CHEMISTRY, PHD

The mission of the Department of Chemistry at the University of Wisconsin–Madison is to conduct world-class, groundbreaking research in the chemical sciences while offering the highest quality of education to undergraduate students, graduate students, and postdoctoral associates. Our leadership in research includes the traditional areas of physical, analytical, inorganic, and organic chemistry, and has rapidly evolved to encompass environmental chemistry, chemical biology, biophysical chemistry, soft and hard materials chemistry, nanotechnology and chemistry education research. We pride ourselves on our highly interactive, diverse, and collegial scientific environment. Our emphasis on collaboration connects us to colleagues across campus, around the country, and throughout the world.

The Department of Chemistry is ranked very highly in all recent national rankings of graduate programs. We offer a doctor of philosophy in chemistry. Specializations within the program are analytical, inorganic, materials, organic, physical chemistry, chemical biology as well as chemistry education research. Breadth coursework may be taken in other departments including physics, mathematics, computer sciences, biochemistry, chemical engineering, and in fields other than the student's specialization within the Department of Chemistry.

Excellent facilities are available for research in a wide variety of specialized fields including synthetic and structural chemistry; natural product and bio-organic chemistry; molecular dynamics and photochemistry; biophysical, bioanalytical, and bioinorganic chemistry; spectroscopy (including magnetic resonance and microwave), theoretical and experimental chemical physics, chemical dynamics, quantum and statistical mechanics; macromolecular and polymer chemistry, materials science, surface and solid-state chemistry; x-ray crystallography, lasers, and light scattering; and chemical education. Programs are assisted by department computing and instrument centers and by other facilities on campus including those of the Division of Information Technology (DoIT).

Information on the research fields of faculty members is available on the chemistry website (http://www.chem.wisc.edu/).

The department offers opportunities for graduate students to obtain teaching experience. Financial assistance is available to most graduate students in the form of teaching or research assistantships, fellowships, or traineeships.

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 1
Spring Deadline	The program does not admit in the spring.
Summer Deadline	The 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

Prospective graduate students are expected to have satisfactorily completed the equivalent in classes and labs of the fundamental courses in chemistry offered at UW–Madison, one year of physics, and mathematics through calculus. Students who have not completed all the prerequisites may be admitted in exceptional cases, but any deficiencies must be made up in the first year of graduate study.

A grade point average of 3.0 (on a 4.0 scale) in the last 60 hours of undergraduate work is the minimum required for admission to graduate studies. Before teaching assistant appointments can be finalized, students for whom English is a second language must participate in the SPEAK Test, the institutional version of the Test of Spoken English (TSE).

Admission for the spring semester is not the norm, and applications for spring should only be submitted following discussion with a faculty member and/or the Graduate Program Office. Most summer admissions are applicants who were already admitted for the fall semester and decided to start earlier so they could serve as a teaching assistant or research assistant.

FUNDING

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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

With few exceptions, students admitted to the PhD program in the Department of Chemistry are guaranteed support for five continuous academic years. The support will be at the level of at least 50% time, and may come from a variety of sources—teaching assistantships, research assistantships, project assistantships, traineeships, and fellowships. This guarantee requires that you remain a graduate student in good standing in the PhD program in the Department of Chemistry, and that your teaching or other assigned responsibilities are satisfactory.

Currently, graduate students who have at least a 33% appointment for a fall or spring term are eligible to receive a full tuition (but not segregated fee) waiver.

Although serving as a teaching assistant is not a requirement of the chemistry department at this time, teaching can be an important part of the graduate training you receive. Most students will serve at least two semesters as a teaching assistant, and many will serve for two years. Whether or not an individual student will be appointed as a teaching assistant, research assistant, trainee or fellow depends on the availability of funding from the major professor, and eligibility for traineeships and fellowships from other sources.

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	The Department of Chemistry will not allow courses in which a student received a grade below a C to satisfy degree requirements.
Assessments and Examinations	During the second year, students complete the Thesis Background Exam (TBE). Students write a paper describing the background of their research, research progress, and future research plans and orally defend their understanding and research to their mentoring committee. During the third year, students complete the Original Research Proposal (RP) Exam. Students propose an original research project outside their area of study and write a paper describing the project. They orally defend their proposed project to their mentoring committee. At the end of the fourth year, students complete the fourth-year Review which determines the progress on dissertation and outlines final steps toward PhD completion. Student answers questions about their research and discusses responses with PI. If student and advisor agree on timeline and tasks, a formal meeting may not be required. If disagreements arise, the committee meets to provide guidance. At the end of the fifth year, if not defending their dissertation, students complete the 5th-Year review which determines the progress on dissertation and outlines final steps toward PhD completion. Student answers questions about their research and discusses responses with PI. If student and advisor agree on timeline and tasks, a formal meeting may not be required. If disagreements arise, the committee meets to provide guidance. In the 5th or 6th year, students write, defend, and submit their dissertation.
Language Requirements	There are currently no language requirements to obtain the PhD in Chemistry.
Graduate School Breadth Requirement	Doctoral students in Chemistry are not required to complete a doctoral minor or graduate/professional certificate as breadth is built into the major requirements.

REQUIRED COURSES

The Department of Chemistry has designated specific graduate courses as "core" courses. These courses are aligned with the various research areas (or paths) within the department and cover the fundamental concepts essential for conducting research in these areas. However, due to the interdisciplinary nature of research, students can choose core courses from any path that best support their research objectives. Any deviations from a path's recommended courses should be approved by the student's

advisor (or faculty advisor at the start of their first semester). **To meet the requirement of a core course, students must take the course for the maximum number of credits offered.**

General PhD Requirements

Code	Title	Credits
Core		
CHEM 901	Seminar-Teaching of Chemistry [1]	1
CHEM 607	Laboratory Safety [1]	1
CHEM 980	Seminar: Review of Current Research [2]	4
CHEM 990	Research [3]	1-12
Seminar Requirement		
Students must enroll in one of the seminar courses below every fall and spring term for 0 credits until they obtain candidacy (dissertator status).		0-2
CHEM 900	Seminar-Inorganic Chemistry	
CHEM 920	Seminar-Analytical Chemistry	
CHEM 940	Seminar-Organic Chemistry	
CHEM 960	Seminar-Physical Chemistry [4]	
Breadth Requirement		
Students in the Chemistry PhD complete breadth by completing a minimum of 3 courses and a minimum of 8 credits with the following requirements:		8
1. Only STEM courses may count toward the breadth requirements. STEM courses must be approved by your advisor and may include courses in chemistry, physics, or other physical sciences; courses from the many biological disciplines including pharmacy- and medical-related courses; courses in engineering; or courses with a computer science, statistics, math, or computational focus.		
2. The Department of Chemistry encourages the graduate students to take graduate-level courses but will count undergraduate mid- or upper-level STEM courses (numbered 300-500) toward the breadth requirement if these courses are approved by the research advisor.		
3. The Department of Chemistry will only count repeatable STEM courses once (for example, courses for traineeships, RCR courses). However, special topics courses that have different topics can be counted more than once.		
4. CHEM 607, CHEM 901, CHEM 980, and CHEM 990 do not satisfy the breadth requirement.		
Path Courses		
Complete appropriate path coursework.		5-8
Electives		
To satisfy minimum credit requirement, students work with advisor to identify elective courses numbered 300 or above.		8-15
Total Credits		**51**

[1] Students must complete CHEM 901 Seminar-Teaching of Chemistry in the fall of their first year and CHEM 607 Laboratory Safety in the spring of their first year.

[2] After joining a research lab, usually in the fall semester of the first year, students enroll in CHEM 980 Seminar: Review of Current Research in subsequent semesters. Students do not enroll in this course after reaching dissertator status.

[3] Students enroll in CHEM 990 Research credits to bring their semester load to 15 credits after enrolling in lecture courses and seminars; if the latter courses already total 15, no Research credits are required for that semester. After reaching dissertator status, students enroll in 3 credits.

[4] Students taking CHEM 960 Seminar-Physical Chemistry for their seminar enroll in a 0-credit section every semester. They also enroll in a 2-credit literature course section of CHEM 960 Seminar-Physical Chemistry one time during their graduate career, usually in the spring of their first year.

Analytical Chemistry Path [1]

Code	Title	Credits
CHEM 721	Instrumental Analysis	3-4
Select any one of the following for the maximum credits offered:		2-3
CHEM 622	Organic Analysis	
CHEM 623	Experimental Spectroscopy	
CHEM 624	Electrochemistry	
CHEM/ GENETICS 626	Genomic Science	
CHEM 629	Atmospheric Chemical Mechanisms	
CHEM 630	Selected Topics in Analytical Chemistry	
CHEM 675	Introductory Quantum Chemistry	
CHEM 725	Separations in Chemical Analysis	
CHEM 728	Electronics for Chemical Instrumentation	

[1] These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Chemical Biology Path [1]

Code	Title	Credits
CHEM/ BIOCHEM 704	Chemical Biology	3
Select any one of the following for the maximum credits offered:		2-4
CHEM 606	Physical Methods for Structure Determination	
CHEM 622	Organic Analysis	
CHEM 630	Selected Topics in Analytical Chemistry	
CHEM 665	Biophysical Chemistry	
CHEM 668	Biophysical Spectroscopy	
CHEM 721	Instrumental Analysis	

[1] These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Chemistry Education Research Path [1]

Code	Title	Credits
CHEM 758	Chemistry Education Research	2
CHEM 858	Special Topics in Chemistry Education	1-3
CURRIC/ COUN PSY/ED POL/ ED PSYCH/ELPA/ RP & SE 719	Introduction to Qualitative Research	3

[1] These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Inorganic Chemistry Path [1]

Code	Title	Credits
Complete the following for the maximum credits offered:		
CHEM 608	Symmetry, Bonding, and Molecular Shapes	3
CHEM 713	Inorganic and Organometallic Chemistry of the Main Group Elements	3

[1] These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Materials Chemistry Path [1]

Code	Title	Credits
Select any one of the following for the maximum credits offered:		3
CHEM 624	Electrochemistry	
CHEM 652	Chemistry of Inorganic Materials	
CHEM 653	Chemistry of Nanoscale Materials	
Select any one of the following for the maximum credits offered:		3
CHEM 654	Materials Chemistry of Polymers	
CHEM 664	Physical Chemistry of Macromolecules	

[1] These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Organic Chemistry Path [1]

Code	Title	Credits
CHEM 641	Advanced Organic Chemistry	3
CHEM 841	Advanced Organic Chemistry	3

[1] These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Physical Chemistry Path [1]

Code	Title	Credits
Complete two of the following courses for the maximum number of credits offered.		
CHEM 661	Chemical and Statistical Thermodynamics	3
CHEM 675	Introductory Quantum Chemistry	3
CHEM 721	Instrumental Analysis	3-4

[1] These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

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

With program approval, students may be allowed to transfer up to 12 credits of graduate coursework from other institutions. In cases where a new faculty member brings a student advisee with them from their prior institution, more than 12 credits may be considered and approved for that student. Coursework earned ten years or more prior to admission to a doctoral degree is not allowed to satisfy requirements.

Undergraduate Credits Earned at Other Institutions or UW-Madison

Refer 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.

CREDITS PER TERM ALLOWED

15 credits. 12 credits maximum of research.

TIME LIMITS

Refer to the Graduate School: Time Limits (https://policy.wisc.edu/library/UW-1221/) policy.

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)

L&S POLICY FOR GRADUATE STUDENT ACADEMIC APPEALS

Graduate students have the right to appeal an academic decision related to an L&S graduate program if the student believes that the decision is inconsistent with published policy.

Academic decisions that may be appealed include:

- Dismissal from the graduate program
- Failure to pass a qualifying or preliminary examination
- Failure to achieve satisfactory academic progress
- Academic disciplinary action related to failure to meet professional conduct standards

Issues such as the following cannot be appealed using this process:

- A faculty member declining to serve as a graduate student's advisor.
- Decisions regarding the student's disciplinary knowledge, evaluation of the quality of work, or similar judgements. These are the domain of the department faculty.
- Course grades. These can be appealed instead using the L&S Policy for Grade Appeal (https://kb.wisc.edu/ls/22258/).
- Incidents of bias or hate, hostile and intimidating behavior (https://hr.wisc.edu/hib/), or discrimination (Title IX (https://compliance.wisc.edu/titleix/), Office of Compliance (https://compliance.wisc.edu/eo-complaint/formal-investigations/)). Direct these to the linked campus offices appropriate for the incident(s).

Appeal Process for Graduate Students

A graduate student wishing to appeal an academic decision must follow the process in the order listed below. Note time limits within each step.

1. The student should first seek informal resolution, if possible, by discussing the concern with their academic advisor, the department's Director of Graduate Studies, and/or the department chair.
2. If the program has an appeal policy listed in their graduate program handbook, the student should follow the policy as written, including adhering to any indicated deadlines. In the absence of a specific departmental process, the chair or designee will be the reviewer and decision maker, and the student should submit a written appeal to the chair within 15 business days of the academic decision. The chair or designee will notify the student in writing of their decision.
3. If the departmental process upholds the original decision, the graduate student may next initiate an appeal to L&S. To do so, the student must submit a written appeal to the L&S Assistant Dean for Graduate Student Academic Affairs within 15 business days of notification of the department's decision.
   a. To the fullest extent possible, the written appeal should include, in a single document: a clear and concise statement of the academic decision being appealed, any relevant background on what led to the decision, the specific policies involved, the relief sought, any relevant documentation related to the departmental appeal, and the names and titles of any individuals contributing to or involved in the decision.
   b. The Assistant Dean will work with the Academic Associate Dean of the appropriate division to consider the appeal. They may seek additional information and/or meetings related to the case.
   c. The Assistant Dean and Academic Associate Dean will provide a written decision within 20 business days.
4. If L&S upholds the original decision, the graduate student may appeal to the Graduate School. More information can be found on their website: Grievances and Appeals (https://grad.wisc.edu/documents/grievances-and-appeals/) (see: Graduate School Appeal Process).

OTHER

n/a

PROFESSIONAL DEVELOPMENT

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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

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1. Articulates research problems, potentials, and limits with respect to theory, knowledge, and practice within an area of chemistry.
2. Formulates ideas, concepts, designs, and techniques beyond the current boundaries of knowledge within an area of chemistry.
3. Creates research and scholarship that makes a substantive contribution to an area of chemistry.
4. Demonstrates breadth within their learning experiences.
5. Advances the beneficial societal impacts of research in chemistry.
6. Communicates complex scientific ideas in a clear and understandable manner.
7. Fosters safe, ethical, and professional conduct.