ENVIRONMENTAL CHEMISTRY AND TECHNOLOGY, PHD

The program has been organized to offer advanced instruction and research training in environmental chemistry and environmental technology leading to the doctor of philosophy (PhD). A doctoral minor in environmental chemistry and technology is also offered. The program trains candidates for careers in teaching, research, resource management, environmental consulting, and private sector/industrial positions. Areas of work include the development of advanced technologies and materials for air and water purification and for the saving and storage of energies; alternative energy technologies; water and air pollution control; soil and sediment remediation; environmental technology; chemical limnology; and groundwater chemistry.

The PhD degree is designed for students who have a strong background in chemistry and who desire graduate training in applying chemistry to environmental systems. Individual programs are tailored to meet the candidate's interests through selection of a specialization and elective courses. Areas of specialization include aquatic chemistry, air pollution chemistry, terrestrial chemistry, and chemical- and bio-technology development.

The Environmental Chemistry and Technology (ECT) Program faculty is composed of an interdepartmental committee. Several committee members who have appointments in the Department of Civil and Environmental Engineering are located in the Water Science and Engineering Laboratory (WSEL). Other members are located in their respective departments.

The environmental chemistry and technology area occupies over 10,000 square feet of office and laboratory space in the Water Science and Engineering Laboratory. Facilities include offices, conference room, classrooms, computer facilities, and over 8,000 square feet devoted to research. The research areas, including trace element and mercury clean laboratories, are designed for research in aquatic chemistry, air pollution chemistry, and environmental technology. Shop facilities (electronics/mechanical) allow fabrication of specialized equipment tailored to the particular field and laboratory research needs. Other specialized facilities include areas for investigations of air pollution chemistry, ceramic membrane technologies, hazardous material remediation, and development of energy storage devices.

In addition to the Water Science and Engineering Laboratory, students have access to numerous facilities on the UW–Madison campus, including laboratories in the Departments of Soil Science; Chemical and Biological Engineering; Materials Science and Engineering; Chemistry, Geoscience; Civil and Environmental Engineering; the Center for Limnology; and the State Laboratory of Hygiene.

ADMISSIONS

ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

Graduate admissions is a two-step process between academic programs and the Graduate School. ***Applicants must meet* the minimum requirements *(https://grad.wisc.edu/apply/requirements/) of the Graduate School as well as the program(s).*** Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply/).

Requirements	Detail
Fall Deadline	December 15
Spring Deadline	This program does not admit in the spring.
Summer Deadline	This program does not admit in the summer.
GRE (Graduate Record Examinations)	Not required.
English Proficiency Test	Refer to the Graduate School: Minimum Requirements for Admission policy: https://policy.wisc.edu/library/UW-1241 (https://policy.wisc.edu/library/UW-1241/).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

APPLICATION PROCESS AND REQUIREMENTS

All applicants must meet the Graduate School's admission requirements (http://grad.wisc.edu/admissions/requirements/) to be considered for admission. Departmental admission is by committee review. Applications submitted after the fall deadline through March 15 will be reviewed if complete and will be considered for admission by the program is space is still available. To check if space is available, please email: ectgradadmission@engr.wisc.edu. (ectgradadmission@engr.wisc.edu)

In addition, applicants must also meet the department's requirements listed below to be considered for admission:

Grades

A minimum undergraduate grade-point average (GPA) of 3.00 (on a 4.00 scale) on the equivalent of the last 60 semester hours (approximately two years of work) or a master's degree with a minimum cumulative GPA of 3.00 is required. Applicants from an international institution must demonstrate strong academic achievement comparable to a 3.00 for an undergraduate or master's degree. The Graduate School will use your institution's grading scale. Do not convert your grades to a 4.00 scale.

Degree

Applicants seeking admission should have a background in the fundamental areas of general, organic, physical, and analytical chemistry. In addition, applicants should have some background in applied sciences which can be fulfilled with a minimum of 6 credits in natural sciences such as botany, zoology, bacteriology, earth science, material science, biochemistry, or engineering. Applicants who have not met these requirements must do so prior to the completion of the master's degree.

Funding

Funded offers for MS (research) and PhD students, in the form of research assistantships, project assistantships, and/or teaching assistantships come directly from individual faculty members (https://engineering.wisc.edu/

departments/civil-environmental-engineering/research/environmental-chemistry-technology/). Please contact interested faculty before or after you have applied to inquire about assistantship opportunities. Funding is not guaranteed with admission. Admitted applicants will be contacted directly by faculty regarding funding opportunities.

COMPLETE APPLICATION

A complete graduate application is required before an application will be reviewed by the faculty. Late applications may not be reviewed for funding opportunities. A complete graduate application contains the following:

Graduate School Application

Applicants must submit an online application to the UW–Madison Graduate School. See Graduate School Admissions (https://grad.wisc.edu/admissions/) to apply.

Statement of Purpose

Submit a statement of purpose of 1,000 words or less in the online application. This statement should cover your technical areas of interest, coursework emphasis, research experience, professional goals, faculty members you are interested in working with, and any other items relevant to your qualifications for graduate school. See the Graduate School for additional guidelines for the Statement of Purpose (https://grad.wisc.edu/apply/prepare/) (scroll to bottom of page).

Three Letters of Recommendation

Three letters of recommendation must be submitted through the online application. These letters should be from people who can judge the applicant's academic, research, and/or work performance. See the Graduate School for FAQs (https://grad.wisc.edu/apply/#FAQ) regarding these letters.

Academic Transcripts

Upload the most recent copies of your transcripts to the online application, from each institution attended. Study abroad transcripts are not required if coursework is reflected on the degree granting university's transcript. Unofficial copies of transcripts are used for departmental review. If the applicant is recommended for admission, then the Graduate School will follow-up with instructions for official transcript submission. Please do not send transcripts or any other application materials to the Graduate School or the Environmental Chemistry and Technology program unless requested.

Resume/Curriculum Vitae

Upload your most recent resume or curriculum vitae in the online application.

English Proficiency Score

Refer to the Graduate School: Minimum Requirements for Admission (https://policy.wisc.edu/library/UW-1241/) policy.

Application Fee

A one-time application fee is required. See the Graduate School frequently asked questions (https://grad.wisc.edu/apply/#FAQ) for fee information. Fee grants are offered by the Graduate School on a limited basis and under certain conditions, as outlined here (https://grad.wisc.edu/apply/fee-grant/). The department does not offer an application fee waiver due to the large volume of applications received. However, if you are working with a specific faculty member, then they may offer you a fee voucher.

FUNDING

FUNDING

GRADUATE SCHOOL RESOURCES

The Bursar's Office provides information about tuition and fees associated with being a graduate student. Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

PROGRAM RESOURCES

Students admitted to the graduate program may receive financial support in the form of fellowships, teaching assistantships, or research assistantships. Support is dependent on availability of funds and students maintaining satisfactory progress towards their degree.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum degree requirements (https://guide.wisc.edu/graduate/#requirementstext) and policies (https://guide.wisc.edu/graduate/#policiestext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement	Detail
Minimum Credit Requirement	51 credits

Minimum Residence Credit Requirement	32 credits
Minimum Graduate Coursework Requirement	26 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).
Other Grade Requirements	Students must earn a B or above in all courses counting toward degree requirements.
Assessments and Examinations	Doctoral students are required to take a comprehensive preliminary exam by the end of their fifth semester of study in the PhD program. A final oral exam of the doctoral dissertation is required. Deposit of the doctoral dissertation in the Graduate School is required.
Language Requirements	No language requirements.
Graduate School Breadth Requirement	All doctoral students are required to complete a doctoral minor or graduate/professional certificate. Refer to the Graduate School: Breadth Requirement in Doctoral Training policy: https://policy.wisc.edu/library/UW-1200 (https://policy.wisc.edu/library/UW-1200/). Students will discuss minor and certificate options with the faculty advisor.

REQUIRED COURSES

Students are required to develop a plan of courses with their advisor. Additional courses beyond the core courses may be included with approval of the student's academic advisor and the approval of the Environmental Chemistry and Technology Academic Planning Committee.

Note that CIV ENGR 500 Water Chemistry, or an equivalent advanced Environmental Chemistry course, is a highly recommended prerequisite for many of the core Environmental Chemistry and Technology courses. If this have not been met prior to entering the program, students should consider this when planning the coursework.

Code	Title	Credits
Core Courses		
Environmental Inorganic Chemistry		
CIV ENGR 703	Environmental Geochemistry	1-3
or GEOSCI 875	Advanced Topics in Geology	
Environmental Organic Chemistry		
CIV ENGR/ M&ENVTOX/ SOIL SCI 631	Toxicants in the Environment: Sources, Distribution, Fate, & Effects	3
or CIV ENGR 704	Environmental Chemical Kinetics	
Air Chemistry		
CIV ENGR/ ATM OCN 701	The Chemistry of Air Pollution	2-3
or CHEM 629	Atmospheric Chemical Mechanisms	
Environmental Technology		
CIV ENGR 609	Special Topics in Water Chemistry (Topic: Advanced Water Analysis)	3
or CHEM 629	Atmospheric Chemical Mechanisms	
Chemistry Courses (numbered 500 or above)		
Students must complete two chemistry courses numbered 500 or above. Refer to the "Chemistry Course Options" for a partial list of potential courses. Other courses may be substituted for this requriement with the approval of the student's academic advisor and Environmental Chemistry and Technology Academic Planning Committee.		2-7
Seminar		
Students must enroll in one of the following seminars each semester. Students must present a seminar once per academic year, either fall or spring semester.		8
CIV ENGR 909	Graduate Seminar - Environmental Chemistry & Technology	
or CIV ENGR/ ATM OCN/ BOTANY/ ENVIR ST/ GEOSCI/ ZOOLOGY 911	Limnology and Marine Science Seminar	
Research		
Students must complete at least 4 credits of research with their faculty advisor. [1]		4
CIV ENGR 890	Pre-Dissertator's Research	
Electives		
Students complete electives in an area of interest chosen in consultation with faculty advisor to satisfy minimum credit requirement.		28-31
Total Credits		**51**

[1] If supported with a graduate assistantship (TA, RA, PA), students should enroll in the appropriate number of research credits each semester to achieve full-time status as required by credit-load rules.

Chemistry Course Options

Code	Title	Credits
BIOCHEM 501	Introduction to Biochemistry	3
BIOCHEM 507	General Biochemistry I	3
BIOCHEM 508	General Biochemistry II	3-4
BIOCHEM/ BOTANY 621	Plant Biochemistry	3
CBE 547	Introduction to Colloid and Interface Science	3
CHEM 524	Chemical Instrumentation	3
CHEM 561	Physical Chemistry I	3
CHEM 605	Spectrochemical Measurements	3
CHEM 613	Chemical Crystallography	3
CHEM 624	Electrochemistry	2-3
CHEM 636	Topics in Chemical Instrumentation: Introduction to NMR	2
CHEM 728	Electronics for Chemical Instrumentation	3
CHEM 637	Topics in Chemical Instrumentation: Advanced Methods in NMR	1-2

CHEM 652	Chemistry of Inorganic Materials	3
CHEM 653	Chemistry of Nanoscale Materials	3
CHEM 665	Biophysical Chemistry	3
CHEM 668	Biophysical Spectroscopy	2-3
CHEM 725	Separations in Chemical Analysis	2-3
CHEM 738	Introduction to Mass Spectrometry	1
CHEM 777	Physical Chemistry of Surfaces	2-3
CIV ENGR 501	Water Analysis-Intermediate	3
CIV ENGR 609	Special Topics in Water Chemistry	1-3
M S & E 748	Structural Analysis of Materials	3
M S & E 758	Transmission Electron Microscopy Laboratory	1
SOIL SCI 621	Soil and Environmental Chemistry	3
SOIL SCI 875	Special Topics	1-4

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy/) serve as the official document of record for Graduate School academic and administrative policies and procedures and are updated continuously. Note some policies redirect to entries in the official UW-Madison Policy Library (https://policy.wisc.edu/). Programs may set more stringent policies than the Graduate School. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Credits Earned at Other Institutions

Refer to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

Undergraduate Credits Earned at Other Institutions or UW-Madison

Upon approval from a student's graduate advisor and the graduate program chair, the Environmental Chemistry and Technology program refers to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)

Refer to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

Credits Earned as a University Special Student at UW–Madison

Refer to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

PROBATION

Refer to the Graduate School: Probation (https://policy.wisc.edu/library/UW-1217/) policy.

ADVISOR / COMMITTEE

Refer to the Graduate School: Advisor (https://policy.wisc.edu/library/UW-1232/) and Graduate School: Committees (Doctoral/Master's/MFA) (https://policy.wisc.edu/library/UW-1201/) policies. In addition to meeting with the assigned faculty advisor, students will also meet their Academic Planning Committee.

CREDITS PER TERM ALLOWED

15 credit maximum. Refer to the Graduate School: Maximum Credit Loads and Overload Requests (https://policy.wisc.edu/library/UW-1228/) policy.

TIME LIMITS

A candidate for a doctoral degree who fails to take the final oral examination and deposit the dissertation within five years after passing the preliminary examination may be required to take another preliminary examination and to be admitted to candidacy a second time.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hate-reporting/)
- Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/#grievance-procedure)
- Hostile and Intimidating Behavior Policies and Procedures (https://hr.wisc.edu/hib/)
  - Office of the Provost for Faculty and Staff Affairs (https://facstaff.provost.wisc.edu/)
- Employee Assistance (http://www.eao.wisc.edu/) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (https://employeedisabilities.wisc.edu/) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (https://grad.wisc.edu/) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (https://compliance.wisc.edu/) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office Student Assistance and Support (OSAS) (https://osas.wisc.edu/) (for all students to seek grievance assistance and support)
- Office of Student Conduct and Community Standards (https://conduct.students.wisc.edu/) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (http://www.ombuds.wisc.edu/) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (https://compliance.wisc.edu/titleix/) (for concerns about discrimination)

Environmental Chemistry and Technology Grievance Procedures

If a student feels unfairly treated or aggrieved by faculty, staff, or another student, the University offers several avenues to resolve the grievance. Students' concerns about unfair treatment are best handled directly with the person responsible for the objectionable action. If the student is uncomfortable making direct contact with the individual(s) involved, they should contact the advisor or the person in charge of the unit where the action occurred (program or department chair, section chair, lab manager, etc.). Many departments and schools/colleges have established specific procedures for handling such situations; check their web pages and published handbooks for information. If such procedures exist at

the local level, these should be investigated first. For more information see the Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/documents/grievances-and-appeals/).

1. The student is encouraged to speak first with the person toward whom the grievance is directed to see if a situation can be resolved at this level.
2. Should a satisfactory resolution not be achieved, the student should contact the program's Grievance Advisor or Director of Graduate Study (see contact box) to discuss the grievance.
    - If the student prefers to talk with someone outside of the Environmental Chemistry and Technology program, contact:
    - Joanna Gurstelle, College of Engineering Assistant Dean for Graduate Affairs
    - The Assistant Dean for Graduate Affairs (engr-dean-graduateaffairs@wisc.edu) provides overall leadership for graduate education in the College of Engineering, and is a point of contact for graduate students who have concerns about education, mentoring, research, or other difficulties.
    - The first attempt is to help students informally address the grievance prior to any formal complaint. Students are also encouraged to talk with their faculty advisors regarding concerns or difficulties if necessary. University resources for sexual harassment, discrimination, disability accommodations, and other related concerns can be found on the UW Office of Compliance website (https://compliance.wisc.edu/).
3. If the issue is not resolved to the student's satisfaction the student can submit the grievance to the Grievance Advisor in writing, within 60 calendar days of the alleged unfair treatment.
4. On receipt of a written complaint, a faculty committee will be convened by the Grievance Advisor to manage the grievance. The program faculty committee will obtain a written response from the person toward whom the complaint is directed. This response will be shared with the person filing the grievance.
5. The faculty committee will determine a decision regarding the grievance. The Grievance Advisor will report on the action taken by the committee in writing to both the student and the party toward whom the complaint was directed within 15 working days from the date the complaint was received.
6. At this point, if either party (the student or the person toward whom the grievance is directed) is unsatisfied with the decision of the faculty committee, the party may file a written appeal. Either party has 10 working days to file a written appeal to the College of Engineering.
7. Documentation of the grievance will be stored for at least 7 years. Significant grievances that set a precedent will be stored indefinitely.

The Graduate School has procedures for students wishing to appeal a grievance decision made at the school/college level. These policies are described in the Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/documents/grievances-and-appeals/).

OTHER

n/a

PROFESSIONAL DEVELOPMENT

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (https://grad.wisc.edu/pd/) to build skills, thrive academically, and launch your career.

LEARNING OUTCOMES

LEARNING OUTCOMES

1. Articulate research problems, potentials, and limits with respect to theory, knowledge, or practice within the field of environmental chemistry and technology.
2. Formulate ideas, concepts, and/or techniques beyond the current boundaries of knowledge in environmental chemistry and technology.
3. Create research or scholarship that makes a substantive contribution.
4. Demonstrate breadth within their learning experiences.
5. Advance contributions to the field of environmental chemistry.
6. Communicate complex ideas in a clear and understandable manner.
7. Fosters ethical and professional conduct.