

Chemistry

Department Information

- **Department Location:**
Ladd Hall
- **Department Phone:**
701-231-8694
- **Department Email:**
ndsu.chemistry@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/chemistry/ (<http://www.ndsu.edu/chemistry/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/chemistry/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/chemistry/>)

The chemistry undergraduate major and its specialized options at North Dakota State University provides opportunities for personal achievement and professional training that are typically not available at many universities. Faculty teach all major courses. Students use state-of-the-art instrumentation in their laboratory courses. Many students get involved in fundamental and applied research with faculty research groups and have growth experiences commonly available only to graduate students. Future secondary chemistry and science teachers can participate in supervised laboratory teaching and peer mentoring programs.

Background Information

Industry and graduate schools are well aware of the quality of the undergraduate education at NDSU and actively seek out our graduates. Scholarships, fellowships and employment in research groups or in supervised teaching activities can cut the already modest cost of an NDSU education by one-half or more.

The Program

The Department of Chemistry and Biochemistry is fully accredited by the American Chemical Society (ACS) and offers programs leading to an ACS-certified Bachelor of Science degree. Options in biochemistry or coatings and polymeric materials can be added to the curriculum. A pre-professional option for those planning on medical, dental and other professional schools is also available. A chemistry major may be combined with secondary school teacher certification with as little as one additional semester for student teaching.

The prescribed curriculum provides a solid grounding through classroom and laboratory work in all of the main areas of chemistry. Major laboratory courses are designed to utilize the latest synthesis and characterization methods and employ advanced, computer-interfaced instrumentation.

Our pre-professional option includes the course work in biological and biochemical sciences that easily meets the requirements of medical, dental and other health-related professional schools. A chemistry major offers rigorous pre-professional education, as well as a back-up option in case career plans change in the future.

Research Opportunities

Almost every chemistry faculty member is heavily involved in forefront research, and undergraduates are encouraged to participate in that research. Students gain important skills and are exposed to the excitement of the hunt for new knowledge. This research experience often helps students define career goals more sharply.

Career Opportunities

People often think of the professional chemist as one who stands at a workbench in an industrial laboratory carefully manipulating chemicals or instruments. A lot of chemists are employed this way. This is often quite satisfying since many people are drawn to chemistry because they enjoy laboratory work. There are, however, many other tasks besides laboratory research in which a chemist may engage, and many different careers for which he or she can prepare for a degree in chemistry. A chemist may be employed in government, business, industry or education. Besides basic and applied research (the lab bench), an industrial chemist may be involved in production, technical service (assisting people who use products), national and international marketing and sales, or management and corporate planning. Some chemists prefer self-employment through small business or consulting firms.

Analytical chemists are in demand for services to other departments within a chemical company, for quality control in large and small concerns, and for environmental monitoring by industrial, governmental and private organizations. Organic chemists, also in great demand, study new pharmaceuticals, polymers and other compounds. Materials chemists are needed by all high-tech industries for their synthesis and characterization skills. Inorganic chemists work on the full range of synthesis, characterization and application of chemical compounds. Physical chemists model

chemical structures and reactions, and design experiments and equipment to study them. The Department of Chemistry and Biochemistry offers specialized education and training in each of these fields.

A degree in chemistry can serve as excellent preparation for careers in medicine, dentistry and other health professions. A chemistry degree also can lead to law school, and perhaps a career in patent law, a very demanding and in-demand technical profession. About half of NDSU's chemistry graduates go on to graduate or professional schools. Almost all the rest go directly into industry. Average entry-level salaries for chemistry graduates is \$45,300 to \$81,400, based on 2016 data from www.payscale.com (<http://www.payscale.com>). For chemists who have advanced degrees, salary and opportunities are often much greater.

Faculty and Facilities

The Department of Chemistry and Biochemistry has 17 faculty members. All of the faculty have doctorate degrees from leading universities.

The Department of Chemistry and Biochemistry's teaching and research facilities are located in two connected buildings—Ladd and Dunbar Halls. Some additional laboratories are located in the A. Glenn Hill Center, and Quentin Burdick Building. Students are trained in the use of state-of-the-art equipment, some of which is duplicated at only a few sites in the world. Some undergraduate students are trained to use several powerful and sophisticated laser systems, and some have even built lasers that were put directly to work on research projects. Nuclear magnetic resonance spectrometry, X-ray diffraction and fluorescence are as up-to-date as one would expect to find at any major research university. Theoretical chemistry researchers use some of the most powerful computers on the NDSU campus.

High School Preparation

Ideal high school preparation for a chemistry major includes four years each of English and mathematics, and a year each of biology, chemistry and physics. Experience with personal computers is also desirable. Strong writing and communication skills are as important to success in chemistry as they are in any technical field.

Financial Support

A number of endowed scholarships and fellowships are available to highly qualified applicants. The Department of Coatings and Polymeric Materials offers industry-funded scholarships and fellowships to chemistry majors interested in taking the coatings and polymeric materials option. In addition, more than half of the students majoring in chemistry are engaged in research and earning substantial portions of their living expenses. Financial support for research experiences is provided principally by grants and contracts of faculty researchers, various summer Research Experiences for Undergraduates (SURE) programs, and national scholarship and fellowship programs, such as the Goldwater Foundation. Since 1992, nine students in the department have been awarded Goldwater Fellowships, which cover all educational expenses. Students interested in secondary school teaching have additional funding opportunities as laboratory teaching assistants and discussion leaders in a peer-tutoring program known as Supplemental Instruction. These positions not only provide an opportunity for help toward meeting expenses but also in adding relevant experience to resumes.

Sample Program Guide

B.S. Chemistry, ACS Certified

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
CHEM 150 & CHEM 160		4 COMM 110	3
MATH 165		4 CHEM 151 & CHEM 161	4
BIOL 150		3 MATH 166	4
Gen Ed Social & Behavioral Sci and Cultural Diversity		3 Gen Ed Humanities and Fine Arts	3
		17	17
Second Year			
Fall	Credits	Spring	Credits
CHEM 341		3 CHEM 342	3
CHEM 353		1 CHEM 354	2
MATH 128		1 MATH 266	3

MATH 259	3	PHYS 252 & 252L	5
PHYS 251 & 251L	5	Gen Ed Wellness	2
Gen Ed Humanities & Fine Arts and Global Perspectives	3		

16	15
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Third Year

Fall	Credits	Spring	Credits
CHEM 431 & 431L		5 CHEM 365	3
CHEM 364		3 CHEM 380	1
CHEM 471		2 Electives	9
ENGL 324		3	
Gen Ed Social and Behavioral Sci		3	

16	13
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Fourth Year

Fall	Credits	Spring	Credits
BIOC 460 & 460L		4 CHEM 425	3
CHEM 432 & 432L		4 CHEM 429	2
Electives		6 CHEM 491	2
		Electives	6

14	13
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Total Credits: 121