

Chemistry

The ACS certified Chemistry major is the basic chemistry degree designed for students seeking careers in the chemical industry, or careers in law, government, journalism, business, etc., that would benefit from a strong background in the physical sciences and mathematics. Many B.S. graduates go on to M.S. or Ph.D. studies. Other degree options include a biochemistry option (also ACS certified), a polymers option (also ACS certified), a pre-professional option, and a chemistry education option.

Students may apply for scholarships available from the Department of Chemistry and Biochemistry and the Department of Coatings and Polymeric Materials (<http://bulletin.ndsu.edu/past-bulletin-archive/2015-16/undergraduate/colleges/science-mathematics/coatings-polymeric-materials>) . See the College/Departmental Scholarships (<https://www.ndsu.edu/bisonconnection/finaid/scholarships>) page on the Bison Connection web site.

Pre-Professional Chemistry Option

This option is designed for students interested in medical, dental, optometry, or veterinary professional school, but who wish to have an alternative career path to careers in industry, law, government, journalism, business, etc., that would benefit from a strong background in the physical sciences and mathematics. This option also provides excellent preparation for graduate study in biochemistry, biotechnology, and molecular biology.

Polymers Option (ACS Certified)

This program is for students who wish to prepare for a career as a chemist in coatings and polymers industries, or for graduate school in polymer chemistry. This is the only program in the U.S. that combines an ACS-certified B.S. degree in Chemistry with a coatings and polymeric materials curriculum. Students have numerous opportunities to participate in the summer research and cooperative programs sponsored by the industry. Scholarship support from the Department of Coatings and Polymeric Materials (<https://www.ndsu.edu/cpm>) is available to students who elect this option.

Pre-Chemistry Education Option

This option is designed for the student interested in a disciplinary major in chemistry, but who is also considering becoming a chemistry and physics teacher. The curriculum includes physics coursework beyond the usual chemistry major to enable the graduate to teach physics in most states. For teacher certification, students must apply to the School of Education (<https://www.ndsu.edu/education>) to enroll in the additional requirements. ACS certification may be earned by taking CHEM 471 Physical Chemistry Laboratory, CHEM 429 Inorganic Chemistry Laboratory, and CHEM 432 Analytical Chemistry II/CHEM 432L Analytical Chemistry II Laboratory, as additional courses and choosing BIOC 460 Foundations of Biochemistry and Molecular Biology I instead of CHEM 260 Elements of Biochemistry.

Scholarships starting in the sophomore year are available for students in the Chemical Education option.

Major Requirements

Major: Chemistry

Degree Type: B.A. or B.S.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321 or ENGL 324	Writing in the Technical Professions Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
Select one of the following:		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following:		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		44

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences* and proficiency at the second year level in a modern foreign language.

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

General Education Requirements		40
Science and Mathematics College Requirements		6-12
Chemistry Core Requirements		
CHEM 341	Organic Chemistry I	3
CHEM 342	Organic Chemistry II	3
CHEM 353	Majors Organic Chemistry Laboratory I	1
CHEM 354	Majors Organic Chemistry Laboratory II	2
CHEM 364	Physical Chemistry I	3
CHEM 365	Physical Chemistry II	3
CHEM 380	Chemistry Junior Seminar	1
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
CHEM 471	Physical Chemistry Laboratory (Not required for Pre-professional and Chemistry Education Options)	2
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 460L	Foundations of Biochemistry I Laboratory	1
CHEM 491	Seminar	2
Related Required Courses		
MATH 128	Introduction to Linear Algebra	1
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Options: Select one of the five options listed below.		12-32
Degree Requirements: Potential of 18 credits to reach 122		18
Total Credits		122-148

Select one of the five options to complete major requirements (12-32 credits):**Option 1: ACS Certified Chemistry**

CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	5
CHEM 432 & 432L	Analytical Chemistry II and Analytical Chemistry II Laboratory	4
MATH 266	Introduction to Differential Equations	3
Total Credits		12

Option 2: ACS Certified w/Biochemistry Option

BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 473	Methods of Biochemical Research	3
BIOC 474	Methods of Recombinant DNA Technology	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	5
MATH 266	Introduction to Differential Equations	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Select 6 credits of the following (Biology):		6
BIOL 315 & 315L	Genetics and Genetics Laboratory	
BOT 380	Plant Physiology	
MICR 352	General Microbiology II	
ZOO 370	Cell Biology	
Total Credits		32

Option 3: Coating & Polymeric Materials

CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	5
CHEM 471	Physical Chemistry Laboratory	2
CHEM 432 & 432L	Analytical Chemistry II and Analytical Chemistry II Laboratory	4
CPM 473	Polymer Synthesis	3
CPM 474 & CPM 484	Coatings I and Coatings I Laboratory	5
CPM 475 & CPM 485	Coatings II and Coatings II Laboratory	5
MATH 266	Introduction to Differential Equations	3
Total Credits		27

Option 4: Pre-Professional Option

BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 425	Inorganic Chemistry I	3
MATH 266 or STAT 330	Introduction to Differential Equations Introductory Statistics	3

MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
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Total Credits **23**

Option 5: Chemistry Pre-Education Application must be made to the School of Education in order to obtain a teaching degree

BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
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CHEM 425	Inorganic Chemistry I	3
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EDUC 321	Introduction to Teaching	3
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EDUC 322	Educational Psychology	3
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MATH 266	Introduction to Differential Equations	3
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or STAT 330	Introductory Statistics	
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PHYS Elective		3
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Recommended for Education Option

BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
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GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
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Total Credits **27**

Minor Requirements

Chemistry Minor

Minor Requirements

Required Credits: 19

Required Courses

CHEM 121	General Chemistry I	3
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CHEM 121L	General Chemistry I Laboratory	1
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CHEM 122	General Chemistry II	3
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CHEM 122L	General Chemistry II Laboratory	1
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Electives **11**

300-400 level courses in chemistry, biochemistry, or coatings & polymeric materials; one lab course required.

Total Credits **19**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.