SAEJA O. KIM - CURRICULUM VITAE 2018

Title: Professor of Mathematics **College:** Arts and Sciences

1. HIGHER EDUCATION

Degree	Field	Date	Institution
Ph.D.	Mathematics	May 1988	University of Illinois at Urbana-Champaign, Urbana, IL
M.S.	Mathematics	May 1985	Brown University, Providence, RI
B.S.	Mathematics	Feb. 1975	Seoul National University (*Magna Cum Laude*), Seoul, Korea
Postdoc. Fellow	Mathematics	Mar.-June 1988	Harvard University, Cambridge, MA

Thesis Title: *Projective Resolutions of Generic Order Ideals*

Thesis Advisor: Daniel R. Grayson, Emeritus, University of Illinois at Urbana-Champaign

2. TEACHING EXPERIENCE

Dates	Rank	Institution
2011 - Present	Professor	Department of Mathematics
2004 - 2005	Post-Tenure Review	
1997 - 2011	Associate Professor	University of Massachusetts Dartmouth
1993 - 1997	Assistant Professor	Tenured in 1996
1990 - 1993	Full Time Lecturer	University of Massachusetts Dartmouth
1984 - Dec.1987	Teaching/Research Assistant	University of Illinois at Urbana-Champaign
1978 - 1980	Teaching Assistant	Brown University

3. OTHER EXPERIENCE

Dates	Position	Institution
2014 - Present	Chairperson	Department of Mathematics
2013 - 2014	Acting Chairperson	University of Massachusetts Dartmouth
July 2	Visitor	Department of Mathematics
- July 10, 2013		Korea University, Seoul, Korea
Jan. 2000	Visiting Scientist	Department of Mathematics
- June 2000		Brown University
Aug. 1988	Visiting Scholar	Department of Mathematics
- May 1989		University of Illinois at Urbana-Champaign
Aug. 1988	Consultant	Wolfram Research Institute
- Jan. 1989		Champaign, IL

4. ACADEMIC AND PROFESSIONAL HONORS AND FELLOWSHIPS

- Acknowledged with three other math colleagues (S. Gottlieb, A. Heryudono, C, Wang) in the preface of Radial Basis Function (RBF) book (2016) by Professor Fornberg and Dr. Flyer in the *National Science Foundation-Conference Board of the Mathematical Sciences* (NSF-CBMS) Series.
- Honorable Mention in *Who's Who in Academia* (2015 Edition), notified from Lisa Davis, Editor News Digest International, www.newsdigest.co .
- Selected as the coach for RI State MATHCOUNTS Team for the National Competition in 2007, 2006, 2002, 1996, and 1995.
- Recognized for excellence in teaching by having biography published in the 2005-2006 10th Annual Edition of *Who's Who Among America's Teachers*.
- UMass Dartmouth Society for Industrial and Applied Mathematics (SIAM) Student Chapter Funds with other Faculty Co-Advisors, 2011-2013.
- UMass Dartmouth's CSCVR Travel Fund in 2017.
- Provost Travel Grants in 2004, 2011, 2012, 2014.
- CAS-Dean Travel Grants in 2011, 2012, 2013, 2014.
- The Institute for Computational and Experimental Research in Mathematics (ICERM) Conference/Workshop Travel Funds in 2012, 2015, 2017.

5. SCHOLARSHIP

A. Refereed Journal Publications

- Y. Chen, G. Davis, S. Gottlieb, A. Hausknecht, A. Heryudono, S. O. Kim, "Transformation of a Mathematics Department's Teaching and Research through a Focus on Computational Science", *Journal of Computational Science Education*(2013), **vol.4**(1) , pp. 24-29.
- J.-H. Jung, S. Gottlieb, S. O. Kim, "Iterative adaptive RBF methods for detection of edges in two dimensional functions", *Applied Numerical Mathematics* (2011), **vol.61**(1), pp. 77-91.
- S. Gottlieb, J.-H. Jung, S. O. Kim, "A Review of David Gottlieb's work on the Resolution of the Gibbs phenomenon", *Communications in Computational Physics* (2011), **vol.9**(3), pp. 497-519.
- S. O. Kim, Y.Y. Earmme, K.-S. Kim, "Useful Conservation Sums in Molecular Dynamics and Atomistics", *Mathematics and Mechanics of Solids* (2010), **vol.15**(8), pp. 885- 895.
- J.-H. Jung, S. Gottlieb, S. O. Kim, C. L. Bresten, D. Higgs, "Recovery of High Order Accuracy in Radial Basis Function Approximations of Discontinuous Problems", *Journal of Scientific Computing* (2010), **vol.45**(1-3), pp. 359–381.
- B. C. Burke, S. O. Kim, K.-S. Kim, "Partial Polar decomposition inverse method applied to determination of internal stresses in an elastic complex structure", *International Journal of Solids and Structures* (2007), **vol.44**, pp. 2010-2020.

- S. O. Kim, "Projective Resolutions of Generic Order Ideals", *Journal of Algebra* (1997), **vol.191**(1), pp. 279-330.
- S. O. Kim, "Connectedness of a Variety generated by an Order ideal on the punctured spectrum", *Communications in Algebra* (1996), **vol.24**(9), pp. 2931-2943.
- S. O. Kim, "Repairing Non-commutative Diagrams", *Journal of Algebra* (1993), **vol.161**(2), pp. 311-323.

B. Refereed Conference Proceeding

- Saeja. O. Kim, Sigal Gottlieb, Jae-Hun Jung, one-page abstract of "Edge Detection with Radial Basis Functions", *US-Korea Conference Proceeding 2013 (UKC 2013).*

C. Poster

- Students: C. Cacciatore, T. Jiang, K. Paul, Faculty Advisors: S. Kim, G. Gottlieb, "Radial Basis Functions & Application in Edge Detection", *Poster*(2011), 17th Massachusetts Statewide Undergraduate Research Conference, UMass Amherst, April 22, 2011.

D. Preprint

- G. E. Davis, Christina E. Distefano, S. O. Kim, "Sub-Additivity of Matrix Energy for Hermitian Matrix", *Preprint*(2009).

E. Research Projects in Progress

- ***Algebraic structure of renormalization groups in sequential homogenization of hierarchically clustered process statistics***: When a physical process such as critical phenomena of phase transformation is made by underlying hierarchically self-similar discrete micro-processes, renormalization group theory is used to evaluate the homogenized characteristics of the process. I've been working on algebraic structure of renormalization group flow in sequential homogenization of hierarchically clustered process statistics for which the micro-processes lose self-similarity. For this mathematical study computational evaluation of the sequential homogenization is initially carried out for a number of statistical models in order to observe the algebraic structure characteristics. This research is expected to open up new insights in understanding quasi-critical phenomena.
- ***Noether's theorem on symmetry breaking bifurcations in interface creasing of neo-Hookean models***: Over the past years, I have applied the Noether's theorem to symmetry breaking bifurcations in surface and interface creasing of neoHookean modelsI. I presented some works on the Noether's second theorem applied to nonlocal elastic fields at ICM 2014. . The Noether's second theorem was conceived applicable to symmetry breaking in incremental deformation field of creasing. In this research, it has been noticed that the creasing can be classified into two cases: one is a singular-field bifurcation and the other is a cascading bifurcation of higher order regular fields. For the singular field bifurcation, it is found that the completeness of the solution in a single harmonic manifold does not provide the proper solution: instead, it is required to search the solution in two split manifolds based on Stroh formalism (the mathematical method developed for the analysis of the equations of anisotropic elasticity). For the cascading bifurcation, it is not still clear how to apply the Noether's theorem.

- ***Research on Edge Detection in Radial Basis Functions* (RBF)**: In my joint work with Jae-Hun Jung at SUNY-Buffalo and Sigal Gottlieb at Umass Dartmouth, for Gegenbauer post processing to work, we require knowledge of the regions in which the solution is smooth. For this, we need to identify the "edges" or discontinuities of a function. Many edge detection methods exist, but most do not exploit the RBF coefficients of the solution, which we obtain in the computation. For computations that use RBFs, it is useful to have an algorithm which detects edges or sharp gradients and is based on the underlying basis functions. We extend this research in four directions with an extension to three dimensions, an adaptation to different RBF bases, a domain decomposition approach for large global images, and the mathematical analysis including proofs in this edge detection. In particular, we want to establish an analytical mathematical foundation for this edge detection approach, and prove certain conjectures based on our observations. I've been working on an elusive proof to validate how and why our algorithm has produced satisfactory results for edge detection. This is still ongoing overdue project.
- ***Topological Data Analysis* (TDA)**: TDA is a fast growing field pioneered by pure mathematicians in the area of algebraic topology and computer scientists in the area of computational geometry. TDA has widely gained attention from data science community but still needs to be developed further to gain insights of value. My old research works were Data driven projects on commutative algebra. I've used MaCaulay Program for mathematical experiment to finding numerical data. Through analyzing my abundant numerical data, I was successful in extracting the main idea through Data Mining which we recognize it as pattern recognition. I was also able to find the algebraic structure of the behavior among my numerical examples and to prove my claim. The Macaulay program is a high powered computer program in algebraic geometry and computational geometry which was created/developed and has kept being updated by Professor Emeritus Daniel Grayson at the University of Illinois, Urbana-Champaign and Professor Mike Stillman at Cornell University. After participating in ICERM's workshop on "Geometry and Topology of Data" last December, I've rekindled my interest in applying algebraic topology and algebraic geometry to applied problems. So with my strong background in pure mathematics, I want to apply my training and skills to classify data cluster and to extract qualitative properties of Data in data cluster. Although my old data driven research is based on data from mathematical experiments, I can apply the similar idea to data from nature such as climate changes, weather predictions, human behaviors such as purchasing, interaction, political science, crimes. Actually this is not an on going project but a fledgling project started during this winter break, I've searched and started reading relevant recent published articles. .

F. Conferences, Workshops, and Symposiums

F1. Conference, Workshop, & Symposium Organizations:

- Co-Organizer, Conference Mini-Symposium, *Creating a dynamic undergraduate research environment in Scientific computing*, Society for Industrial and Applied Mathematics (SIAM), CSE 2013, Boston, MA, Feb. 25-Mar.1, 2013.
- Co-Organizer, NSF-CBMS Conference, *Radial Basis Functions: Mathematical Developments and Applications*, UMass Dartmouth, North Dartmouth, MA, June 20-June 24, 2011.
- Co-Organizer, Conference Mini-Symposium, *High Order Numerical Methods for PDEs*, SIAM Annual Meeting, Pittsburgh, PA, July, 12-16, 2010.

F2. Conference Session Chairs:

- Session Chair, *Mathematics Education and Popularization of Mathematics*, SC18-02, the International Congress of Mathematicians 2014 (ICM 2014), Seoul Korea, Aug. 19, 2014.
- Session Co-Chair, *Industrial and Applied Mathematics 1*, UKC 2013, East Rutherford, NJ, Aug. 8, 2013.
- Presider for one-hour invited lecture session by Dr. Auxencia A. Limjap from Philippine, the 12th International Congress on Mathematical Education (ICME-12), Seoul, Korea, July 8-15, 2012.
- Session Chair for Contributed Papers at the Conference of AMS, San Antonio, TX, January 1993.

F3. Invited Talks and Conference Presentations:

- S. Kim, *Symmetries and Conservation integrals of nonlocal elastic fields*, ICM 2014, SC11-05, Seoul, Korea, Aug. 13-21, 2014.
- S. Kim (presenter), Y. Chen, G. Davis, S. Gottlieb, A. Hausknecht, A. Heryudono, *Focus on computational mathematics as a vehicle for transformation of the educational experience, and its far reaching consequences at UMass Dartmouth*, ICM 2014, SC18-01, Seoul, Korea, Aug. 13-21, 2014.
- Saeja O. Kim (presenter), Sigal Gottlieb, and Jae-Hun Jung, *Edge Detection with Radial Basis Functions*, UKC 2013, East Rutherford, NJ, Aug. 7-11, 2013.
- S. Kim (presenter),G. Gottlieb,D. Higgs, *The role of parameters in oscillations and total variation behavior of WENO methods*, the 7th International Congress on Industrial & Applied Mathematics Conference (ICIAM 2011), MS101, Vancouver, Canada, July 16-23, 2011.
- S. Kim (presenter), G. Gottlieb, D. Higgs, *The effect of the stencil choosing sensitivity parameter on the total variation in WENO*, ICIAM 2011, MS252, Vancouver, Canada, July 16-23, 2011.
- S. Kim (presenter), J.-H. Jung, S. Gottlieb, *Detecting Edges in Two Dimensional Functions with Radial Basis Functions*, SIAM Annual Meeting, Pittsburgh, PA, July 12-16, 2010.
- J.-H. Jung (presenter), S. Gottlieb, S. Kim, *Iterative adaptive RBF methods for detection of edges in two dimensional functions*, the International Conference on Spectral and High Order Methods (ICOSAHOM), Norway, June 22-26, 2009.
- S. Gottlieb (presenter) , J.-H. Jung, S. Kim, C. Bresten, D. Higgs, *Recovery of high order accuracy via Gegenbauer reconstruction in radial basis function approximation for discontinuous problems*, the Fifth MIT Conference on Computational Fluid & Solid Mechanics, Cambridge, MA, June 17, 2009.
- S. Kim, *Using Visual Aids, the Stella Octangula for the Group of Rotations of a Cube*, American Mathematical Society-Mathematical Association of America (AMS-MAA) Joint Annual Meeting, Orlando, FL, Jan. 10-13, 1996.
- S. Kim, *Eigenvectors and Axes of Symmetry*, AMS-MAA Joint Annual Meeting, Orlando, FL, Jan. 10-13, 1996.
- S. Kim, *Applying Groebner Bases to Computing Projective Resolutions of Cyclic Modules*, the Twenty-First Holiday Symposium at New Mexico State University, Las Cruces, NM, December 27-31, 1994.

- S. Kim, *Connectedness of a Variety generated by an Order ideal on the punctured spectrum*, AMS-MAA Joint Annual Meeting, San Antonio, TX, January 1993.
- S. Kim, *Repairing Noncommutative Diagrams*, Association for Women in Mathematics (AWM) Workshop, Baltimore, MD, January, 1992.
- S. Kim, *Projective Resolutions of Generic Order Ideals*, AMS-MAA Joint Annual Meeting, Baltimore, MD, January,1992.

F4. Conference Participations:

- Attended the *European Advanced Materials Congress*, Stockholm, Sweden, August 22-24, 2017.
- Attended the *International Congress on Fracture* (ICF 14), Rhodes, Greece, June 18-23, 2017.
- Attended the *High Performance Computing-HPC Day Conference*, UMass Dartmouth, Nov.14, 2014, May 17, 2016, May 25, 2017.
- Attended the invited event *Wheaton College, Summit for Women in STEM*, Norton, MA, April 8, 2017: I chaperoned three EAS-CSE PhD program graduate students and three math majors for this event. One PhD candidate served on a panel session at my recommendation.
- Attended the conference *Frontiers in Applied and Computational Mathematics* in honor of Professor Chi-Wang Shu at Brown University, the Institute for Computational and Experimental Research in Mathematics (ICERM), Providence, Jan. 4-6, 2017.
- Attended the *American Society of Mechanical Engineering-International Mechanical Engineering Congress & Exposition* (ASME2016 - IMECE), Phoenix, AZ, Nov. 11-16, 2016.
- Attended the 24th *International Congress of Theoretical and Applied Mechanics* (ICTAM 2016), Montreal, Canada, Aug. 21-26, 2016.
- Attended the *SIAM Annual Meeting* for one day, Boston, MA, July 14, 2016.
- Attended the conference on *Deterministic and Stochastic Partial Differential Equations*, Brown University, November 6-8, 2015.
- Attended the conference Arithmetic 2015-Silvermania on *Elliptic curves, Diophantine Geometry, and Arithmetic Dynamics* in honor of Professor Joseph Silverman's mathematical career, Brown University, Aug. 11-15, 2015.
- Attended the conference on *CENTRE COURNOT: Probabilization of Science*, MIT, Dec. 2, 2014.
- Attended the David Gottlieb Memorial Lecture on *Scientific Computing*, Brown University, Oct. 20, 2014, Oct. 26, 2015, Sep. 26, 2016, Oct. 16, 2017.
- Attended the *Finite Element Circus*, UMass Dartmouth, Oct. 16-17, 2015.
- Attended the *ICWM 2014*, Seoul, Korea, Aug. 12, 2014
- Attended the *ICM 2014*, Seoul, Korea, Aug. 13-21, 2014.
- Attended the *UKC 2013*, East Rutherford, NJ, Aug. 7-11, 2013.
- Attended the *SIAM-CSE13*, Boston, MA, Feb. 25-Mar. 1, 2013.

- Attended *Northeastern Section Meetings of the MAA*, Bridgewater State University, Nov. 20, 2012 : I chaperoned several math majors to attend the meeting.
- Attended the *the 12th International Congress on Mathematical Education* (ICME-12), Seoul, Korea, July 8-15, 2012.
- Attended the *ICIAM 2011*, Vancouver, Canada, July 16-23, 2011: I chaperoned NSF funded CSUMS-RESCUE participants to attend the meeting.
- Attended the *SIAM Annual Meeting*, Pittsburgh, PA, July 12-16, 2010: I chaperoned NSF funded CSUMS-RESCUE participants to attend the meeting.
- Attended the *New England Numerical Analysis Conference*, Umass Dartmouth, Worcester Polytechnic Institute, MA, and Univ. of Rhode Island, RI, in May, 2011, May 8, 2010, and April 4, 2009 respectively.
- Attended the International Conference on *Advances in Scientific Computing*, Brown University, Dec. 6-8, 2009.
- Attended the *SIAM Annual Meeting*, Denver, CO, July 6-10, 2009: I chaperoned NSF funded CSUMS-RESCUE participants to attend the meeting.
- Attended the Fifth MIT Conference on Computational Fluid & Solid Mechanics, Cambridge, MA, June 17, 2009.
- Attended the *Massachusetts Statewide Undergraduate Research Conference*, UMass Amherst, May 1, 2009, April 23, 2010, April 22, 2011, April 2012: I chaperoned NSF funded CSUMS-RESCUE participants to attend the meeting.
- Attended the *Discrete Mathematics Days of the Northeast Conference*, Smith College, Northampton, MA, April 5, 2008.
- Attended the *Discrete Mathematics Days of the Northeast Conference*, Middlebury College, Breadloaf Campus, Ripton, Vermont, Sep. 15, 2007.
- Attended the *Commutative Algebra Conference* honoring the contributions of Professor Phillip Griffith, University of Illinois at Urbana-Champaign, Urbana, IL, Sep. 16-18, 2005
- Attended the *Route 81 Conference on Commutative Algebra and Algebraic Geometry* in honor of Professor Graham Evans, Cornell University, Ithaca, NY, Oct. 2-3, 2004.
- Attended the *The Proof Project:Research Collaborative 2004*, Providence, RI, Sep. 16-18, 2004.
- Attended the *MAA-AMS Annual Math Fest*, Providence, RI, Aug. 12-24, 2004.
- Attended the Conference *RosenFest* in honor of Professor Rosen, Brown University, Providence, RI, March 5-7, 1999.
- Attended the Conference on *the Arithmetic of Function Fields* , Brown University, Providence, RI, April 19-21, 1996.
- Attended the *AMS-MAA Joint Annual Meeting*, Orlando, FL, Jan. 10-13, 1996.
- Attended the *AMS-MAA Joint Annual Meeting*, San Antonio, TX, January, 1993.
- Attended the *AMS-MAA Joint Annual Meeting*, Baltimore, MD, Jan. January, 1992.

F5. Workshops and Symposiums:

- Invited Participant in the workshop on *Geometry and Topology of Data*, ICERM, Providence, RI, December 11-13, 2017.
- Participant in the workshop on *Mechanics in Scientific Discovery*, Florence, Italy, June 9-12, 2017.
- Participant in the Round Table Symposium on *Mechanics, Education and Research Universities:Perspectives for the 21st Century* in honor of Professor Choon Fong Shih (founding president of KAUST and former president of NUS), at the House of the American Academy of Arts and Sciences (AAAS), Cambridge/Somerville, MA, May 12, 2016.
- Invited Participant in the topical workshop on *Mathematics in Data Science*, ICERM, July 28-30, 2015.
- Invited Participant in the semester workshop on *Mathematics of Lattices and Cybersecurity*, ICERM, April 21-24, 2015.
- Participant in the 2015 Symposium on *the Application of Mechanics to Geophysics*, the Univ. of California San Diego (UCSD), La Jolla, CA, Jan.17-18, 2015.
- Invited Participant in the semester workshop on *Mathematics of Data Analysis in Cybersecurity*, ICERM, Oct. 22-24, 2014.
- Invited Participant in the 5-Day Workshop, *Mathematics and Mechanics in the Search for New Materials*, Banff International Research Station for Mathematical Innovation and Discovery (BIRS), Banff, Canada, July 15-19, 2013.
- Invited participant in the Symposium on *Improving 21st century mathematics education in conjunction with overseas Korean mathematician*, ICME-12, Seoul, Korea, July 8-15, 2012.
- Invited participant in the workshop on *the Linear Algebra Discussion Group Session*, ICME-12, Seoul, Korea, July 8-15, 2012.
- Invited participant in the NSF/CBMS Regional Conference on *NSF/CBMS Conference: Finite Element Exterior Calculus*, ICERM, June 11-15, 2012.
- Participant in the *AWM 40th Anniversary Workshop*, Brown University, RI, Sep. 17-18, 2011.
- Participant in the workshop on *Number Theory*, Providence, RI, April 26-27, 2003.
- Invited participant in the International Conference on *Syzygies and Geometry*, Northeastern University, Boston, MA, Oct. 9-11, 1995.
- Invited participant in the workshop on *Number Theory and Fermat's Last Theorem*, Boston University, Boston, MA, Aug. 9-18, 1995.
- Invited participant in the NSF-CBMS Regional Conference on *Tight Closure, Big Cohen-Macaulay Algebras and Uniform Artin Rees Theorem*, North Dakota State University, Fargo, ND, June 25-29, 1995.
- Invited participant in the 21st Holiday Symposium on *Applying Groebner Bases to Computing Projective Resolutions of Cyclic Modules*, New Mexico State University, NM, Dec. 27-31, 1994.

- Invited participant in the workshop on *the Abstract Algebra with ISETL*, Purdue University, West Lafayette, June 9-18, 1994.
- Invited participant in the AMS-IMS-SIAM Summer Research Conferences in the Mathematical Sciences on *Commutative Algebra: Syzygies, Multiplicities and Birational Algebra*, Mount Holyoke College, South Hadley, MA, July 1992.

6. CURRICULAR MATERIALS

A. Programs Developed or Revised

- Have developed *New Placement Tests for College Algebra Readiness and Calculus Readiness*: Created, developed, and reviewed by Professor B. Luo, the First Year Math Coordinator, S. Koumas, the Director of Academic Resource, and Professor S. Kim, the Chair. With institutional collaboration from J. Bonilla (Institutional Research), M. Robinson (CITS), S. Splinter (CITS), S. Melloni (ASPO), and K. Shah (ASPO), these new on-line placement tests have been offered to new incoming/transfer students starting from Dec. 2017. These new on-line placement tests replace ACCUPLACER and would expect to save money for school: ACCUPLACER costs $3 per one student.
- Have led a minor revision in minimum grade requirements for degree completion: approved in 2017.
- Have reviewed a complete revision of mathematics curriculum in three options and facilitated the process for approval: led by Professor S. Gottlieb and Professor D. Fine; has been approved in 2016.
- Have revised and updated three math advising track sheets which were originally created by Professor S. Gottlieb and Professor D. Fine.
- Have reviewed, approved, and signed MOU for Accelerated MAT-Math BS/BA & developed courses between STEM and Math in AY 2014-2015. Gary Davis has been involved with a initial program.
- Have developed *MTH 100-level Renumbering* with correcting the prerequisites of courses as shown in the course catalog: led by Professor B. Luo, Professor A. Hausknecht, and Professor S. Kim to align math 100-level courses with the level of each course material effective fall 2014.
- Have Created UMass Dartmouth Developmental Math Enhanced Courses (MTH 140E, MTH146E, MTH147E, MTH150E) with members of Math Developmental Class Task Force, AY 2013-2015.

B. Course Developed

- MTH499/599: Introduction to Cryptography.
  - This course is an introduction to the mathematical foundations of modern cryptography. Covered topics are public key cryptosystems, digital signature schemes including topics in symmetric ciphers, protocols, and complexity. Both computations and logical arguments have been emphasized throughout the course. We've used some available computer packages (e.g., Maple, MATLAB, Octave etc.) to do numerical computations. Students are strongly encouraged to make codes for some basic number theoretic calculations such as gcd, extended Euclidean algorithm, and the fast powering algorithm. For those students who are not comfortable with programming, they are referred to Web-Calculator, developed by J. Silverman, one of the text's authors for simple calculations. Students are expected to have group projects on one of the following topics such as *Vigenere Cipher*, *Merkle-Hellman Knapsack Cryptography*, *Data Encryption Standard*(DES), *Elliptic Curve Cryptography*.

C. Undergraduate Students Supervised

- Co-advisor (with B. Luo): HON 490-Honors thesis, entitled "Study of efficiency and Effectiveness of Enhanced MTH140 with extra 4th hour by Hillary Havener, 2014.
- Co-Advisor (with S. Gottlieb): C. Cacciatore, T. Jiang, K. Paul,"Radial Basis Functions & Application in Edge Detection", Poster Session at the 17th Massachusetts Statewide Undergraduate Research Conference, UMass Amherst, April 22, 2011.
- Co-Advisor (with G. Davis, J.-H. Jung): Chris Bresten & Andrew Perry: "A Deniable Private Key Cryptosystem implemented in parallel Python, Poster Session at 2009 SIAM Annual Meeting, Denver, Colorado, July 6-10, 2009.
- One of the faculty mentors for NSF-funded CSUMS summer workshops, 2009-2013.

7. GRANTS

A. Grants as PI

- Sole PI on AWM-NSF Travel Grant, to present my works at the contributed sessions of ICM 2014, and to attend International Congress of Women Mathematicians (ICWM 2014), Aug. 12-21, 2014, Seoul, Korea, for a total of $2,900.
- PI on NSF grant DMS-1040883 for a NSF/CBMS Regional Conference in the Mathematical Sciences, *Radial Basis Functions: Mathematical Developments and Applications*, June 20-24, 2011, for a total of $35,000.
- PI on UMass Dartmouth Provost Departmental/Program Seminar Series, *Undergraduate Seminar Series on Computational Sciences*, 2009-2010, for a total of $1,000.
- Sole PI on UMass Dartmouth Faculty Research Grant, *Algebraic Structure Identification of Optimal Inversion for Linear Inverse Problems*, 07/1/09-06/30/10 for a total of $2,000.

B. Grants as Co-PI or Senior Personnel

- Co-PI on CAS Department/Program Event: *The AfterMath Symposium and The @Math Orientation Event*, 2017-2018 for a total of $2,600, PI: Scott Field.
- Co-PI on CAS Department/Program Event: *The AfterMath Symposium*, 2016-2017 for a total of $1,300, PI: Yanlai Chen.
- Co-PI on AFOSR: *DURIP: A heterogeneous terascale computing cluster for the development of GPU optimized high order numerical methods*, 2010-2011 for a total of $199,800, PI: Sigal Gottlieb.
- Co-PI on UMass Dartmouth Provost Departmental/Program Seminar Series, *Undergraduate Seminar Series on Computational Sciences*, 2010-2011, for a total of $1,000, PI: Gary Davis.
- Senior Personnel on NSF grant, *RUI: Discovery Research K-12: Developing Algebra-Ready Students for Middle School:Exploring the Impact of Early Algebra*, 09/01/09-08/31/14, for a total of $1,578,668, PI: Maria Blanton.

- Senior Personnel on NSF: *MRI-R2: Acquisition of a Heterogeneous Terascale Shared Campus Computing Facility*, 06/01/10-06/01/11, for a total of $199,480, PI: Robert T. Fisher.
- Consultant (the Director of Consulting and Data Management of Student Research) on NSF grant DMS-0802974, *RUI: CSUMS: Research in Scientific Computing in Undergraduate Education (RESCUE)*, 09/2008-08/2013, for a total of $788,985, PI: S. Gottlieb.

C. Grants UNFUNDED

- Co-PI: Proposal submitted for external funding 09/28/2010: DOE IIPS Submission Number: 000017884866-107113-49913. Stokes-free Discontinuous Galerkin Fluid Solver with Reduced-order Modeling. $612,636. PI: Yanlai Chen.
- Co-PI: Proposal submitted for external funding 12/14/2010: NSF DMS 1115412. COLLABORATIVE RESEARCH: Development of a robust pseudospectral-RBF hybrid method for fluid simulations with parameter reduction. $400,984. PI: Alfa Heryudono.
- PI: NSF: "DUE-S-STEM: Proactive Mentoring of Talented Undergraduate Students (PROMOTUS), 09/01/10-08/31/15, $600,000, Co-PIs: Robert Fisher, Sigal Gottlieb, Bruce H Palmer, Tara K Rajaniemi.
- Co-PI: Proposal submitted for external funding "NSF-DMS: COLLABORATIVE RESEARCH: Radial Basis Function Methods for the Solution of Time-Dependent PDEs". $300,232, PI: C. Wang.
- Co-PI: "NSF: DMS-MPS/DMS-Workforce in the Mathematical Sciences, PRISM: Mathematics and Science Transformative Education through Research (MASTER)" 09/01/09-08/31/14, $1,384,845, PI: G. Davis.
- Co-PI: AFOSR Whitepaper: "Adapting Radial Basis Function Methods for the Solution of Non-periodic Time-dependant PDEs, submitted in Aug. 2009, $127,201.92, PI: Alfa Heryudono.
- Sole PI: NSF-RUI: "Symmetric Algebras, Vector Bundles, and Generic Order Ideals, $43,416 , 07/01/1997 - 06/30/2000.
- Sole PI: NSF-RUI: "Recovering Modules from their Generic Order Ideals, $52,715, 07/01/1996 - 06/30/1998.
- Co-PI: NSF: College Algebra Curriculum Reform NSF Planning Grant Proposal, "Mathematics a La Carte, June 1994.

8. SERVICE

A. Service to the Department

- Academic and Administrative Leadership as Acting Chairperson and Chairperson: 2013-Present.
  - Have overseen successful AQAD including two external reviewers' campus site-visit in AY 2017-2018.
  - Have overseen management of department budget for daily operations and departmental events.

  - Have conducted annual personal evaluations.
  - Have conducted major personnel evaluations for contract renewal, tenure,promotion, and PMYR.
  - Have overseen maintenance of Math-assigned space and facilities, and allocation.
  - Have updated Math Standards for Tenure with promotion to Associate Professor and promotion to Full Professor in AY2016-2017: led by Professor Y. Chen.
  - Have written and produced an annual department report.
  - Have formed screen and search committee for tenure track assistant professor hire or PTL hire.
  - Have interviewed candidates for tenure track assistant professors.
  - Have conducted major evaluations for contract renewal of FTLs.
  - Have reviewed application materials and hired PTLs.
  - Have advised at risk, transfer, and re-admitted students.
  - Have taken a role of mediator (usually resolver) to assist in resolving various students' issues.
  - Have advised and reviewed degree completion for each expected graduation expected senior.
  - Have emailed admitted high school students individually with curriculum track sheets and brochures in February from 2014 to 2016: CAS-Dean's office has taken over this recruitment event from February, 2017.
  - Have certified undergraduate students for graduation.
  - Have developed yearly course schedules and faculty assignments with assistance from an administrative assistant.
  - Have coordinated math academic sessions for Open House in fall, Admitted Students Event in spring, Orientation in June and August, and CAS Major Day.
  - Have led a minor revision in minimum grade requirements for degree completion.
  - Have approved travel authorizations and travel refunds for faculty members and graduate students.
  - Have conducted annual performance evaluation for mathematics department's employee.
  - Have successfully recommended to raise the mathematics department's position from Clerk 4 to Administrative Assistant I.
  - Have participated in the nationwide Departmental Profile survey by AMS since 2014.
- Department Curriculum Committee: 2017-2018 (the Chair), 1991-2013.
- Co-organizer: The @Math orientation event of UMass Dartmouth: Nov. 13, 2017.
- Co-organizer: The Aftermath Symposium of UMass Dartmouth: April 26, 2016 and Nov. 10, 2016.
- Search and Screen Committee for Tenure Track Position: 1997-1998, 2003-2004, 2004-2005, 2007, 2009, 2012.

- The Chair of Search and Screen Committee for FTLs: 2014-2015, Summer 2016, Summer 2017.
- A member of the team for proposing the Data Science Program: 2011-2012.
- Department Connect Representative: 2011-2013.
- Department Liaison for NSF-funded Noyce Scholarship Program of the Center for University, School, and Community Partnerships (CUSP): 2008-2011.
- A Member of the Faculty Evaluation Committee: 1996-2013.
- Coordinator and Proctor of the nationwide William Lowell Putnam Mathematical Competition: 2005-2008, 2012-2013.
- Hiring Committee for Department's Secretary: 2000, 2001, 2002.

B. Service to the College

- Ad Hoc Faculty Evaluation Committee for CAS-Dean: 2007-2008.
- Science Academic Council: Spring 2003.

C. Service to the University

- UMD Co-Representative to the Developmental Math Advisory Board: March 2014-2015.
- A member of the team for interdisciplinary Computational Science and Engineers (CSE) track in EAS PhD program: 2011-2014.
- An Advisory Board Member on *Mathematics and Physics Opportunities fro Women in Research*(MPOWR): 2012-2013
- General Education Committee: 2007-2009, 2010-2012.
- A member of Faculty Senate: 2012-2013.
- A member of CSCVR since 2011
- A Master of Science Thesis Committee member for a Common Wealth Scholar in ECE: 2011-2012.
- A Commonwealth Honors Thesis/Project Committee member for a math senior: 2009-2010.
- General Education Subcommittee for Mathematics, Science, & Technology: March 2007- May 2009. Sep. 2010.
- University Curriculum Committee: 2003-2005.
- Sabbatical Leave Committee: 2002-2004.
- Grievance Committee for the Faculty Federation: 1998, 2001, 2005, 2009.
- University Research Committee: 1997-2000.

D. Service to the Profession

- A member of the Center for Scientific Computation & Visualzation Research (CSCVR).
- Have had Pi Day Live Phone Interviews with Phil Paleologos from the Townsquare Media New Bedford/Fall River for live broadcastings on March 14 (3.14) in 2015 and 2016.
- A Panelist: EMIRGE(Empowering Massachusetts Innovation and Research in Graduate Education) Women in STEM Roundtable, April 30, 2016, UMass Dartmouth..
- A Panelist: Annual STEM4Girls—annual STEM outreach event in May, 2015 & 2016, UMass Dartmouth.
- A Reviewer for The draft workshop report *Mathematics Curriculum, Teacher Professionalism, and Supporting Policies in Korea and the United States-Summary of a Workshop* at the invitation of Report Review Associate of the NRC's Policy and Global Affairs Division, 2014.
- A Referee for peer-reviewed journals:
  - Journal of Scientific Computing, 2010, 2011.
  - Applied Numerical Mathematics, 2011.
  - Educational Studies in Mathematics, 1999.
  - Research in Collegiate Mathematics Education,1994.
- The General Secretary of Korean-American Mathematical Scientists Association (KAMSA):2013-2015.
- A Executive Committee of KAMSA: 1997 - 2007.
- Reviewer for proposals:
  - UMass Dartmouth Summer Research Fellowship Program, 2015.
  - Umass Dartmouth CAS-EFS Grant Proposal, 2015.
  - KSEA Young Investigator Grant (YIGs), 2015.
  - NSF proposal for mathematics in East Asia and Pacific Cooperative Program, 2000.
- A member of AMS, SIAM, AWM, KAMSA.
- A Consultant for Barrington Middle school MATHCOUNTS Team: 2008-2012.
- A Mathematics Department Liaison for NSF-funded Noyce Scholarship Program of the Center for University, School & Community Partnerships (CUSP) at UMass Dartmouth, 2008-2011.
- A Panel Reviewer for 2010 Improving Teacher Quality (ITQ) State Grant, Department of Higher Education, MA, Feb. 11, 2010.
- A Co-Chair for Mathematics Exam of Korean-American Scientists & Engineers Association (KSEA): the Third National Mathematics Competition 2004.
- Arranged Joint Presentation, *Hands-on and Minds-on Geometry for Grades 4-10: Stella Octangula*, for local high school and middle school mathematics teachers, UMass Dartmouth, February 1, 1993.

E. Service to the Community

- A Coach for Barrington Middle school MATHCOUNTS Team: 1994-2012.

APPENDIX: COURSES

Listing of Courses

Date	Course	Title	Enrollment
Spring 2018	MTH 221	Linear Algebra	27
	Two Courses Release	(Chairperson Contract)	
Fall 2017	MTH 221	Linear Algebra	37
	Two Courses Release	(Chairperson Contract)	
Summer 2017	MTH 298	Experience Program (Practicum) -Applied Statistics & Data Analysis	1
Spring 2017	MTH 221	Linear Algebra	18
	MTH 302	Theory of Numbers	19
	MTH 298	Experience Program (Practicum) -Math in the Government Agency	1
	Two Courses Release	(Chairperson Contract)	
Fall 2016	MTH 221	Linear Algebra	33
	MTH 396	Directed Study: MTH 353 -Applied Linear Algebra	1
	Two Courses Release	(Chairperson Contract)	
Spring 2016	MTH 221	Linear Algebra	25
	MTH 302	Theory of Numbers	16
	Two Courses Release	(Chairperson Contract)	
Fall 2015	MTH 221	Linear Algebra	33
	Two Courses Release	(Chairperson Contract)	
Summer 2015	MTH 211	Calculus III	15
Spring 2015	MTH 221	Linear Algebra	25
	Two Courses Release	(Chairperson Contract)	
Fall 2014	MTH 221	Linear Algebra	33
	HON 490	Honor's Thesis: *Study of Efficiency and Effectiveness of Enhanced MTH140 with extra 4th Hour*	1
	Two Courses Release	(Chairperson Contract)	
Spring 2014	MTH 221	Linear Algebra	36
	Two Courses Release	(Acting Chair Contract)	
Fall 2013	MTH 221	Linear Algebra	33
	Two Courses Release	(Acting Chair Contract)	
Spring 2013	Sabbatical	UMass Dartmouth	
Fall 2012	MTH 221	Linear Algebra	32
	MTH 311	Advanced Calculus I	12
	One Course Release	NSF-RUI-CSUMS	

Listing of Courses (Continued)

Date	Course	Title	Enrollment
Spring 2012	MTH 103 (MTH 146)	Finite Mathematics	35
	MTH 312	Advanced Calculus II	8
	One Course Release	CONNECT MATH Representative	Funded by Provost
Fall 2011	MTH 181-01	Discrete Mathematics I	36
	MTH181-02	Discrete Mathematics I	32
	MTH 311	Advanced Calculus I	12
Spring 2011	MTH 182-01	Discrete Mathematics II	31
	MTH 312	Advanced Calculus II	14
	One Course Release	NSF-RUI-CSUMS	
Fall 2010	MTH 181-01	Discrete Mathematics I	28
	MTH 311	Advanced Calculus I	16
	One Course Release	NSF-RUI-CSUMS	
Spring 2010	MTH 182-01	Discrete Mathematics II	29
	MTH 182-02	Discrete Mathematics II	16
	MTH 312	Advanced Calculus II	13
Fall 2009	MTH 181-01	Discrete Mathematics I	32
	MTH 181-01	Discrete Mathematics I	32
	MTH 311	Advanced Calculus I	19
Spring 2009	MTH 182-01	Discrete Mathematics II	30
	MTH 182-02	Discrete Mathematics II	15
	MTH 499-04	Introduction to Cryptography	16
	MTH 599-01	Cryptography	3
Fall 2008	MTH 181-01	Discrete Mathematics I	31
	MTH 181-01	Discrete Mathematics I	26
	MTH 441	Modern Algebra I	9
Spring 2008	MTH 182-01	Discrete Mathematics II	31
	MTH 182-02	Discrete Mathematics II	24
	MTH 302	Theory of Numbers	10
	MTH 495	Independent Study for Number Theory	1
Fall 2007	MTH 181-01	Discrete Mathematics I	26
	MTH 181-01	Discrete Mathematics I	30
	MTH 441	Modern Algebra I	11
	MTH 496	Directed Study: Modern Algebra II	1

Listing of Courses (Continued)

Date	Course	Title	Enrollment
Spring 2007	MTH 182-01	Discrete Mathematics II	23
	MTH 182-02	Discrete Mathematics II	17
	MTH 499	Topics in Cryptology	15
Fall 2006	MTH 181-01	Discrete Mathematics I	24
	MTH 181-01	Discrete Mathematics I	20
	MTH 441	Modern Algebra I	19
Spring 2006	MTH 182-01	Discrete Mathematics II	23
	MTH 182-02	Discrete Mathematics II	17
	MTH 302	Theory of Numbers	24
Fall 2005	MTH 131 (MTH 150)	PreCalculus	29
	MTH 181	Discrete Mathematics I	13
	MTH 441	Modern Algebra I	13
Spring 2005	MTH 111 (MTH 151)	Calculus I	37
	MTH 182	Discrete Mathematics II	21
	MTH 442	Modern Algebra II	9
Fall 2004	MTH 131 (MTH 150)	PreCalculus	43
	MTH 181	Discrete Mathematics I	35
	MTH 441	Modern Algebra I	15
Spring 2004	MTH 101 (MTH 148)	College Algebra	35
	MTH 131-01 (MTH 150)	PreCalculus	30
	MTH 131-02 (MTH 150)	PreCalculus	21
Fall 2003	MTH 131-02 (MTH 150)	PreCalculus	31
	MTH 131-03 (MTH 150)	PreCalculus	33
	MTH 441	Modern Algebra I	14
Summer 2003	MTH 211	Calculus III	11
Spring 2003	MTH 101 (MTH 148)	College Algebra	40
	MTH 131(MTH 150)	PreCalculus	34
	MTH 312	Advanced Calculus II	12
	MTH 496	Directed Study:Modern Algebra II	1
Fall 2002	MTH 101-08 (MTH 148)	College Algebra	37
	MTH 101-10 (MTH 148)	College Algebra	39
	MTH 311	Advanced Calculus I	27
Summer 2002	MTH 211	Calculus III	14
	MTH 112 (MTH 152)	Calculus II	21

Listing of Courses (Continued)

Date	Course	Title	Enrollment
Spring 2002	MTH 102-01 (MTH 149)	Introductory Calculus	34
	MTH 102-02 (MTH 149)	Introductory Calculus	15
	MTH 312	Advanced Calculus II	12
Fall 2001	MTH 131-02 (MTH 150)	PreCalculus	34
	MTH 131-03 (MTH 150)	PreCalculus	34
	MTH 311	Advanced Calculus I	27
Summer 2001	MTH 211	Calculus III	17
	MTH 112 (MTH 152)	Calculus II	21
Spring 2001	MTH 102-01 (MTH 149)	Introductory Calculus	46
	MTH 102-02 (MTH 149)	Introductory Calculus	28
	MTH 312	Advanced Calculus II	11
Fall 2000	MTH 131-02 (MTH 150)	PreCalculus	32
	MTH 131-03 (MTH 150)	PreCalculus	31
	MTH 311	Advanced Calculus I	16
Spring 2000	Sabbatical	Brown University: Visiting Scientist	
Fall 1999	MTH 131-02 (MTH 150)	PreCalculus	24
	MTH 131-03 (MTH 150)	PreCalculus	24
	MTH 441	Modern Algebra I	15
Summer 1999	MTH 211	Calculus III	17
Spring 1999	MTH 102-01 (MTH 149)	Introductory Calculus	39
	MTH 102-02 (MTH 149)	Introductory Calculus	36
	MTH 102-02 (MTH 149)	Introductory Calculus	10
Fall 1998	MTH 107-01 (Inactive)	Elements of College Math Enhanced	38
	MTH 107-02 (Inactive)	Elements of College Math Enhanced	40
	MTH 441	Modern Algebra I	3
	MTH 298	Experiential Learning Program	1
Spring 1998	MTH 102-01 (MTH 149)	Introductory Calculus	29
	MTH 102-02 (MTH 149)	Introductory Calculus	14
	MTH 302	Theory of Numbers	7
Fall 1997	MTH 102-01 (MTH 149)	Introductory Calculus	34
	MTH 102-01 (MTH 149)	Introductory Calculus	17
	MTH 441	Modern Algebra I	12

Listing of Courses (Continued)

Date	Course	Title
1990-1997	MTH 463	Mathematical Modelling
	MTH 461	Elementary Topology
	MTH 496	Directed Study in Modern Algebra
	MTH 442	Modern Algebra II
	MTH 441	Modern Algebra I
	MTH 302	Theory of Numbers
	MTH 203 (now Inactive Course)	Technical Calculus III
	MTH 112 (now MTH 152)	Calculus II
	MTH 102 (now MTH 149)	Introductory Calculus
	MTH 101 (now MTH148)	College Algebra
	MTH 100	Basic College Algebra