

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/2014-15/undergraduate/colleges/science-mathematics/coatings-polymeric-materials>). See the College/Departmental Scholarships (<http://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 (<http://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 (<http://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	Principles of Chemistry I	
or CHEM 160	Principles of Chemistry Laboratory I	

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
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Select one of the following:		4
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CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
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CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
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Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B): Select from current general education list	6
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Wellness (W): Select from current general education list	2
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Cultural Diversity (D): Select from current general education list	
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Global Perspectives (G): Select from current general education list	
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Total Credits	44
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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 Analytical Chemistry I & 431L 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 University Physics II & 252L 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 Inorganic Chemistry I & CHEM 429 and Inorganic Chemistry Laboratory	5
CHEM 432 Analytical Chemistry II & 432L 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 General Biology I & 150L and General Biology I Laboratory	4
CHEM 425 Inorganic Chemistry I & CHEM 429 and Inorganic Chemistry Laboratory	5
MATH 266 Introduction to Differential Equations	3

MICR 350 General Microbiology & 350L and General Microbiology Lab	5
Select 6 credits of the following (Biology):	6
BIOL 315 Genetics & 315L 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 Inorganic Chemistry I & CHEM 429 and Inorganic Chemistry Laboratory	5
CHEM 471 Physical Chemistry Laboratory	2
CHEM 432 Analytical Chemistry II & 432L and Analytical Chemistry II Laboratory	4
CPM 473 Polymer Synthesis	3
CPM 474 Coatings I & CPM 484 and Coatings I Laboratory	5
CPM 475 Coatings II & CPM 485 and Coatings II Laboratory	5
MATH 266 Introduction to Differential Equations	3
Total Credits	27

Option 4: Pre-Professional Option

BIOL 150 General Biology I & 150L and General Biology I Laboratory	4
BIOL 220 Human Anatomy and Physiology I & 220L and Human Anatomy and Physiology I Laboratory	4
BIOL 221 Human Anatomy and Physiology II & 221L and Human Anatomy and Physiology II Laboratory	4
CHEM 425 Inorganic Chemistry I	3
MATH 266 Introduction to Differential Equations or STAT 330 Introductory Statistics	3
MICR 350 General Microbiology & 350L and General Microbiology Lab	5
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 General Biology I & 150L and General Biology I Laboratory	4
CHEM 425 Inorganic Chemistry I	3
EDUC 321 Introduction to Teaching	3
EDUC 322 Educational Psychology	3
MATH 266 Introduction to Differential Equations or STAT 330 Introductory Statistics	3
PHYS Elective	3
Recommended for Education Option	
BIOL 151 General Biology II & 151L and General Biology II Laboratory	4

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
CHEM 121L	General Chemistry I Laboratory	1
CHEM 122	General Chemistry II	3
CHEM 122L	General Chemistry II Laboratory	1

Electives		11
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300-400 level courses in chemistry, biochemistry, or coatings & polymeric materials; one lab course required.

Total Credits		19
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Minor Requirements and Notes

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