

# CHEMISTRY, PH.D.

## REQUIREMENTS

### MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (<http://guide.wisc.edu/graduate/#policiesandrequirements>), 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 are able to complete a program with minimal disruptions to careers and other commitments.

**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

#### Requirements Detail

Minimum Credit Requirement 51 credits

Minimum Residence Credit Requirement 32 credits

Minimum Graduate Coursework Requirement Half of degree coursework (26 credits out of 51 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide.

Overall Graduate GPA Requirement 3.00 GPA required.

Other Grade Requirements The Graduate School requires an average grade of B or better in all coursework (300 or above, not including research credits) taken as a graduate student unless conditions for probationary status require higher grades. Grades of Incomplete are considered to be unsatisfactory if they are not removed during the next enrolled semester.

**Assessments and Examinations** During their second year, the students complete the Thesis Background Exam (TBE). They 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, the students complete the Original Research Proposal (RP) Exam. The 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 their fourth year, the students complete the 4th-Year Meeting with their mentoring committee. This meeting includes an oral presentation of their research and discussion of what research needs to be completed to obtain the PhD. The students and committee discuss the students' future plans.

At the end of their fifth year, if not defending their dissertation, the students complete the 5th-Year Meeting with the mentoring committee. This meeting includes an oral presentation of their research and discussion of what research needs to be completed to obtain the PhD. The students and committee discuss the students' future plans.

In the 5th or 6th year, the students write, defend, and submit their dissertation.

**Language Requirements** There are currently no language requirements to obtain the Ph.D. in Chemistry.

**Doctoral Minor/Breadth Requirements** Doctoral students must complete the required courses plus a minimum of 9 credits of minor courses. This requirement may be satisfied by an external minor (option A) or a distributed minor (option B). The minor, whether option A or B, is designed to represent a coherent body of work. To ensure coherence, the student must consult with their research advisor. The Ph.D. Minor Agreement Form should be submitted to the Graduate Program Office for approval at an early date, before the student is halfway through the proposed course sequence.

### REQUIRED COURSES

Code	Title	Credits
CHEM 901	Seminar-Teaching of Chemistry	1
CHEM 607	Laboratory Safety	1
CHEM 964	Seminar. Molecular Dynamics	0-1

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. After joining a research lab, usually in the fall semester of the first year, students enroll in CHEM 964 Seminar. Molecular Dynamics in subsequent semesters.

The Department of Chemistry recognizes 7 paths to the Ph.D. in Chemistry; each path has specific required courses, called core courses, and other path-specific requirements.<sup>1</sup>

**Analytical Chemistry Track**

Code	Title	Credits
CHEM 721	Instrumental Analysis	3-4
CHEM 920	Seminar-Analytical Chemistry	0

Select two of the following:

CHEM 622	Organic Analysis	
CHEM 623	Experimental Spectroscopy	
CHEM 624	Electrochemistry	
CHEM/ GENETICS 626	Genomic Science	
CHEM/ BMOLCHEM 627	Methods and Technologies for Protein Characterization	
CHEM 629	Atmospheric Chemical Mechanisms	
CHEM 630	Selected Topics in Analytical Chemistry	
CHEM 725	Separations in Chemical Analysis	
CHEM 728	Electronics for Chemical Instrumentation	

**Chemical Biology Track**

Code	Title	Credits
CHEM/ BIOCHEM 704	Chemical Biology	3

Select one of the following seminars: 0

CHEM 900	Seminar-Inorganic Chemistry	
CHEM 920	Seminar-Analytical Chemistry	
CHEM 940	Seminar-Organic Chemistry	

Select any one of the following for the maximum credits offered:

CHEM 606	Physical Methods for Structure Determination	
CHEM 622	Organic Analysis	
CHEM/ BMOLCHEM 627	Methods and Technologies for Protein Characterization	
CHEM 630	Selected Topics in Analytical Chemistry	
CHEM/ BIOCHEM 665	Biophysical Chemistry	
CHEM 668	Biophysical Spectroscopy	
CHEM 721	Instrumental Analysis	

**Chemistry Education Research Track**

Code	Title	Credits
CHEM 758	Chemistry Education Research	2
CURRIC/COUN PSY/ ED POL/ED PSYCH/ ELPA/RP & SE 719	Introduction to Qualitative Research	3
ED PSYCH/ELPA 822	Introduction to Quantitative Inquiry in Education	3

The following 3 courses are recommended for the minor:

Two chemistry courses relevant to the research project.

One advanced methods course selected from the following:

ED PSYCH 760	Statistical Methods Applied to Education I
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ED PSYCH 761	Statistical Methods Applied to Education II
ED PSYCH 763	Regression Models in Education
ED PSYCH 861	Statistical Analysis and Design in Educational Research
ED PSYCH/ ELPA 964	Hierarchical Linear Modeling
ED PSYCH/ COUN PSY/ CURRIC/ ED POL/ELPA/ RP & SE 788	Qualitative Research Methods in Education: Field Methods I
ED PSYCH/ COUN PSY/ CURRIC/ ED POL/ELPA/ RP & SE 789	Qualitative Research Methods in Education: Field Methods II

**Inorganic Chemistry Track**

Code	Title	Credits
CHEM 608	Symmetry, Bonding, and Molecular Shapes	1-3
CHEM 713	Inorganic and Organometallic Chemistry of the Main Group Elements	1-3
CHEM 900	Seminar-Inorganic Chemistry	0

Two of the following courses are recommended for the minor requirement:

CHEM 606	Physical Methods for Structure Determination
CHEM 613	Chemical Crystallography
CHEM 714	Organometallic Chemistry of the Transition Elements
CHEM 801	Selected Topics in Inorganic Chemistry

**Materials Chemistry Track**

Code	Title	Credits
CHEM 920	Seminar-Analytical Chemistry	0

Select two of the following:

CHEM 613	Chemical Crystallography
CHEM 624	Electrochemistry
CHEM 630	Selected Topics in Analytical Chemistry
CHEM 652	Chemistry of Inorganic Materials
CHEM 653	Chemistry of Nanoscale Materials
CHEM 654	Materials Chemistry of Polymers
CHEM 664	Physical Chemistry of Macromolecules
CHEM 842	Advanced Organic Chemistry
CBE 562	Special Topics in Chemical Engineering
M S & E 521	Advanced Polymeric Materials

**Organic Chemistry Track**

Code	Title	Credits
CHEM 641	Advanced Organic Chemistry	3
CHEM 841	Advanced Organic Chemistry	3
CHEM 940	Seminar-Organic Chemistry	0

Recommended courses, which may be taken as part of the minor:

Code	Title	Credits
CHEM 843	Advanced Organic Chemistry	1-3
CHEM 605	Spectrochemical Measurements	3
CHEM 636	Topics in Chemical Instrumentation: Introduction to NMR	2

**Physical Chemistry Track**

Code	Title	Credits
CHEM 661	Chemical and Statistical Thermodynamics	3
CHEM 675	Introductory Quantum Chemistry	3
CHEM 960	Seminar-Physical Chemistry	2

Complete at least 1 course from the following:

CHEM 664	Physical Chemistry of Macromolecules
CHEM/ BIOCHEM 665	Biophysical Chemistry
CHEM 668	Biophysical Spectroscopy
CHEM 762	Molecular Reaction Dynamics
CHEM 763	Introduction to Molecular Spectroscopy
CHEM 775	Electronic Structure of Molecules
CHEM 777	Physical Chemistry of Surfaces
CHEM 860	Selected Topics in Physical Chemistry
CHEM 864	Statistical Mechanics
CHEM/ BIOCHEM 872	Selected Topics in Macromolecular and Biophysical Chemistry

<sup>1</sup> These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.