

ENVIRONMENTAL CHEMISTRY

College of Natural Science and Mathematics
Department of Chemistry and Biochemistry
907-474-5510
www.uaf.edu/chem/

M.S., Ph.D. Degrees

Minimum Requirements for Degrees: M.S.: 30 credits;
Ph.D.: 18 thesis credits

Environmental Chemistry is a diverse and highly interdisciplinary field that focus on the chemical processes influencing the composition and chemical speciation of natural systems (air, water and soils), the chemical fate and mobility of contaminants in the environment, chemical processes that affect the toxicity and bioavailability of contaminants and chemical aspects of contaminant remediation and pollution prevention (green chemistry). The common link to all these areas of study is a focus on the underlying chemical structure, reactivity and mechanisms that dictate the extent and rates of environmentally important chemical reactions. Environmental chemistry is a challenging field, requiring core training in physical, analytical, organic and inorganic chemistry and an understanding of how these disciplines can be applied to complex environmental systems. It is also a highly rewarding discipline, as it provides a quantitative and fundamental approach to understanding the processes that influence the quality of the environment we live and work in.

The UAF Department of Chemistry and Biochemistry offers B.S., M.S. and Ph.D. degrees in Environmental Chemistry. The program provides education and research opportunities focused on the molecular scale aspects of environmental science. The program defines three tracks to meet a wide range of student interest, including (i) Atmospheric Chemistry (ii) Aqueous/Environmental Geochemistry, and (iii) Environmental Toxicology and Contaminant Fate. Students may also design a custom focus area, subject to approval by their advisory committee.

Our faculty are involved in a wide range of projects from field studies of chemical transformation and transport, to laboratory and modeling studies of the basic mechanisms of environmental reactions, to the development of novel chemistry useful in contaminant remediation. The program is centered in the Natural Sciences Building on the UAF campus that houses state-of-the-art classrooms, laboratories and computer facilities to support education and research activities. Located in the "Heart of Alaska," UAF is home to numerous research institutes and centers that focus on Arctic science and engineering and provide great opportunities for collaboration and cross-disciplinary studies focused on the chemistry of polar and sub-arctic systems.

The graduate program in environmental chemistry provides advanced training in the concepts and methods of molecular environmental sciences. The M.S. degree prepares students for careers in the environmental science and technology sector as a specialist in the analysis and interpretation of environmental chemical data and/or for more advanced studies in environmental Chemistry or related disciplines. The requirement of a master's thesis provides an opportunity for students to gain expertise in a particular sub-discipline and, more importantly, gain experience in research methods, presentation skills and critical thinking. The Ph.D. provides advanced training beyond the level of a master's degree with the expectation that Ph.D. recipients will be acknowledged as experts in their particular topic of study. This is accomplished primarily through the Ph.D. thesis, which is a body of independent research that presents new findings on forefront topics related to molecular processes in the environment. The Ph.D. degree in environmental chemistry prepares students for careers in academia

or the public and private research sectors. Graduate (M.S. and Ph.D.) students in the environmental chemistry program are typically supported through teaching and research assistantships or fellowships.

Graduate Program — M.S. Degree

1. Complete the general university requirements (page 202).
2. Complete the master's degree requirements (page 206).
3. Complete two of the following environmental core courses:
CHEM F605—Aquatic Chemistry 3
CHEM F606—Atmospheric Chemistry 3
CHEM F631—Environmental Fate and Transport..... 3
CHEM F655—Environmental Toxicology..... 3
4. Complete two seminar courses
CHEM F691—Research Presentation Techniques 1
CHEM F692—Seminar..... 1
5. Complete approved electives* 3 – 6
6. Complete a thesis..... 12
7. Minimum credits required 30

Graduate Program — Ph.D. Degree

1. Complete the general university requirements (page 202).
2. Complete the Ph.D. degree requirements (page 207).
3. Complete three of the following core courses:
CHEM F605—Aquatic Chemistry 3
CHEM F606—Atmospheric Chemistry 3
CHEM F631—Environmental Fate and Transport..... 3
CHEM F655—Environmental Toxicology..... 3
4. Complete two seminar courses.
CHEM F691—Research Presentation Techniques 1
CHEM F692—Seminar..... 1
5. Complete approved electives* 3 – 6
6. Complete a thesis..... 18
7. Minimum credits required 32

* *Approved electives (both M.S. and Ph.D.) are specified by the student's committee. The following tracks are defined as a guide. Within these tracks students will be expected to complete as part of the core and electives:*

- i. *Atmospheric Chemistry: CHEM F601, CHEM F605, CHEM F606 and CHEM F631*
- ii. *Aqueous/Environmental Geochemistry: CHEM F605, CHEM F606 or CHEM F631, GEOS F618 and CHEM F609/GEOS F633.*
- iii. *Environmental Toxicology and Contaminant Fate: CHEM F605 or CHEM F606, CHEM F631 and CHEM F655*

A customized focus area may be developed based on an appropriate sequence of core and elective courses, subject to approval by the student's advisory committee.

See Biochemistry and Molecular Biology.

See Chemistry.