Bachelor of Science with Major in Chemistry

Required 120 credits (36 of which must be numbered 300 or above, and 60 of which must be from a 4-year institution) including:

I. Essential Studies Requirements (see University ES guidelines and course listings)

II. The Following Curriculum:

Major Requirements — 43 hours (Option A) or 39 hours (Option B) of Chemistry and Biochemistry including:

Option A. Physical Science Emphasis

Freshman Year		
First Semester		**Credits**
CHEM 101	Orientation to Chemistry	1
CHEM 121 & 121L or CHEM 221 ***and*** CHEM 221L	General Chemistry I or Fundamentals of Chemistry - Concepts ***and*** Fundamentals of Chemistry Laboratory	4
ENGL 110	College Composition I	3
MATH 165	Calculus I [1]	4
Essential Studies and Other Electives [2]		3
	Credits	**15**
Second Semester		
CHEM 122 & 122L or CHEM 254 ***and*** CHEM 254L	General Chemistry II [4] or Inorganic Chemistry I ***and*** Inorganic Chemistry I Laboratory	4
MATH 166	Calculus II	4
ENGL 130	Composition II: Writing for Public Audiences	3
Essential Studies and Other Electives [2]		3
	Credits	**14**
Sophomore Year		
First Semester		
CHEM 333 & 333L	Analytical Chemistry and Analytical Chemistry Laboratory	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 361	Problem Solving in Organic Chemistry I	1
PHYS 251	University Physics I	4
MATH 265	Calculus III	4
	Credits	**17**
Second Semester		
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
CHEM 362	Problem Solving in Organic Chemistry II	1
PHYS 252	University Physics II	4
Essential Studies and Other Electives [2,4]		5
	Credits	**14**
Junior Year		
First Semester		
CHEM 443	Instrumental Analysis III - Chromatography/Mass Spectrometry [3]	2
CHEM 470	Thermodynamics Kinetics	3
CHEM 470R	Thermodynamics Kinetics Recitation	1
First Semester of a Foreign Language [5]		4
Essential Studies and Other Electives [2,4]		5
	Credits	**15**
Second Semester		
CHEM 441	Instrumental Analysis I - Spectroscopy [3]	2
CHEM 471	Quantum Mechanics Spectroscopy [6]	3
CHEM 471R	Quantum Mechanics Spectroscopy Recitation [6]	1
CHEM 462	Physical Chemistry Laboratory [6]	3
Second Semester of a Foreign Language [5]		4
Essential Studies and Other Electives [2,4]		2
	Credits	**15**
Senior Year		
First Semester		
Essential Studies and Other Electives [2,4]		15
	Credits	**15**
Second Semester		
CHEM 442	Instrumental Analysis II - Electrochemistry [3]	2
CHEM 495	Chemistry Capstone	3
Essential Studies and Other Electives [4]		10
	Credits	**15**
	Total Credits	**120**

1. If a student is not ready for MATH 165 Calculus I, the math sequence may be moved back one semester and MATH 107 Precalculus (also MATH 103 College Algebra, if needed) should be taken in the first semester.
2. Suggested electives are courses in Physics, Mathematics, Biochemistry, Biology, Computer Science, Chemical Engineering, Business Management, Speech or Education (see below for Teacher Licensure).
3. Chem 44X (CHEM 441 Instrumental Analysis I - Spectroscopy, CHEM 442 Instrumental Analysis II - Electrochemistry and CHEM 443 Instrumental Analysis III - Chromatography/Mass Spectrometry) courses are offered within a regular, two-year cycle. Students can take Chem 44X courses in any order. To complete the degree in four years, students must begin taking the first available Chem 44x course of the cycle in their Junior year (at the latest).
4. Other undergraduate and graduate level courses in Chemistry may be taken as electives. Inorganic Chemistry I (Chem 254/L) is especially recommended for broader chemistry knowledge for students taking Chem 221 & 221L for good preparation for organic chemistry. If the Chemistry Capstone (Chem 495) is not taken for Essential Studies fulfillment, then one credit hour must be taken of either Special Problems in Chemistry (Chem 392) or Senior Research (Chem 492).
5. Two semesters of a foreign language are required. If a student wishes to pursue Study Abroad, taking language courses earlier is recommended.
6. Chem 462, 471 and 471R are offered in spring even years.

Option B. Biochemistry Emphasis

Freshman Year		
First Semester		**Credits**
CHEM 101	Orientation to Chemistry	1
CHEM 121 & 121L or CHEM 221 ***and*** CHEM 221L	General Chemistry I or Fundamentals of Chemistry - Concepts ***and*** Fundamentals of Chemistry Laboratory	4
ENGL 110	College Composition I	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory [2]	4
Essential Studies Electives		3
	Credits	**15**
Second Semester		
CHEM 122 & 122L or CHEM 254 ***and*** CHEM 254L	General Chemistry II [3] or Inorganic Chemistry I ***and*** Inorganic Chemistry I Laboratory	4

MATH 146 or MATH 165	Applied Calculus I [1] or Calculus I	3
BIOL 151 & 151L	General Biology II and General Biology II Laboratory [2]	4
ENGL 130	Composition II: Writing for Public Audiences	3
	Credits	**14**
Sophomore Year		
First Semester		
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 361	Problem Solving in Organic Chemistry I	1
PHYS 211	College Physics I	4
Essential Studies and Other Electives [3]		3
	Credits	**12**
Second Semester		
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
CHEM 362	Problem Solving in Organic Chemistry II	1
PHYS 212	College Physics II	4
Essential Studies and Other Electives [3]		6
	Credits	**15**
Junior Year		
First Semester		
CHEM 333 & 333L	Analytical Chemistry and Analytical Chemistry Laboratory	4
BIOL 315 or BIOL 341	Genetics [4] or Cell Biology	3
First Semester of a Foreign Language [5]		4
Essential Studies and Other Electives [3]		9
	Credits	**20**
Second Semester		
BIMD 301	Biochemistry	3
CHEM 466	Fundamentals of Physical and Biophysical Chemistry [6]	3
CHEM 467	Survey of Physical Chemistry Laboratory [6]	2
Second Semester of a Foreign Language [5]		4
Essential Studies and Other Electives [3]		3
	Credits	**15**
Senior Year		
First Semester		
BIMD 401	Advanced Biochemistry	3
BIMD 494	Directed Studies	2
Essential Studies and Other Electives [3]		9
	Credits	**14**
Second Semester		
CHEM 495	Chemistry Capstone	3
Essential Studies and Other Electives [3]		12
	Credits	**15**
	Total Credits	**120**

1 If a student is not ready for MATH 146 Applied Calculus I, MATH 103 College Algebra should be taken in the first semester. If a student would like the option to change into the B.S. in Chemistry or the B.S. with a Major in Chemistry with emphasis on the Physical Science Option at a later date, be aware that MATH 165 Calculus I, MATH 166 Calculus II, and MATH 265 Calculus III are required. If a student who begins either the B.S. in Chemistry or the B.S. with a Major in Chemistry with emphasis on the Physical Science Option wishes to change into the Biochemistry Option, MATH 165 Calculus I will substitute for MATH 146 Applied Calculus I.

2 BIOL 150 General Biology I and BIOL 151 General Biology II can be taken in the sophomore year. They are prerequisites to other required biology courses.

3 Other undergraduate and graduate level courses in Chemistry may be taken as electives. Inorganic Chemistry I (Chem 254/L) is especially recommended for broader chemistry knowledge for students taking Chem 221 & 221L for good preparation for organic chemistry. Other suggested electives are courses in Physics, Mathematics, Biochemistry, Biology, Languages, Computer Science, Chemical Engineering, Business Management, Speech, and Education (see below for Teacher Licensure)

4 Instead of BIOL 341 Cell Biology or BIOL 315 Genetics, students may take BIMD 302 General Microbiology Lecture and BIMD 302L General Microbiology Laboratory.

5 Two semesters of a foreign language are required. If a student wishes to pursue Study Abroad, taking language courses earlier is recommended.

6 Chem 466 and 467 are offered in spring on even years.

Teacher Licensure

Through a partnership with the College of Education and Human Development, the Department of Teaching, Leadership & Professional Practice students may seek secondary licensure in Chemistry. The following program of study must be completed:

I. Chemistry Coursework

1. Chemistry Courses required for a Chemistry degree (B.S. in Chemistry or B.S. with major in Chemistry), including level-II proficiency (two semesters) in a foreign language.
2. Essential studies coursework.

II. Admission to the Secondary Program i.e., completion of preadmission courses. See College of Education and Human Development for admission and licensing requirements (https://catalog.und.edu/undergraduateacademicinformation/departmentalcoursesprograms/chemistry/chem-bs-major/public.courseleaf.com/undergraduateacademicinformation/departmentalcoursesprograms/teachingandlearning/tl-bsed-se/). Including courses:

T&L 250 Introduction to Education

T&L 251 Understanding Individuals with Different Abilities

III. The program in Secondary Education (see Department of Teaching, Leadership & Professional Practice (https://und-public.courseleaf.com/undergraduateacademicinformation/departmentalcoursesprograms/teachingandlearning/tl-bsed-se/))

Chemistry majors seeking secondary licensure must have an advisor in both the Chemistry Department and the Department of Teaching, Leadership & Professional Practice.