

# Doctor of Philosophy in Chemistry

## Admission Requirements

The applicant must meet the School of Graduate Studies' current minimum general admission requirements as published in the graduate catalog.

1. A baccalaureate degree with a major in chemistry or allied fields.
2. Undergraduate credit in mathematics through integral calculus.
3. One year of physics.
4. Satisfy the School of Graduate Studies' English Language Proficiency requirements as published in the graduate catalog.

## Degree Requirements

Students seeking the Doctor of Philosophy degree at the University of North Dakota must satisfy all general requirements set forth by the School of Graduate Studies as well as particular requirements set forth by the Chemistry Department.

The degree of Doctor of Philosophy with a major in chemistry is a research degree and is conferred only in recognition of high achievement in independent scientific research and scholarship.

A candidate for the Ph.D. degree with a major in chemistry must complete a research problem in one of the four fields of chemistry. The scope of the doctoral dissertation will be such as to require the equivalent of at least one full-time academic year of research. Some doctoral research will require a substantially longer time. This research is expected to make a significant contribution to the candidate's chosen field of chemistry. When the major professor decides that the candidate has satisfactorily completed the research problem, the candidate, in accordance with the regulations of the University, is required to prepare a dissertation covering the research.

1. Completion of 90 semester credits beyond the baccalaureate degree
2. Maintenance of at least a 3.0 GPA for all classes completed as a graduate student.
3. Required Courses:
  - a. Two (2) credits of CHEM 509 Graduate Seminar
  - b. Nine (9) credits of 500-level courses from one of the three specific major sequences listed below:

Code	Title	Credits
<b>Analysis and Applications</b>		
CHEM 541	Analytical Spectroscopy	3
CHEM 542	Electrochemical Methods	3
CHEM 543	Chromatography	3
<b>Synthetic</b>		
CHEM 511	Advanced Inorganic Chemistry	3
CHEM 512	Organometallic Chemistry	3
CHEM 520	Advanced Organic Chemistry I	3
CHEM 521	Advanced Organic Chemistry II	3
CHEM 522	Advanced Organic Chemistry III	3
CHEM 475	Materials Chemistry	3
<b>Theory</b>		
CHEM 530	Chemical Thermodynamics	3
	or PHYS 543 Statistical Physics	
	or CHE 509 Advanced Chemical Engineering Thermodynamics	
CHEM 531	Chemical Dynamics	3
CHEM 532	Quantum Mechanics in Chemistry	3
	or PHYS 539 Quantum Mechanics	

- c. Three (3) credits of CHEM 519 Special Topics in Chemistry

- d. Scholarly Tools: Up to 9 credits of foundational classes, either from other Departments (subject to approval by the student's advisory committee) or those listed below:

Code	Title	Credits
CHEM 466	Fundamentals of Physical and Biophysical Chemistry	3
CHEM 454	Inorganic Chemistry II	3
CHEM 333	Analytical Chemistry	3
CHEM 361	Problem Solving in Organic Chemistry I	1
CHEM 362	Problem Solving in Organic Chemistry II	1
CHEM 510	Intermediate Inorganic Chemistry	3

- e. Nine (9) credits of elective courses (at least six must be 500-level Chemistry courses; three of these nine must be taken in divisions other than the major). Some of these credits may be replaced by Scholarly Tools as described above if deemed appropriate.
- f. CHEM 599 Research 55-57 credits
- g. CHEM 999 Dissertation 10-12 credits
- h. Passing of the Comprehensive Exam is required. To advance to Candidacy, the student must also file a Topic proposal.