

CHEMISTRY

The chemistry undergraduate major and its specialized options provide opportunities for personal achievement and professional training that are typically not available either in larger or smaller 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 North Dakota State University and actively seek out our graduates. Students interested in professional or graduate schools tell us that they are glad they chose to stay closer to home for their undergraduate education while saving their financial resources for their post-graduate education. 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 Molecular Biology is fully accredited by the American Chemical Society (ACS) and offers programs leading to an ACS-certified B.S. degree. Options in biochemistry and polymers and coatings can be added to the curriculum. A pre-professional option for those planning on medical, dental and other professional schools also is 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 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 that he/she can prepare for with 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 Molecular Biology 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 \$40,000 to \$50,000, based on 2006 data from salary.hotjobs.com.

Faculty And Facilities

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

The Department of Chemistry and Molecular Biology's teaching and research facilities are located in two connected buildings—Ladd and Dunbar Halls. Some additional laboratories are located in the IACC. 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 and X-ray diffraction and fluorescence are as up-to-date as one finds at any major university. Theoretical chemistry researchers use some of the most powerful group of computers on the NDSU campus.

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 polymers and coatings 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, by various summer Research Experiences for Undergraduates programs and by national scholarship and fellowship programs such as the Goldwater Foundation. Since 1992, seven students in the department have been awarded Goldwater Fellowships, which cover all educational expenses. Majors 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 provide both an opportunity for help toward meeting expenses and in adding relevant experience to resumes.

High School Preparation

An 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.

Sample Curriculum

General Education Requirements	Credits
First Year Experience	
Univ. 189 - Skills for Academic Success.....	1
Communication	
Comm. 110 - Fundamentals of Public Speaking.....	3
Engl. 110, 120 - College Composition I, II.....	3, 3
Engl. 321 - Writing in Technical Professions <i>or</i> Engl. 324 - Writing in the Sciences	3
Quantitative Reasoning	
Math. 165 - Calculus I	4
Science & Technology	
Chem. 121, 121L - General Chemistry I and Lab <i>or</i> Chem. 150, 160 - Principles of Chemistry I and Lab	3, 1
Chem. 122, 122L - General Chemistry II and Lab <i>or</i> Chem. 160, 161 - Principles of Chemistry II and Lab	3, 1
Phys. 251, 251L - University Physics I and Lab.....	4, 1
Humanities & Fine Arts.....	6
Social & Behavioral Sciences	6
Wellness	2
Cultural Diversity.....	-
Global Perspective.....	-
Total.....	40

College and Department Requirements	Credits
Hum/Soc. Science Electives (B.S. Degree)	6
Hum/Soc. Science Electives (B.A. Degree).....	12
Second Year Language Proficiency	-
Totals.....	6-12

Major Requirements	Credits
Bioc. 460 - Foundations of Biochemistry and Molecular Biology I.....	4
Chem. 341, 342 - Organic Chemistry I and II.....	3, 3
Chem. 353, 354 - Majors Organic Chemistry Labs I and II	1, 2
Chem. 364, 365 - Physical Chemistry I and II.....	4, 4
Chem. 380 - Chemistry Junior Seminar	1
Chem. 431, 431L - Analytical Chemistry I and Lab.....	3, 2
Chem. 491 - Chemistry Senior Seminar	2
Math. 128 - Introductory Linear Algebra.....	1
Math. 166 - Calculus II.....	4
Math. 259 - Multivariate Calculus	3
Math. 266 - Introductory Differential Equations	3
Phys. 252, 252L - University Physics II and Lab	4, 1
Option Electives	10-36
Electives	11-14
Totals.....	54-80
CURRICULUM TOTAL	125

This sample curriculum is not intended to serve as a curriculum guide for current students, but rather an example of course offerings for prospective students. For the curriculum requirements in effect at the time of entrance into a program, consult with an academic adviser or with the Office of Registration and Records.

For Further Information

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