.msc-les.org/conf/wams2012/>
27. Zarrillo, M., H. Miller, R. Balasubramanian, R. Berg, R. Eaton and M. Kestler. Preliminary Development of a Real Time Seasonal Load Restriction System for Remote Sites. peer reviewed, the *Proceedings of ASCE's 15th International Conference on Cold Regions Engineering*, Quebec, Canada, August 19-22, 2012. <http://www.csce.ca/2012/iccre/>
28. Zarrillo, Marguerite and Elia El Lazkani. Impact of Security Measures and Algorithms on Operations at Transportation Facilities. peer reviewed, the *Proceedings of SAM'12, 2012 International Conference on Security and Management*, Las Vegas, NV, July 16-19, 2012. <http://sam.udmercy.edu/sam12>
29. Rami Harb, Essam Radwan, Shankar Ramasamy, Chris Russo, Marguerite Zarrillo, Evaluation of SHAKER Model for Implementation on the Florida Turnpike Enterprise (FTE), a Pilot Study, peer reviewed, presented & published in the *Proceedings of ASCE*

10th International Conference on Applications of Advanced Technologies in Transportation Engineering, Athens, Greece, publication and presentation May 27-31, 2008.
<http://www.civil.ntua.gr/aatt/generalinfo.html>

30. Zarrillo, Marguerite L. Capacity Analysis of 10 Toll Plazas on the OOCEA Network, peer reviewed, presented & published in the *Proceeding of the 18th IASTED International Conference on Modelling and Simulation, International Association of Science and Technology for Development*, Montreal, Quebec, Canada, May 30 – June 1, 2007, p 562-567. <http://portal.acm.org/citation.cfm?id=1295742>
<http://www.actapress.com/Abstract.aspx?paperId=30683>
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31. Zarrillo, Marguerite L., A. Essam Radwan, Determining Maximum Throughputs at Toll Collection Facilities. peer reviewed, presented & published in the *Proceedings of ASCE 8th International Conference on Applications of Advanced Technologies in Transportation Engineering*, Beijing China, May 2004. http://www.jttx.net.cn/aatt_eng/fc.htm
32. Zarrillo, Marguerite L., A. Essam Radwan, Daniel Schmitt. SHAKER: A Maximum Throughput Model for Toll Collection Facilities. peer reviewed, presented & published in the *Proceedings of the Society for Computer Simulation International 2003 Summer Computer Simulation Conference*, editors Agostino G. Bruzzone and Mhamed Itmi, Montreal Canada, July 2003, Volume 35, Number 3, pp. 602-607.
<http://www.scs.org/scsarchive/getDoc.cfm?id=2253>
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33. Zarrillo, Marguerite L., A. Essam Radwan, Ali Jaffery. TNCC and the No-Queue-Maximum-Throughput Indicator at Toll Facilities. peer reviewed, presented & published in the *Proceedings of the Society for Computer Simulation International 2003 Summer Computer Simulation Conference*, editors Agostino G. Bruzzone and Mhamed Itmi, Montreal Canada, July 2003, Volume 35, Number 3, pp. 624-629.
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34. Zarrillo, Marguerite L., A. Essam Radwan, Angus Mak, Joseph Dowd and William Cyr. Identification of Bottlenecks on a Toll Network of Highways. peer reviewed, presented & published in the *Proceedings of ASCE 7th International Conference on Applications of Advanced Technologies in Transportation Engineering*, Boston, August 2002.
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35. Joseph H. Dowd and Marguerite L. Zarrillo. Case Study Application of TNCC: a Simulation Tool to Identify Plaza Bottlenecks on a Toll Network of Highways. peer reviewed, presented & published in the *Proceedings of ASCE 7th International Conference on Applications of Advanced Technologies in Transportation Engineering*, Boston, August 2002.
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36. Zarrillo, Marguerite L and Essam A. Radwan, Modeling the OOCEA's Toll Network of Highways Using Plaza Capacity Analyses. peer reviewed, presented & published in the *Proceedings of the 8th World Congress on Intelligent Transport Systems*, Sydney Australia, September-October 2001, 11 pages. <http://tris.trb.org/view.aspx?id=663325>
37. Zarrillo, Marguerite L. Recommended Lane Configuration for ETC Implementation: Case Study of the MassPike-90 Interchange 11A. peer reviewed, presented & published in the *Proceedings of ASCE 6th International Conference on Applications of Advanced Technologies in Transportation Engineering*, Singapore, June 2000.
http://www.jtzn.net.cn/aatt_eng/fc.htm
38. Zarrillo, M.L. and A.E. Radwan. Capacity and LOS at a Toll Plaza with ETC. peer reviewed, presented & published in the *Proceedings of the 9th Annual Meeting of ITS America*, Washington D.C., April 1999. <http://www.itsa.org/>
39. Zarrillo, M.L. and A.E. Radwan. Lane Reconfiguration with ETC Deployment. peer reviewed, presented & published in the *Proceedings of the 9th Annual Meeting of ITS America*, Washington D.C., April, 1999. <http://www.itsa.org/>
40. Radwan A.E. and M.L. Zarrillo. Application of the TP Model to Toll Plaza Configurations. peer reviewed, presented & published in the *Proceedings of the 8th WCTR, World Conference on Transport Research*, Antwerp, Belgium, July 12-17, 1998. ISBN: 0-08-043590-4 PERGAMON.
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41. Zarrillo, M.L., A.E. Radwan, H.M. Al-Deek, L.L. Hoffman, A.A. Mohamed. Traffic Operations During Electronic Toll Collection: Case Study of the Holland East Plaza. peer reviewed, presented & published in the *Proceedings of ASCE 5th International Conference on Applications of Advanced Technologies in Transportation Engineering*, Newport Beach, California, April 26-29, 1998, pp 383-402.
<http://tris.trb.org/view.aspx?id=507699>
42. Zarrillo, M.L., A.E. Radwan, H.M. Al-Deek. Application of Queuing Models to Electronic Toll Collection. peer reviewed, presented & published in the *Proceedings of*

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44. Zarrillo, M.L., A.E. Radwan, H.M. Al-Deek, and L.L. Hoffman, Assuring Quality Service During Toll Collection. peer reviewed, presented & published in the *Proceedings of the 1997 Annual Meeting of the American Statistical Association, ASA, Section on Quality and Productivity*, Orlando, Florida, May 10-13, 1997.
<http://www.amstat.org/publications/index.cfm>
45. Zarrillo, M.L., A.E. Radwan and H.M. Al-Deek. Application of Queuing Models to an Electronic Toll Collection and Traffic Management System. *20th International Conference on Computers & Industrial Engineering*, Kyongju, Korea, October 6-9, 1996.
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Published Reports

46. Final Report & Quarterly Reports #1, 2, 3, 4, 5, 6, 7 and 8. Data collection via CRS&SI Technology to Determine When to Impose SLR; Cooperative Agreement: RITARS-11-H-UMDA, Oct 1, 2011, Jan 1, 2012, Mar 1, 2012, July 1, 2012, Oct 1, 2012, Jan 1, 2013, Mar 1, 2013 and July 1, 2013. Final Report completed April 2014.
47. Yearly NSF FastLane reports; TC: Medium: Collaborative Research: Pay-as-you-Go Security and Privacy for Integrated Transportation Payment Systems, June 2011, June 2012 and June 2013. Final Report completed January 2014.
48. Radwan, Essam and Marguerite L. Zarrillo, Capacity of the OOCEA Network of Toll Roads with Electronic Toll Collection (ETC) – Final Report. Florida Department of Transportation, February 2007, 104 pages. <http://tris.trb.org/view.aspx?id=731137>
49. Radwan, Essam, Marguerite L. Zarrillo, Shankar Ramasamy, TNCC Validation and Enhancement – Final Report. Florida Department of Transportation, August 2004, 112 pages. http://www.dot.state.fl.us/Research-Center/Completed_Proj/Summary_TE/FDOT_BC096_19_rpt.pdf

Published PhD Dissertation

50. Zarrillo, Marguerite L, Development and Applications of TPModel, a Queuing Model

Describing Traffic Operations During Electronic Toll collection (ETC). Ph.D. Thesis, University of Central Florida, Orlando, Florida, June 1998, 283 pages.

<http://tris.trb.org/view.aspx?id=636698>

GRANTS RECEIVED and PENDING

a. Multiple (in collaboration)

- ▲ Co-PI: Regional New England University Transportation Center (UTC), submitted to the USDOT August 2017, **\$600,000+**, pending review.
- ▲ Co-PI: UMass Dartmouth Provost Award, Physics Seminar Series, submitted May 2018, **\$1000**, pending review.
- ▲ Co-PI: UMass Dartmouth Provost Award, Physics Seminar Series, May 2017, **\$1000**.
- ▲ Research Affiliate: *The UMass Unmanned Aerial System Research & Education Collaborative (UASREC)*, funded by the UMass President's Science and Technology Grant Initiative Fund, **\$25,000**, spring 2016 – continuing to current date.
- ▲ PI: *Data Collection via CRS&SI Technology to Determine when to Impose SLR*, USDOT Research and Innovative Technology Administration, [RITA](#) -RS10-01, **\$771,049**, June 1, 2011 - December 31, 2013.
- ▲ Co-PI: *Consortium on Anytime-Anywhere-Anyway (AAA) Transportation Information*, funded by the UMass President's 2010 Science & Technology (S&T) Initiative Fund, **\$106,159**, July 15, 2010 – July 14, 2011.
- ▲ Co-PI: *Coordinated Transportation Services for Individuals with Disabilities to Access Employment through DSS Inventory Linkage and Mobility Management: Sharing Transportation Needs and Resources*, University of Massachusetts Medical School, Work Without Limits Initiative, **\$20,000**.
- ▲ Co-PI: *Integrated Payment Systems: Consortium on Security and Privacy (IPS-CUSP)*, funded by the UMass President's Science and Technology Grant Initiative Fund, **\$125,000**, July 15, 2008 – July 14, 2010.
- ▲ PI: *University Collaborative for Intelligent Transportation Systems (UC for ITS)*, funded by the UMass President's Science and Technology Grant Initiative Fund, \$160,000 plus \$10,000 from UMD Chancellor and \$10,000 from UMass Boston Chancellor for a total of **\$180,000**, July 15, 2007 – July 14, 2009.
- ▲ PI: *Transportation Research Agreement Between the State of Vermont Agency of Transportation and the University of Massachusetts Dartmouth*, funded by VTrans (Vermont Department of Transportation), **\$600,000**, February 19, 2002.
- ▲ Co-PI: *SWE-UMD Outreach to Middle/High Schools*, funded by the Boston Foundation for Architecture, **\$2,200**, June 1 2000 – August 31, 2000.

b. Individual

- ▲ PI: *Security and Privacy Breaches in ETPS: Problem Survey & Case Study of I-90*, subcontract University of Massachusetts Amherst, **\$74,170**, subaward #13-007257 B 00, New England UTC Prime Award Number MIT 570003339, June 1, 2012 – July 31, 2014

- ▲ PI: *TC: Medium: Collaborative Research: Pay-as-you-Go: Security and Privacy for Integrated Transportation Payment Systems*, National Science Foundation (NSF), CNS Trustworthy Computing, **\$100,000**, June 1, 2010 – December 31, 2013.
- ▲ PI: *Two Projects in Fleet Tracking Technology Deployment to Enhance Mobility Management*, funded by the National Center on Senior Transportation (NCST) University Student Scholars Program, **\$2,000**, January 15, 2010 – January 14, 2011.
- ▲ PI: *Alternative Campus Evacuation Scenarios Using VISSIM Modeling and Simulation Software*, funded by UMass Dartmouth Office of Faculty Development, **\$1,500**, February 1, 2010 – January 31, 2011.
- ▲ PI: *Integrated Transportation Payment Systems: Principles, Concepts, and Applications*, **\$5,550**, funded by USDOT UMass Transportation Center, September 1, 2009 – July 31, 2011.
- ▲ PI: *Transit Management Systems*, subcontract to the IBI's *New Bedford ITS Deployment Project*, funded by USDOT, **\$20,000**, March 1, 2009 – May 31, 2010.
- ▲ PI: *Calibration and Validation of SHAKER and TNCC for Deployment on Florida's Turnpike*, funded by the Center for Advanced Transportation Systems Simulation, University of Central Florida, Florida Department of Transportation, **\$40,000**, August 31, 2007 – March 31, 2009.
- ▲ PI: *Sabbatical Leave Grant: SHAKER: a Toll Plaza Queuing Model*, funded by the Center for Advanced Transportation Systems Simulation, University of Central Florida, **\$60,000**, August 24, 2005 – May 31, 2006.
- ▲ PI: *Supplement Grant TNCC Validation and Enhancement*, funded by the Center for Advanced Transportation Systems Simulation, University of Central Florida, Florida Department of Transportation, **\$3,000**, March 1, 2004 – August 15, 2004.
- ▲ PI: *TNCC Validation and Enhancement: DSS for Choosing the Best Toll Plaza Lane Configuration*, funded by the Center for Advanced Transportation Systems Simulation, University of Central Florida, Florida Department of Transportation, **\$75,000**, December 1, 2002 – March 1, 2004.
- ▲ PI: *Grant Extension Capacity of the OOCEA Network of Toll Roads with Electronic Toll Collection (ETC)*, funded by the Center for Advanced Transportation Systems Simulation, University of Central Florida, Florida Department of Transportation, **\$7,500**, August 15, 2002.
- ▲ PI: *Capacity of the OOCEA Network of Toll Roads with Electronic Toll Collection (ETC)*, funded by the Center for Advanced Transportation Systems Simulation, University of Central Florida, Florida Department of Transportation, **\$40,000**, April 27, 2001 – February 27, 2002.
- ▲ PI: *TPQueue: a queuing model to estimate Toll Plaza Congestion & Vehicular Emission*, funded by the UMD Foundation / Healey Endowment Grant Program, **\$2,500**, January 1, 1999 – December 31, 1999.

CONFERENCE PRESENTATIONS

a. Invited Slide Presentations on technical research, presented outside UMD – no proceedings published

1. Marguerite Zarrillo, Fleet Tracking, a Mobility Management Tool, presented at the 20th Annual Coalition of Urban and Metropolitan Universities, CUMU, Conference, Syracuse, NY, October 5-7, 2014.
2. , DSS for New England DOTs that Best Determine When to Impose SLRs using Data Collected via CRS&SI Technology, presented at TRB's 92nd Annual Meeting, *Sensing Technologies for Transportation Applications workshop # 135*, sponsored by ABJ50 and ABJ60, Washington D.C. , January 13, 2013. <http://amonline.trb.org/39g3na/1>
3. Zarrillo, Marguerite L., Deployment of Protection Measures and its Impact on Capacity at Toll Collection Facilities, *Trustworthy Computing (TC): Pay-as-you-Go 3rd Workshop and Conference*, UMass Amherst, July 26, 2012.
4. Miller, Heather, Marguerite Zarrillo, Ramprasad Babasubramanian, Honggang Wang. Data Collection via CRS&SI Technology to Determine when to Impose Spring Load Restrictions (SLR), presented at TRB's 91st Annual Meeting, *Sensing Technologies for Transportation Applications workshop # 184*, sponsored by ABJ50 and ABJ60, Washington D.C. , January 22, 2012.
<http://pressamp.trb.org/conferenceinteractiveprogram/EventDetails.aspx?ID=22545>
5. Zarrillo, Marguerite L., Road Weather Management Stakeholders Meeting, Data Collection via CRS&SI Technology to Determine when to Impose SLR, Albuquerque, NM, September 7-9, 2011.
http://www.its.dot.gov/clarus/road_weather_meeting.htm
<http://www.its.dot.gov/clarus/pdf/2011%20Road%20Weather%20Management%20Stakeholder%20Meeting.pdf>
http://www.its.dot.gov/presentations/roadweather/Zarrillo_RemoteSensing_files/frame.htm
6. Zarrillo, Marguerite L., Data Collection via CRS&SI Technology to Determine when to Impose SLR. Final Meeting S&T Consortium on Anytime-Anywhere-Anyway (AAA) Transportation Information, UMass Amherst, June 10, 2011.
7. Azogu, Ikechukwu and Marguerite Zarrillo. Measurement of Electronic Payment Systems on Traffic Operations, Security and Privacy: Proposed Research. *ITS Massachusetts 16th Annual Meeting and Conference*, Boston, April 6, 2011.
8. Zarrillo, Marguerite L., Ikechukwu Azogu and Neda Masoud, Enhancing Transportation Service in the local Community for Low Income, Elderly, Students and People with Disabilities, [Massachusetts Association of Councils on Aging and Senior Center Directors annual meeting](#), North Falmouth, MA, October 6-8, 2010.
9. Zarrillo, Marguerite L., Ikechukwu Azogu and Neda Masoud, Fleet Tracking & Data Management for Transportation Providers of Low Income, Elderly, Students and People with Disabilities, Southeastern Massachusetts Sustainability Council meeting, sponsored

by the UMD Sustainability Office, SRPEDD and SMTA. New Bedford, MA, September 23, 2010.

10. Zarrillo, Marguerite L., ETC, AET, ORT: financing our transportation infrastructure; what's next around the globe?, *Trustworthy Computing (TC): Pay-as-you-Go 1st Workshop and Conference*, Amherst, MA, June 3, 2010.
11. Zarrillo, Marguerite L. Open Road Tolling (ORT): What's Next Around the Globe? *ITS Massachusetts 15th Annual Meeting and Conference*, Boston, April 29, 2010.
12. Zarrillo, Marguerite L., Tyler Spillhaus, Fadi Berbara, Matt Madonna. Evacuation of UMass Dartmouth using VISSIM. *ITS Massachusetts 15th Annual Meeting and Conference*, Boston, April 29, 2010.
13. Zarrillo, Marguerite L. and Angela Cadet. UMass Dartmouth Transportation Research Newsletter. *ITS Massachusetts 15th Annual Meeting and Conference*, Boston, April 29, 2010.
14. Zarrillo, Marguerite L., UMass Collaborative for ITS and the ITS Certificate Program, *ITS Massachusetts 14th Annual Meeting and Conference*, Boston, April 28, 2009.
15. Zarrillo, Marguerite L., John Collura, Nathan Gartner, Tomas Materdey, UMass ITS Certificate Program – Meeting the Commonwealth's workforce training needs in ITS, *ITS MA Board & ITS America Joint Meeting*, Boston, February 9, 2009.
16. Zarrillo, Marguerite L. Decision Support System, DSS for Toll Roads. *ITS Massachusetts 12th Annual Meeting and Conference*, Boston, MA, May 1, 2007.
17. Zarrillo, Marguerite. Throughput Optimization at Toll Collection Facilities Providing More than One Collection Service Type in the Same Lane. *Optimization Days*, Université de Montréal, May 2002. <http://www.crt.umontreal.ca/jopt2002/en/>
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b. Invited Slide Presentations on technical research, presented inside UMD

– no proceedings published

18. Zarrillo, Marguerite. Surface Transportation Engineering: Theory, Operations, Simulations, Tolling and Driver Behavior, UMass Dartmouth Research Retreat #2, UMD BOT, January 16, 2015.
19. Zarrillo, Marguerite. Fleet Tracking, a Mobility Management Tool, UMass Dartmouth Service Learning and Student Engagement 1st Annual Meeting, UMD Library Reading Room, March 6, 2015.

Works presented at UMass Dartmouth Sigma Xi Poster Research Exhibit – Graduate Research, some of which are related to Masters Thesis or Ph.D.

dissertation research

- 20. Li, Weiwei and Marguerite Zarrillo, Simulation Using VISSIM of an Existing Traffic Area and a Proposed Solution. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.**
- 21. Mitsmenn, Benjamin J. and Marguerite Zarrillo, Thurber's Avenue Curve, Providence RI: A Comprehensive Analysis of Traffic Flow and Access Ramp Location Functionality on Northbound Interstate 95. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.**
- 22. Beaudry, Jeffrey and Marguerite L. Zarrillo. Feasibility Study for the Conversion of Several Dartmouth Intersections to Median U-Turn Intersections. Poster sessions at the 19th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 23-24, 2013.**
- 23. Bresten, Christopher and Marguerite Zarrillo. Continuum Modeling of Pedestrian Traffic for barrier Analysis. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 24. Cabral, Christopher S. and Marguerite L. Zarrillo. Investigation of the North Attleborough, MA Route 1 – Route 1A – Elmwood St Intersection. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 25. Lazkani, Elia El, Marguerite L. Zarrillo, Tyler Spilhaus and David Prairie. ITPS Security & Privacy Breaches; Extent of the Problem and a Simulated Case Study. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 26. O'Connor, Scott, Aaron Larocque, Ramprasad Balasubramanian, Marguerite Zarrillo, Heather Miller and Honggang Wang. Data Collection via CRS & SI Technology to Determine when to Impose SLR Spring Load Restrictions. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 27. Parajuly, Suren and Marguerite Zarrillo. Newly Constructed Interchange for I-195 to Accommodate UMass Dartmouth. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 28. Sangoju, Sreekanth and Marguerite Zarrillo. Signalizing the T-intersection of Old Westport Rd and Chase Rd, Dartmouth, MA. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 29. Schöndienst, Thilo and Marguerite Zarrillo. Models and Technology to Influence Driver Behavior around the Globe. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**

30. Azogu, Ikechukwu and Marguerite Zarrillo. Measurement of Electronic Payment Systems on Traffic Operations, Security and Privacy: Proposed Research. Poster sessions at the 17th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2011.
31. Masoud, Neda and Marguerite Zarrillo. Examining the Impact of Traffic Mix and Driver Behavior Complexities on Fundamental Flow Diagram Using HighSim. Poster sessions at the 17th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2011.
32. Otu, Wisdom, Tyler Spilhaus and Marguerite Zarrillo. Ring Road Traffic Simulation, One Way versus Two way. Poster sessions at the 17th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2011.
33. Azogu, Ikechukwu and Marguerite Zarrillo. Real-Time Online Vehicle Tracking Using Google Map GPS Cell Phone Tracker. Poster sessions at the 16th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2010.
34. Masoud, Neda and Marguerite Zarrillo. Flow Density Diagram: Modeling the Data with Kinematics. Poster sessions at the 16th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2010.
35. Zarrillo, Marguerite and Emmanuel Q. Agyei. Decision Support System to Model Traffic Generated Pollution at Toll Plazas. Poster sessions at the 12th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2006.
36. Zarrillo, Marguerite L. and Animesh Basnet. DSS and GUI, Decision Support System and Graphical User Interface to Assist in Choosing Appropriate Lane Configurations at Toll Facilities. Poster session at the 11th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2005.
37. Zarrillo, Marguerite and Ali Jaffery. Modelling Traffic at Toll Plaza Facilities, NQMC. Poster session at the 10th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2004.
38. Zarrillo, Marguerite, Animesh Basnet, Amarnath Chennamaraju, Ali A. Jaffery, Angus Mak and Shivraj Vichare. Decision Support System for Toll Network Operators. Poster session at the 10th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2004.
39. Zarrillo, Marguerite and Daniel Schmitt. Modeling Traffic at Toll Collection Facilities by Applying Vehicle Properties, Driver Perception–Reaction Time and Stop–Time to the Basic Equations of Motion from Car-Following Theory. Poster session at the 10th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2004.
40. Zarrillo, Marguerite and Ali Jaffery. TNCC, Toll Network Capacity Calculator. Poster session at the 9th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2003.

41. Zarrillo, Marguerite and Daniel Schmitt. Modelling Toll Plaza Performance Decision Support System for Operators: SHAKER. Poster session at the 9th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2003.

Additional Works presented at UMass Dartmouth Sigma Xi Poster Research Exhibit – Undergraduate Research

42. Azor, Cedrick, and Marguerite Zarrillo, Route 18 East Bridgewater Intersection, MA. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
43. Bond, Stephanie, Mountain Madness. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
44. Cecelya, Ethan, and Marguerite Zarrillo, Improving the UMass Dartmouth Entrance and Surrounding Area. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
45. Corsano, Taylor, and Marguerite Zarrillo, Entrance to the University of Massachusetts Dartmouth, MA. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
46. Deng, Yuyin, and Marguerite Zarrillo, Feasibility of Installing Flashing Yellow at the Intersection of Route 151 and Old Barnstable Road (Cape Cod, MA). Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
47. Duhamel, Benjamin, and Marguerite Zarrillo, Assessing Stormwater Runoff with Bioswales, Dartmouth, MA. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
48. Dumas, Trever, and Marguerite Zarrillo. Impact Study of a Proposed Third Cape Cod Bridge. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
49. Gallagher, Sean, and Marguerite Zarrillo, Investigating Solutions to Gridlock in Northboro. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.

50. Medeiros, Josh, and Marguerite Zarrillo, Signalizing the T-Intersection of Old Westport Rd and Chase Rd, Dartmouth, MA. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
51. Pavao, Steve, Yahya Maatouk and Marguerite Zarrillo, Possible Alternative Toll Collection Methods for the Turnpike in Massachusetts. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
52. Perkins, Jacqueline, and Marguerite Zarrillo, Adopting Pedestrian Friendly Designs. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
53. Perry, Thomas, and Marguerite Zarrillo, Snow and Ice Control: Environmentally Viable Options for Anti-Icing Roads in Massachusetts. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
54. Roche, Joseph, and Marguerite Zarrillo, Winter Road Safety and Road Treatment Types. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
55. Santos, David, and Marguerite Zarrillo, Roundabout Design for Route 140 & Route 6 Intersection. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
56. Waters, Michael, and Marguerite Zarrillo, Investigation of the Taunton, MA, Intersection at Dean St (Route 44) – Longmeadow Rd – Owen Rdwy. Poster sessions at the 21st Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 22-23, 2015.
57. Berganti, Christopher, Joseph Teixeira and Marguerite Zarrillo, South Main St. Fall River, MA. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.
58. Bizcaino, William A, Lawrence Davis and Marguerite L. Zarrillo. Improvements For the State Road and Hathaway Road Intersection. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.
59. Bomely, Ashley, Collin Patrick Slade and Marguerite L. Zarrillo. Intersection Safety Study & Intersection Redesign: Winnapaug Road at Airport Road in Westerly, RI.

Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.

- 60. Bouchard, Chelsea E. and Marguerite Zarrillo, Concern for a Heavily Traveled Traffic Area: Foxboro, Massachusetts. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.**
- 61. DaSilva, Janssen, Ciano Mendez and Marguerite Zarrillo, Southcoast Bikeway Safe Routes Analysis. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.**
- 62. Grasso, Thomas J. and Marguerite Zarrillo, Fall River Bike Path on the Eastern Ave / Pleasant Street Intersection. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.**
- 63. Hart, Adam M, Evan Ross and Marguerite L. Zarrillo. New Bedford - Fairhaven Bridge. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.**
- 64. Lapointe, Alex and Marguerite Zarrillo, Accessibility to Wamsutta Mill Complex and Whale's Tooth Station in New Bedford. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.**
- 65. Palmer, Kevin, Kendra Santamaria and Marguerite Zarrillo, Pedestrian Traffic on the UMass Dartmouth Campus. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.**
- 66. Szarek, Conor and Marguerite Zarrillo, Suggesting Expanded Routes for the City of Fall River's Bikeway Master Plan Using Case Studies and Qualitative Data. Poster sessions at the 20th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 15-16, 2014.**
- 67. Campbell, Kameron, Travis Ward and Marguerite L. Zarrillo. Renovations To Chartley Four Corners in Norton, Massachusetts: Signalization as a Renovation. Poster sessions at the 19th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 23-24, 2013.**
- 68. Kneeland, Robert and Marguerite L. Zarrillo. VISSIM Traffic Simulation Intersection I-195 and Plymouth Ave Fall River, MA. Poster sessions at the 19th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific**

Research Society - UMass Dartmouth Chapter, April 23-24, 2013.

- 69. Li, Jianyang and Marguerite L. Zarrillo. Relieving Congestion at the Intersection of Allen Street and Slocum Road. Poster sessions at the 19th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 23-24, 2013.**
- 70. Prairie, David, Neuza Pedro and Marguerite L. Zarrillo. VISSIM Traffic Simulation at Intersection Route 114A and Arcade Ave, Seekonk, MA. Poster sessions at the 19th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 23-24, 2013.**
- 71. Prairie, David, Neuza Pedro and Marguerite L. Zarrillo. ETPS Security & Privacy Breaches; Extent of the Problem, Update. Poster sessions at the 19th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 23-24, 2013.**
- 72. Wright, David J., Joseph E. Coon and Marguerite L. Zarrillo. Alternative Designs For Route 128 Interchange & Close Proximity High Street Intersection, Danvers, MA. Poster sessions at the 19th Annual University of Massachusetts Dartmouth Research Exhibition, sponsored by the Sigma Xi Scientific Research Society - UMass Dartmouth Chapter, April 23-24, 2013.**
- 73. Zarrillo, Marguerite, Matthew Dashner and Peter Engle. Analysis of Signal Warrants and VISSIM Simulation of Milton Street Intersections. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 74. Zarrillo, Marguerite and Luis de Oliveira. Analysis for Improvements to Globe Four Corners Intersection in Fall River MA. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 75. Zarrillo, Marguerite, Robert Drown and Brenton Medeiros. Improvement to the I-195 Interchange with Faunce Corner Road. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 76. Zarrillo, Marguerite, Emilio Estacio, Ahmed D. Mahaba and William W Porter. Coordination & Optimization of Signalized Intersections In Order to Reduce Travel Time on the Route 6 Corridor through Dartmouth, MA. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 77. Zarrillo, Marguerite, Brian Hassett and Brandon Melo. Faunce Corner Road & I-195 Diverging Diamond Interchange A Retrofit as a Solution To Congestion Area. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**
- 78. Zarrillo, Marguerite and David Prairie. ETPS Security & Privacy Breaches; Extent of the Problem Case Study. Poster sessions at the 18th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2012.**

79. Zarrillo, Marguerite, O'Mara Antoine and Ashley Costa. Analysis of 2007 UMass Dartmouth Campus Parking Survey. Poster sessions at the 16th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2010.
80. Zarrillo, Marguerite, Fadi Berbara, Matthew Madonna, Dalton Ryan and Tyler Spilhaus. UMass Dartmouth Evacuation Using VISSIM. Poster sessions at the 16th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2010.
81. Zarrillo, Marguerite, Stephen Hildreth and Chris VanDenBerghe. Assessment of Congestion of Two Adjacent Intersections in North Dartmouth, Massachusetts. Poster sessions at the 16th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2010.
82. Zarrillo, Marguerite, Jason Muller and Emile Tayeh. A Visual Simulation of Two Intersections in West Bridgewater, MA: A Unique Stretch of Route 106. Poster sessions at the 16th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2010.
83. Zarrillo, Marguerite, Joe Piccirilli, Shane Pikor and Nicholas Shom. Impacts of Cell Phone Usage on Drivers' Performance. Poster sessions at the 16th Annual University of Massachusetts Dartmouth Sigma Xi Research Exhibit, April 2010.

ACADEMIC & PROFESSIONAL HONORS & AWARDS

A. Professional Recognition, Honors & Awards:

- ♣ I am a [recipient](#) of the 2010 UMass President's [Public Service Award](#).
- ♣ I am a voting Board member of the international [Traffic Flow Theory and Characteristics](#) Committee of the Transportation Research Board, [TRB](#).
- ♣ I am a voting Board member of the Intelligent Transportation Society, [ITS-MA](#), the Massachusetts Chapter, as of April 2008, friend as of September 1998. This is one of many Chapters of the National [ITS America](#). I have also served 4 terms as an elected official, Secretary of ITS-MA, from April 2001 until April 2005. In addition, I served as past Vice Chair of [ITS-MA](#) Technical Committee. I served as *World Congress Ambassador* for the [ITS](#), Intelligent Transportation Society, Florida Local Arrangements Committee for the *1996 3rd World Congress on Intelligent Transportation Systems* in Orlando, Florida. The annual World Congresses on Intelligent Transport Systems is an international meeting and exhibition that rotates among three major geographic regions (Americas, Europe, Asia Pacific), and is therefore held in or near the U.S. once every three years. This event is co-sponsored by ITS America, [ITS Japan](#), and [ERTICO-ITS Europe](#).
- ♣ I am the past Chair of ASCE Transportation & Development Institutes's, T&DI, Intermodal Committee, <http://content.tanddi.org/>. T&DI organizes the international Advanced Applications in Transportation Technology (AATT) conferences among other things.
- ♣ March 2006, I received my *Excellence in Entrepreneurship Certificate*.
<http://floridaphotonicscluster.blogspot.com/2008/11/excellence-in-entrepreneurship.html>

- ▲ November 17, 1999, I was awarded the Certificate of Achievement for completing the Massachusetts Quality Award's (MQA) examiner training program. This Certificate enable me to participate as an examiner on teams put together by MassExcellence <http://www.massexcellence.com/> and visit Companies on-site, review the Companies' Award Applications and select the awarding Company. Massachusetts' statewide Baldrige-based education, state examiner, assessment and award program is based on the Malcolm Baldrige National Quality Program at the National Institute of Standards and Technology, Department of Commerce. <http://www.baldrige.nist.gov/>
- ▲ Spring, 2003, I received the UMD Chancellor's Outstanding Woman Award.
- ▲ Member of the Engineering Honor Society Tau Beta Pi. <http://www.tbp.org/pages/main.cfm>
- ▲ Member of the Physics Honor Society Sigma Pi Sigma. <http://www.sigmapisigma.org/>
- ▲ Member of Sigma Xi, The Scientific Research Society. <http://www.sigmaksi.org/>
- ▲ December 2007 I was inducted into the Golden Key Honor Society. <http://www.goldenkey.org/GKIHS>.
- ▲ Fall 2002, I was granted the UMD "Unsung Hero" award for all my efforts in assisting the Admissions office and its activities. I received a gift as well as a certificate signed by the Director of Admissions and the Assistant Chancellor for Enrollment Management.

B. Monetary Travel Awards:

- ▲ January 2014, UMD's Office of the Provost awarded \$500 toward my trip to Washington DC. My student presented our paper at the Transportation Research Board, [TRB, 93rd Annual Meeting](#). My grant supported one UMass Dartmouth undergraduate student to also attend this conference. In addition the Office of the College of Engineering awarded \$800 toward this same trip.
- ▲ Travel to Conferences and research meetings paid entirely by my Grant Awards 2012-2013.
- ▲ January 2011, UMD's COE Dean awarded \$1000 through the TRIPS program toward my trip to Washington DC. I presented a proposal to the [USDOT RITA](#), US Department of Transportation Research and Innovative Technology Administration.
- ▲ January 2011, UMD's Office of the Provost awarded \$500 toward my trip to Washington DC. My student presented our paper at the Transportation Research Board, [TRB, 90th Annual Meeting](#). My grant supported two UMass Dartmouth Physics graduate students to also attend this conference.
- ▲ July 2010, UMD's Office of the Provost awarded \$500 toward my trip to Annecy, France. I presented my paper at the [TRB TFT mid-year meeting](#).
- ▲ January 2010, UMD's Office of the Provost awarded \$500 toward my trip to Washington DC. I presented a paper at the Transportation Research Board, TRB, 89th Annual Meeting. My grant supported two UMass Dartmouth Physics graduate students to also attend this conference.
- ▲ June 2008, along with COE Dean and the Chairs of the Biology and Chemistry Departments, I received a stipend from UMD's Office of the Provost to attend the *Best Practices in Science Education Conference* at Amherst.
- ▲ May 2007, UMD's Office of the Provost awarded a \$500 stipend toward my trip to Montreal

CA. I presented my paper at the 18th IASTED International Conference and received a *Certificate for Contribution*.

▲ April 2007, UMD's Office of the Provost awarded a small stipend toward my trip to Boston. I presented a paper at the 12th ITS-MA Annual Meeting and Conference.

▲ January 2006, UMD's Office of the Provost awarded \$500 toward my trip to Washington DC. I presented a paper at the Transportation Research Board, TRB, 85th Annual Meeting. My grant supported a UMass Dartmouth Physics graduate student to also attend this conference.

▲ May 2004, UMD's College of Engineering awarded \$1000 and the Office of the Provost awarded \$500 toward my trip to Beijing China, where I presented a paper at the ASCE's 8th AATT Conference.

▲ January 2004, UMD's Office of the Provost awarded \$500 toward my trip to Washington DC. I presented a paper at the Transportation Research Board, TRB, 83rd Annual Meeting. I also presented a poster session and my grant funded one of my students to attend this conference.

▲ August 2000, I received a stipend of \$421.25 from CATSS to attend meetings in Orlando, FL concerning the feasibility and benefits of a project concerning the capacity analysis of the OCEA's toll road network. These meetings were held from August 14 to August 17, 2000.

▲ August 19, 2000, I received a stipend of \$414.95 from the national society, ASCE, to attend as the Junior Faculty Member Representative the *Conference Organizing Committee* meeting for ASCE's 2002 AATTE Conference.

▲ July 2000, I received a \$1000 stipend for attending the 2nd STEMTEC Summer Institute on Student Active College Teaching in Math and Science" in the summer, July 17 through July 20, 2000, held at the University of Massachusetts Amherst. STEMTEC stands for Science, Technology, Engineering, and Mathematics Teacher Education Collaborative and is funded by the National Science Foundation

▲ Summer, 1999, I received an award for participation in the STEMTEC Summer Institute at the University of Massachusetts Amherst. STEMTEC is the Science, Technology, Engineering, and Mathematics, Teacher, education Collaborative.

▲ 1998 through Fall, 2003, for eleven semesters, I received stipends for work in the University's Advising Center.

▲ Fall 1998 & Spring 1999, I received a stipend for attendance of the Dialogues with Fall River Middle School and High School Leaders. The Leadership Academy, which was a follow-up of these Dialogues, also provided a stipend for the spring semester of 1999. These Dialogues are in support of the Teaching and Learning Center / UMD.

OTHER PROFESSIONAL ACTIVITIES

a. Affiliations

- I am a UMassAir Research Affiliate of **The UMass Unmanned Aerial System Research & Education Collaborative (UASREC)**. I advice students on drone transport applications to real-time data collection that result in a wide range of applications such as transportation data

collection, sampling of sea turtles, farmland water flow, and drone thermal sensors to detect bird nest eggs in grasslands. I conference call into UMassAir regular monthly meetings held at UMass Amherst.

- I am an active member of [ASCE](#), American Society of Civil Engineers. I am a member of the *Infrastructure System Committee, ISC*, within ASCE's Transportation & Development Institute, T&DI. I am also past Chair of T&DI's *Intermodal Transportation Committee*. I am also an active member of ASCE's [BSCES](#), the Boston Society of Civil Engineers Section.
- I am an elected member of the Traffic Flow Theory Committee of the Transportation Research Board, [TRB](#). I am a *friend* (active paper reviewer and subcommittee contributor) of TRB's Highways Capacity and Quality of Service Committee and TRB's Traffic Operations Committee.
- 2008-2016, I was a Board member of the Intelligent Transportation Society, [ITS-MA](#), the Massachusetts Chapter of [ITS America](#). I have regularly presented at ITS-MA Annual Meetings and published in the ITS America Annual Meeting Proceedings. I have also served 4 terms as an elected official, Secretary of ITS-MA, from April 2001 until April 2005. In addition, I served as past Vice Chair of [ITS-MA](#) Technical Committee for 3 years. I also served as an Ambassador to the *World Congress*, Intelligent Transport Society. I have also presented and published at the World Congress on Intelligent Transport Systems. The three main world organizations responsible for advancing Intelligent Transport Systems, ITS JAPAN, ITS America and ERTICO - ITS Europe, have agreed that there should be one major international World Congress each year. They aim to provide a prestigious platform for the presentation and discussion of advanced concepts, research results, and deployment activities.
- 2016-today, I am a Board member of the New England Transportation Society, [NEITS](#), formerly ITS-MA. I was on the organizing committee for the NEITS Interchange Conference, April 24-25, 2017.
- Member of the [Sustainability Council Southeastern Massachusetts](#), co-chair of the [Transportation Working Group](#).
- Director and creator of the UMass Collaboration for ITS, a 4-member, 4-campus group of faculty established to write grant-proposals and create online ITS courses for transportation professionals.
- Member of the UMass Integrated Payment Systems - Consortium on Security and Privacy ([IPS-CUSP](#)), a multidisciplinary research group of faculty from UMass and Brown University, researching cryptographic protocols of transportation payment systems that preserve privacy and payment security. The group includes a diverse team of experts in computer science, electrical and computer engineering and transportation engineering.
- Board member of the Southeastern Massachusetts Transportation Alliance, [SMTA](#).
<http://www.srpedd.org/SMTA%20website/SMTA%20Summary.pdf>
<http://www.thesunchronicle.com/articles/2010/07/28/news/7738740.txt>
http://www.heraldnews.com/news/local_news/x730410521/ROUTE-OF-THE-PROBLEM-New-group-tackles-transportation-woes
http://boston.bizjournals.com/boston/related_content.html?topic=Southeastern%20Massachusetts%20Transportation%20Alliance
<http://www.thesunchronicle.com/articles/2010/08/03/taunton/7739742.txt>
<http://www.srpedd.org/SMTA%20website/Brief%20Summary%20of%20Focus%20Groups.pdf>
- Active participant in International Bridge, Tunnel and Turnpike Association, [IBTTA](#)

- Active paper reviewer for conferences: TRB, ASCE, IEEE, AATT, [INFORMS](#), ITS, IBTTA
- Active participant in [ITE](#), Institute of Transportation Engineers; past President of the Student Chapter University of Central Florida Student Chapter, 1995-98.
- Past participant in [WTS](#), Women's Transportation Seminar – Boston Chapter; I served on the Board of Directors for the Central Florida Chapter, 1997-1998
- I am a past member of [SWE](#), the National Society of Women Engineers, and serve as UMD Counselor for the student chapter 2002-2005.
- I am a past member of [APS](#), the American Physical Society.

b. Transportation Software & Model Development

- **TPModel :**

This is Software that predicts the vehicle delay at a toll collection facility and then draws the cumulative arrival and cumulative departure diagrams. It also animates the queue lengths in all lanes over the entire course of the rush hour. Input includes the characteristics of the arriving traffic and characteristics of the toll facility.

- **TPCC :**

This is Software that calculates the capacity at a toll facility. The calculation is based on plaza characteristics such as the number of lanes and types of services in each lane and their processing rates. It is also dependent upon the traffic characteristics such as the usage of ETC usage, automatic coin machines and percentage of arrivals that are trucks using traditional services.

- **TNCC :**

This is Software that calculates the No-Queue-Maximum-Throughput, NQMT, at a toll facility. The iterative methodology initially overestimates the plaza's capability to process traffic volumes, then reduces the number of approaching vehicles until the plaza successfully processes all vehicles such that queues no longer exist at the end of the hour. This reduction maintains the approaching traffic characteristic values such as the usage of ETC, usage of the Automatic Coin Machines and usage by arrivals that are trucks using traditional services. The calculation is based on plaza characteristics such as the number of lanes and types of services in each lane and their processing rates. Processing rates in the mixed service lanes are increasing sinusoidal functions.

- **SHAKER :**

This is Software that in addition to calculating the NQMT at a toll facility also calculates the Maximum Throughput whenever queues exist at the end of the hour. The calculation is based on probability and car-following theory. The user builds a plaza with particular characteristics such as the number of lanes and types of services in each lane and their processing rates (used in the calibration procedure). The current version of SHAKER allows for 5 different categories of traffic. The Maximum Throughput is dependent upon vehicle properties in each of the categories such as the average lengths of the vehicles, average distance-gap-lengths between vehicles, average acceleration and deceleration values for the vehicles, and the average time vehicles stop to pay their toll. The Maximum Throughput also depends upon the driver's reaction times and traffic characteristics such as the usage of Electronic Toll Collection, ETC, Automatic Coin Machines usage and the usage by arrivals that are trucks using traditional services.

- **DSS OOCEA & FTE :**

The Decision Support System, DSS, assists engineers and operators make decisions concerning a network of toll roads. It is connected to a database containing highway network hourly geometric and traffic information and provides operators with on-line tools that aid in their hour-to-hour

decisions concerning toll plaza lane configurations. Operators may plan for special scheduled events in which traffic volumes are known to surge. Using the DSS, Engineers may design lane configurations at toll facilities that meet traffic requirements. Engineers may also design new interchange locations on the highway network and predict the effect on toll plazas segments as well as the effect on the overall network. The effect of adding additional lanes to busy highway segments is predicable. The effects of an incident or other unscheduled lane closing at any particular hour of the day can be simulated. Furthermore, maintenance and lane closers for construction may be scheduled at hours of the day in which bottlenecks are at a minimum.

- **DSS New England Roadway Thaw :**

The Decision Support System, DSS, assists engineers decide when to close roadways to heavy vehicles during the spring thaw. Frozen subsoil beneath roadways begins thawing from top down, thus firm road supporting subsoil becomes more fluid-like during spring thaw. Heavy vehicle traffic can destroy pavement during this critical time and road closures to heavy vehicles are necessary. The DSS has a large ArcGIS database used to create the Thaw Plot at eight data collection sites in northern New England. The data is easily accessed on the DSS via an ArcGIS mapping interface that displays site locations. These Thaw Plots are graphs in time of the subsoil depth at which temperatures are 32 degrees Fahrenheit. During spring thaw, there are usually two depth-points where the subsoil is 32 degrees. The deeper point is at the bottom of the frozen subsoil, typically 5-7 feet, and the upper point is at the top of the frozen subsoil, sometimes just below the roadway pavement, but deepening as summer approaches. These plots assist engineers and roadway managers in their decisions for road closure to heavy vehicles. Models are also being developed to predict Thaw Plot data points using air temperatures rather than the data from the data collection sites. This is necessary because the sensors and instrumentation at these sites is very expensive and is limited to eight sites. Using air temperature data to model Thaw Plots allows engineers to determine road closures over a larger region efficiently and cost effectively.

- **Fleet Tracking & Data Management DSS for Small Transportation Providers :**

By providing mobility management to transportation providers in southeastern Massachusetts, a more coordinated and efficient transportation delivery system can be established for the elderly, people with lower incomes, students, and people with disabilities and special needs. The project also provides a service learning experience for students. New technology GPS cell phone technology and opensource software that students customized and deployed enabled fleet tracking of vehicles and data management for three small, local transportation providers: the New Bedford Council on Aging (NBCA), Community Care-A-Vans (CCAV) and the UMass Dartmouth DartVan services. Although current lower costs for fleet tracking software and hardware now enable this technology to be financially and technologically possible, many of these community providers have little knowledge over their deployment. Through interaction with the providers and their drivers, students collected needs and resource data, customized mapping decision support systems (DSS) that contained tracking capabilities and interactive database capabilities. Through interaction with these community transportation providers, students designed the DSS so that future supplementary features, such as reporting tools, could be added with ease. These providers can use these tools to report accurate trip information to prospective funding agencies.

- **Centralized Inventory of Transportation Providers in Southeastern Massachusetts to Encourage Resource Sharing :**

By providing a central location of information, an inventory or a searchable database, for small transportation providers in the region, it is hoped that they will develop relationships, link resources, share relevant information, share vehicles, reduce unnecessary duplicate trips, thus

resulting in reduced fuel consumption, shorter driving times and improved services. For example, the potential is great for the sharing of resources such as idle vehicles. By delivering mobility management improvements along with the inventory, students facilitate sustainability as well as provide financial support to small community transportation providers.

- **Decision Support System for Seasonal Load Restrictions, DSS-SLR :**

Sponsored by the USDOT's RITA, my interdisciplinary research team collaborated with the USDA Forest Service, the Maine Department of Transportation (DOT), the New Hampshire DOT, and USDOT RITA to develop a new experimental system that monitors subsurface roadway health conditions in real time during the critical spring thaw and recovery periods. The DSS-SLR collects subsurface temperature data via satellite and cellular transmission, stores and plots the data and then through analysis, determines whether roads are vulnerable to damage by heavy vehicular traffic. State DOTs restrict heavy vehicles from using the roads by imposing seasonal load restrictions (SLR) during these short critical spring thaw periods. This research project eliminates manual data collection and replaces it with state-of-the-art commercial remote sensing and spatial information (CRS&SI) technology for real time data transfer via satellite. Because the DSS determines when to effectively impose SLRs, it will assist State DOTs in minimizing road damage and road maintenance costs. Additionally, it prevents imposition of SLRs at inappropriate times, minimizing inconvenience to drivers and minimizing fuel costs to the commercial vehicle industry that often must reroute deliveries. By using CRS&SI technology, State DOTs will also eliminate the manual collection of subsurface temperature data. Centralizing data will simplify its processing, thus making them less tedious and more automated. Although the DSS will primarily be used for monitoring, it is anticipated that State DOTs and the commercial vehicle industry will expand the DSS with other applications and use it for training. <http://mzgis.prod.umassd.edu/dssslr>

- **Decision Support System for Electronic Transportation Payment Systems, ETPS**

Sponsored by the National Science Foundation, NSF, this research investigates the security and privacy breaches of Electronic Transportation Payment Systems, ETPS, via Radio-Frequency Identification, RFID, tags and smart cards, their frequency of occurrence and type. This National Science Foundation, NSF, funded study has created a website that collects news events reporting breaches worldwide and automatically categorizes them by various characteristics, including five defined categories for security types of breaches and five categories of privacy breaches. A preliminary statistical analysis reports the existing extent of the problem in ETPS. A second objective requires investigation of the impact on traffic operations due to the adoption of security protection measures or software algorithms. One case study, a toll collection facility on the Massachusetts Turnpike is simulated in PTV Vision VISSIM traffic software for various transaction times. This ETPS is a ticketing tolling payment system located on the I-90 east-west Turnpike in Massachusetts, USA. Simulations were performed with and without added times at the point of the payment transaction. Results indicate that the impact on operations is negligible for security measures that add milliseconds of transaction time. However, for added transaction times in a range of seconds, the operational impact is more significant and leads to additional congestion at the toll plazas. <http://mzgis.prod.umassd.edu/sop/index.php>

PUBLIC SERVICE

I have been an active member of the Board of Directors for the *Intelligent Transportation Society of Massachusetts (ITS-MA)* for many years and a founding member of

the newly expanded society, now named, *New England ITS (NEITS)*. Board members include professionals in three sectors, academia, the public government sector and the private sector such as transportation consultants and contractors. Members are now representatives from six States, VT, NH, ME, CT, RI and MA. As a founding member, I was again elected for another year and currently serve on the NEITS Board of Directors.

I was a lead organizer on several charges for the *2018 NEITS Annual Interchange*, held on May 10th and 11th, 2018, in the Biltmore Hotel, Providence, RI. I was lead program developer for two technical sessions as well as participant in the committees main program development. The Interchange was entitled "Intelligent Mobility and Incident Management: Promising ITS Initiatives." This activity took up much of my time, most notably during the spring semester, having weekly conference calls with the other leads on the organizing committee. I sent out announcement and invitations for abstracts. I collected abstracts, sent them out for review, and made decisions over which submission should be accepted for a speaker session and which submission should be accepted for a poster session. I organized technical sessions by topic. I recruited academics, both professors and students, in all Universities from the six participating states to submit abstracts. I generated an email list of academics in New England doing ITS research. In addition, I sought out guest speakers from the State DOT offices for our panel discussions and keynote speaker. The director of the RI DOT was our keynote speaker this year. During the conference, I moderated one of the technical speaker sessions, introducing five speakers with their bio that they provided. I also coordinated the one all-day poster session by directing and assisting students hang up their posters. Finally, I generated a five-page report for the NEITS Board of Directors, on which I serve as a voting member. I included a "Lessons Learned" section for next year's Interchange.

Transportation Engineering, by its nature, is an area of research intrinsic to public service. The developing technologies, especially technologies associated with Intelligent Transportation Systems (ITS), encompass a whole range of advanced communication systems, computer hardware and software; for instance, changeable message signs, CMS, electronic toll collection, ETC, traffic management centers, TMC, and incident detection algorithms, IDA, to name just a few. These 'smart' systems are now becoming standard resources in the design, construction, operation and management of our roadway systems, transit systems, rail, waterways and ports and airports. Due to the decreasing costs of ITS, small transportation providers can also benefit from the ever growing mobility management toolbox. The implementation of these advanced technologies results in safer and more efficient highways, provides earlier traveler information concerning roadway conditions and assists with the management of roadway incidents.

The Intelligent Transportation Society (ITS) Massachusetts Chapter is a non-profit organization affiliated with the Engineering Center in Boston and consists of transportation professionals in the private sectors, professionals in public agencies and government, and educators and researchers. The Chapter is part of a larger organization, ITS America, which includes member countries in North and South America. With the other two worldly organizations, ITS Japan and ERTICO-ITS-Europe, every country on the globe participates annually in the World Congress - ITS Conference. I have participated in the Congress, as well as presented papers and helped organize annual conferences for ITS America and ITS-MA Chapter.

For example, I volunteer my time and expertise to the Board of ITS-MA for nearly 12 years, since the fall semester 1998, attending the monthly meetings. The Board influences the decisions made by public officials in areas of transportation, everything from security to

performance of our mobility systems. This helps me establish relationships and keep current of policies and problems in the public agencies, MBTA, MTA, MassHighways and the Port Authority, now all incorporated into the MassDOT. I am able to participate in discussions and bring my expertise to the Board meetings. Before becoming an invited Board member, I served four terms as an elected officer for ITS-MA, Secretary.

I am also very active within the Transportation Research Board, TRB, whose mission is to promote innovation and progress in transportation through research. TRB is one of six major divisions of the National Research Council, a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. The National Research Council is jointly administered by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. I have been attending the TRB Annual meeting of more than 10,000 international transportation professionals for the last 15 years, regularly presenting my research and participating in the numerous TRB Committees and Subcommittees.

For example, I am now a voting Board member of the international TRB Committee, Traffic Flow Theory & Characteristics, TFTC, (AHB40), just one of several technical committees that serve as individuals, not as representatives of the organizations by which they are employed or of which they may be members. These Committees review international papers submitted to the TRB Annual Meeting, jointly write white papers covering state-of-the-art practices in transportation engineering, and set standards and advise government officials around the world. Research and debate are pursued throughout the year, not only at the annual meetings. Most recently, I helped organize TFTC's summer conference *Symposium on the Fundamental Diagram: 75 Years or Greenshields-75 Symposium*, held near here in Woods Hole, Massachusetts.

I am also an active participant on other TRB Committees, such as Traffic Operations (AHB40) and Highway Capacity & Quality of Service Committees (AHB20), reviewing papers and attending meetings. A typical example of service activities for TRB include my participation on AHB45(1) SimSub Committee's subcommittee on Calibration and Validation of Traffic Simulation Software. SimSub is a joint Committee of AHB45, AHB20, AHB40, AHB25, Traffic Signal Systems Committee and ADB30, the Transportation Network Modeling Committee. As technology advances, traffic computer simulation is playing an increasing role as a problem solving tool for transportation system analysis. SimSub coordinates the efforts of these five Committees. I have also joined the efforts of Europe's joint Multitude COST, which has the same objective: to set guidelines for the use, calibration and validation of traffic simulation software.

I have also volunteered my expertise by serving on Committees of the American Society Civil Engineers, ASCE. I have been actively participating as a member of ASCE's *Infrastructure System Committee*, ISC, within ASCE's Transportation & Development Institute, T&DI. I am the Chair of T&DI's *Intermodal Committee*. I help organize ASCE's Conferences such as the international Advanced Application of Technologies in Transportation (AATT) Conference.

I have also been active locally, offering my expertise and my students in service learning projects. I have become aware of the benefits to our students of my having strong relationships with our industrial partners in the Commonwealth, our government officials and our local community transportation professionals. One of my small research awards was funded through our industrial partner, IBI Group, whom I met on the ITS-MA Board. The award enabled eight UMD students to collect and analyze GPS data on the local transit buses run by the Southeastern Regional Transit Authority (SRTA).

In order to further establish connections with the local transportation providers, last year I attended the first ever Massachusetts Transportation Coordination Institute with nine other community members in October, 2009. It was a 3-day workshop and conference led by the Community Transportation Association of America (CTAA). It was sponsored by a grant initiative, Work Without Limits, with funding from the Center for Medicare and Medicaid Services and the UMass Medical School. The team from our local region of Massachusetts named itself the Southeastern Massachusetts Transportation Alliance (SMTA) and put together a work plan to identify transportation needs in the southeastern region of Massachusetts. The plan included the identification of all transportation resources available in the region. This inventory will ultimately be housed in a web based one-stop information center. SMTA was formed because the members saw the need to expand transportation services in the region, but realized that more public transportation funding is an unlikely solution. Instead, the Alliance wants to find ways to make existing transportation more sustainable by increasing transportation coordination between providers. We continue to meet monthly and have held three public forums. Two of my students will present their research work at a workshop this coming September, 2010, in the New Bedford Ocean Explorium and then again in October, 2010, in North Falmouth.

As a member of SMTA, I am able to collect many valuable service learning project ideas for my advanced transportation engineering class, facilitating my service as COE *fellow* representative to UMD's Service Learning Initiative. SMTA includes members from the Southeastern Regional Planning & Economic Development District (SRPEDD), a SRPEDD Commissioner and Advocate, and representatives from the Massachusetts Rehab Commission (MRC), the New Bedford Council on Aging (NBCA), the Fairhaven Council on Aging (FCA), Community Care-A-Vans (CCAV), the Greater Attleboro-Taunton Regional Transit Authority (GATRA), New Bedford Career Center (NBCC) and the Community Economic Development Center (CEDC).

I assisted two of the 10-member SMTA Alliance, CCAV and NBCA, to acquire funding to hire four summer UMD student-interns, 2-graduates and 2-undergraduates. Working in my UMD's Intelligent Transportation Laboratory, they are creating a centralized database to assist NBCA and CCAV with dispatching, scheduling and tracking. We are also working with the UMD campus police and will include the campus DartVan in the project. The work includes the creation of an individualized web based Decision Support System (DSS) that will provide real-time GPS fleet tracking on Google maps as well as provide an interactive database search engine. It is anticipated that these three transportation providers will be the beginning of a network of providers in the region to join in the Sustainability Initiative. By joining the DSS and using ITS mobility management tools, they can begin to share resources. These smaller non-profit transportation providers for people with little access to transportation, such as the elderly, the disabled, and students, will use the DSS and have access to shared resources. This initiative goes hand in hand with the mission of the Southeastern Massachusetts Council on Sustainability, of which I co-chair the Transportation Working Group, formed in June 2009.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Society of Civil Engineers (ASCE)†

Boston Society of Civil Engineers Section (BSCES)†

Transportation Research Board (TRB) Traffic Flow Theory & Characteristics (TFTC) Committee
American Physical Society (APS)†
New England Intelligent Transportation Society (formerly ITS-MA)†§
Southeastern Massachusetts Transportation Alliance (SMTA)
Southeastern Massachusetts Sustainability Council & the Transportation Working Group
UMass Collaboration for Intelligent Transportation Systems
UMass Integrated Payment Systems: Consortium on Security and Privacy (IPS-CUSP)
† Annual dues are required.
§ Dues are paid by UMass Amherst