

## CHEMISTRY / BIOCHEMISTRY GRADUATE PROGRAMS

UMass Dartmouth offers both a Master of Science and a PhD in Chemistry/Biochemistry. The graduate programs provide individualized attention and unique research opportunities for students. Classes are typically small, affording superb opportunities for interaction with the faculty and access to state-of-the-art equipment and computational resources.

### Areas of specialization at UMassD

Students gain broad knowledge of the field and UMass Dartmouth has particular expertise in biotechnology and environmental chemistry. You may choose to specialize in:

- analytical chemistry
- biochemistry
- biophysical chemistry
- computational chemistry
- inorganic chemistry
- marine chemistry
- organic chemistry
- physical chemistry

### Master of Science

You have three tracks to pursue your Master's degree. You must complete a minimum of 30 credit hours, with a minimum grade point average of 3.00 on a scale of 4.00.

- The Research Thesis (plan A) option is designed for full-time students who wish to continue their PhD graduate education, or who want to pursue a career. Graduate assistantships are available for students in this track.
- The thesis program requires at least 18 credits of formal lecture or lecture/laboratory courses, with the remaining 12 credits dedicated to research leading to a written thesis. Students also must register for a graduate seminar each semester they are in residence, and present a seminar to the department each year. At the end of the student's studies, the thesis is defended in an oral examination.
- The Research Project (plan B) is a non-thesis option intended primarily for working students pursuing the master's degree part time. Students complete at least 30 credits of formal course work and a short project (5 hours) in the laboratory. A graduate seminar is required. These students are not eligible for assistantships.
- Library Research Project (plan C) is a non-thesis option intended primarily for working students pursuing the master's degree part time. Students complete at least 30 hours of formal course work and a short project (5 hours) in the library. A graduate seminar is required. These students are not eligible for assistantships.

### PhD program

You can directly apply to the PhD program at UMass Dartmouth. The program provides both breadth and depth through a flexible structure of formal course work, independent study, and research.

- It is a full-time program that takes approximately five years to complete. You will be eligible for graduate assistantships for research and/or teaching activities.
- A minimum of 55 course credits is required beyond the BS, of which at least 24 credits of formal courses, at least 27 credits of doctoral dissertation research, and 4 credits of Graduate Seminar.
- A GPA of 3.0 or above on a 4.0 grading scale is required to satisfy the course requirements throughout the program.
- Doctoral students must also successfully pass written qualifying examinations, and the original research proposal-doctoral candidacy examination.
- The final part of the program is devoted principally to research leading to the doctoral dissertation. The doctoral students are required to successfully defend the dissertation research proposal and pass the dissertation defense.

### Research opportunities

Graduate students may participate on research projects in

- molecular biology
- biophysics
- protein biochemistry
- analytical biochemistry
- computer modeling of biological molecules

The department also is a major center for cranberry research.

Research in environmental chemistry focuses on analytical chemistry, marine chemistry, and natural products.

Biochemistry research focuses on bioanalytical and bioinorganic chemistry, and pharmaceutical biotechnology.

### Technology resources

- Bruker AVANCE III 400 MHz NMR spectrometer
- Bruker D8 Quest x-ray diffractometer
- Waters XevoQ-TOF UPLC-MS system
- Thermofisher FOCUS/ITQ-700 GC-MS
- a wide range of chemical instrumentation
- access to UMass Dartmouth Confocal Microscope facility
- access to UMass Dartmouth Scientific Computing Cluster



## Graduate opportunities

Graduates of our MS program are prepared for careers in industrial, government, or university laboratories and in secondary schools as teachers of chemistry, as well as entry into a Ph.D. program.

Graduates of our PhD program are prepared for teach and research in academia as well as enter careers in pharmaceuticals, industry, government, or other types of laboratories.

## Faculty

**Donald W. Boerth**, University of Minnesota; theoretical and physical organic chemistry, theoretical studies of acidity and isotope exchange in nucleic acid components, computer graphics in chemistry.

**Shuowei Cai**, University of Massachusetts Amherst; bioanalytical and biophysical chemistry, protein chemistry, drug formulation, and pharmaceutical biotechnology.

**Patrick Cappillino**, Boston University; molecular and solid state inorganic chemistry, meso- and nanostructured materials, electrochemistry, surface chemistry, bioinorganic chemistry.

**Maolin Guo**, Edinburgh University; biochemistry and molecular biology, protein engineering, structural biology, bioinorganic chemistry, metals in biology and medicine.

**David R. Manke**, Massachusetts Institute of Technology; inorganic chemistry: solid state separations and catalysis, air-sensitive transition metal reactivity, small molecule activation, organometallic chemistry.

**Maricris L. Mayes**, Michigan State University; theoretical and computational chemistry, quantum chemistry method and algorithmic development, excited-state and nonadiabatic dynamics, ab initio molecular dynamics, modeling and simulation of materials and biological systems, high-performance and massively parallel computing.

**Charlene W. Mello**, University of Massachusetts Lowell; antimicrobial peptides, protein chemistry, biomolecular recognition, naturally derived structural materials, interfacing of biological materials with inorganic materials, biochemical sensors.

**Catherine C. Neto**, Brown University; phytochemicals with anticancer, antimicrobial, antioxidant, and neuroprotective activity from cranberries and other plant sources; bioactivity, purification, and structure elucidation of natural products; effects of plant physiology and plant nutrition on production of secondary metabolites including functional food factors; chemical education in the organic laboratory.

**Emmanuel C. A. Ojadi**, Brandeis University; photochemistry, photobiology and photophysics of porphyrin compounds and their applications to energy transformation processes involving oxidation reduction reactions; photorefractivity of porphyrin polymers, photoelectrochemistry on porphyrin coated electrodes and thin films.

**Sivappa Rasapalli**; National Chemical Laboratory, University of Pune; synthesis of natural products: heterocyclic chemistry, green chemistry, development of novel synthetic methodologies, catalysis (enzymatic, organo and organometallic), development of novel biomaterials for bioengineering and for drug delivery.

**Yuegang Zuo**, Swiss Federal Institute of Technology; analytical, forensic and environmental chemistry: toxicology, environmental monitoring, marine chemistry, atmospheric photochemistry, photobiology, natural products chemistry

## Contact Information

### Program Questions

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### Admission Questions

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