CHEMISTRY MAJOR (B.S.)

https://ceps.unh.edu/chemistry/program/bs/chemistry-major

Description

The B.S. Chemistry degree is certified by the American Chemical Society and provides a deep, rigorous experience that prepares students for graduate work or a career in chemical industry and related fields. The curriculum offers thorough training in the major fields of chemistry, covering analytical, inorganic, organic, and physical chemistry, as well as biochemistry and chemical biology. Students gain laboratory experience in molecular synthesis and characterization, chemical biology, analytical and instrumental methods, physical chemical measurements and data analysis, and spectroscopy. At the same time, the program requires students to participate in scientific inquiry, via both advanced laboratory experiences and independent research.

Requirements

Degree Requirements

Minimum Credit Requirement: 128 credits

Minimum Residency Requirement: 32 credits must be taken at UNH

Minimum GPA: 2.0 required for conferral*

Core Curriculum Required: Discovery & Writing Program Requirements

Foreign Language Requirement: No

All Major, Option and Elective Requirements as indicated.
**Major GPA requirements as indicated.*

Major Requirements

Code	Title	Credits
Required Courses		
CHEM 400	Freshman Seminar	1
CHEM 403	General Chemistry I	4
CHEM 404	General Chemistry II	4
CHEM 517 & CHEM 518	Introduction to Chemical Measurement Science and Practical Chemical Measurement Techniques and Instrumentation	5
CHEM 547 & CHEM 549	Organic Chemistry I and Organic Chemistry Laboratory	5
CHEM 548 & CHEM 550	Organic Chemistry II and Organic Chemistry Laboratory	5
CHEM 574 & CHEM 576	Chemistry Across the Periodic Table and Experimental Inorganic Chemistry	6
BMCB 658	General Biochemistry [1, 3]	3
or CHEM 740	Chemical Biology	
CHEM 683 & CHEM 685	Physical Chemistry I and Physical Chemistry Laboratory	5
CHEM 684 & CHEM 686	Physical Chemistry II and Physical Chemistry Laboratory	5
CHEM 755	Advanced Organic Chemistry	3
CHEM 762 & CHEM 763	Advanced Chemical Analysis Instrumentation and Advanced Chemical Instrumentation Laboratory	5
CHEM 774	Inorganic Chemistry	3
CHEM 776	Physical Chemistry III	3
CHEM 777	Advanced Synthesis and Characterization	3
CHEM 798	Senior Seminar	1
CHEM 799	Senior Thesis [2]	8
MATH 425	Calculus I	4
MATH 426	Calculus II	4
PHYS 407	General Physics I	4
PHYS 408	General Physics II	4
Total Credits		**85**

1. BMCB 658 General Biochemistry and CHEM 740 Chemical Biology each satisfy the Discovery Biological Sciences requirement (BS Chemistry majors only).
2. CHEM 799 Senior Thesis is a year-long experience of 4 credits per semester and satisfies the Discovery Capstone Experience requirement.
3. CHEM 740 Chemical Biology meets the ACS BIOCHEM requirement.

Degree Plan

Sample Degree Plan

This sample degree plan serves as a general guide; students collaborate with their academic advisor to develop a personalized degree plan to meet their academic goals and program requirements.

First Year		
Fall		**Credits**
CHEM 400	Freshman Seminar	1
CHEM 403	General Chemistry I	4
MATH 425	Calculus I	4
PHYS 407	General Physics I	4
Discovery Course		4
	Credits	**17**
Spring		
CHEM 404	General Chemistry II	4
MATH 426	Calculus II	4
ENGL 401	First-Year Writing	4
PHYS 408	General Physics II	4
	Credits	**16**
Second Year		
Fall		
CHEM 517	Introduction to Chemical Measurement Science	3
CHEM 518	Practical Chemical Measurement Techniques and Instrumentation	2
CHEM 547	Organic Chemistry I	3
CHEM 549	Organic Chemistry Laboratory	2
Discovery Course		4
Discovery Course		4
	Credits	**18**
Spring		
CHEM 548	Organic Chemistry II	3
CHEM 550	Organic Chemistry Laboratory	2
CHEM 574	Chemistry Across the Periodic Table	4
CHEM 576	Experimental Inorganic Chemistry	2
Discovery Course		4
	Credits	**15**
Third Year		
Fall		
CHEM 683	Physical Chemistry I	3

CHEM 685	Physical Chemistry Laboratory	2
CHEM 774	Inorganic Chemistry	3
CHEM 755	Advanced Organic Chemistry	3
CHEM 777	Advanced Synthesis and Characterization	3
Discovery Course		4
	Credits	**18**
Spring		
CHEM 684	Physical Chemistry II	3
CHEM 686	Physical Chemistry Laboratory	2
CHEM 762	Advanced Chemical Analysis Instrumentation	3
CHEM 763	Advanced Chemical Instrumentation Laboratory	2
Elective Course		4
Discovery Course		4
	Credits	**18**
Fourth Year		
Fall		
CHEM 776	Physical Chemistry III (Not offered every year. Can take CHEM 708 or CHEM 740 are Chem elective equivalent)	3
CHEM 799	Senior Thesis (first semester of a yearlong experience)	4
BMCB 658 or CHEM 740	General Biochemistry or Chemical Biology	3
Elective Course (1 credits each if not	course at 4 credits or 2 Electives at 4 taking BMCB 658)	4
	Credits	**14**
Spring		
Elective Course		4
Elective Course		3
CHEM 798	Senior Seminar	1
CHEM 799	Senior Thesis	4
	Credits	**12**
	Total Credits	**128**

Student Learning Outcomes

Program Learning Outcomes

- Reason with Chemistry's anchoring concepts: that matter consists of atoms that have internal structures that dictate their chemical and physical behavior; that atoms interact via electrostatic forces to form chemical bonds that chemical compounds have geometric structures that influence their chemical and physical behaviors; that intermolecular forces—electrostatic forces between molecules—dictate the physical behavior of matter; that matter changes, forming products that have new chemical and physical properties that energy is the key currency of chemical reactions in molecular scale systems as well as macroscopic systems; that chemical changes have a time scale over which they occur; that all chemical changes are, in principle, reversible, and chemical processes often reach a state of dynamic equilibrium; that Chemistry is generally advanced via experimental observations; and that Chemistry constructs meaning interchangeably at the particulate and macroscopic levels.
- Use Chemistry's cross-cutting concepts to interrogate and explain phenomena: chemical identity (how do we identify chemical substances?); structure-property relationships (how do we predict the properties of materials?); chemical causality (why do chemical processes occur?); chemical mechanism (how do chemical processes occur?); chemical control (how can we control chemical processes?); benefits-costs-risks (how do we evaluate the impacts of chemically transforming matter?).
- Demonstrate the following general scientific practices when displaying knowledge of chemical ideas and concepts: asking questions; developing and using models; constructing explanations; planning and carrying out investigations; engaging in argument from evidence; analyzing and interpreting data; using mathematics and computational thinking; obtaining, evaluating, and communicating information OR demonstrate the following Chemistry core practices when displaying knowledge of chemical ideas and concepts (a) analysis: development and application of strategies for detecting, identifying, separating, and quantifying chemical substances (b)synthesis: the design of new substances and synthetic routes (c)transformation: controlling chemical processes for non-synthetic purposes.