CHEMISTRY MAJOR (B.S.)

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

Description

Chemistry Major (B.S.) 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. Students gain laboratory experience in molecular synthesis and characterization, 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

Required Courses

Code	Title	Credits
CHEM 400	Freshman Seminar	1
CHEM 403	General Chemistry I	4
CHEM 404	General Chemistry II	4
CHEM 517 & CHEM 518	Quantitative Analysis and Quantitative Analysis Laboratory	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
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 & CHEM #756	Advanced Organic Chemistry and Advanced Organic Chemistry Laboratory	5-6
CHEM 762 & CHEM 763	Instrumental Methods of Chemical Analysis and Instrumental Methods of Chemical Analysis Laboratory	5
CHEM 774 & CHEM 775	Inorganic Chemistry and Inorganic Chemistry Laboratory	5
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		89-90

1 BMCB 658 General Biochemistry satisfies the Discovery Biological Sciences requirement (for BS Chem majors only).

2 CHEM 799 Senior Thesis is a year-long experience of 4 credits per semester and satisfies the Discovery Capstone Experience requirement.

Degree Plan

This is the suggested degree plan for B.S. Chemistry majors. A student can alter this plan in consultation with an academic adviser.

Course	Title	Credits
First Year		
Fall		
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
	Total Credits	17

Course	Title	Credits
First Year		
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
	Total Credits	16

Course	Title	Credits
Second Year		
Fall		
CHEM 517	Quantitative Analysis	4
CHEM 518	Quantitative Analysis Laboratory	1
CHEM 547	Organic Chemistry I	3
CHEM 549	Organic Chemistry Laboratory	2
Discovery Courses (2 courses at 4 credits each)		8
	Credits	18
	Total Credits	18

Course	Title	Credits
Second Year		
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
	Total Credits	15

Course	Title	Credits
Third Year		
Fall		
CHEM 683	Physical Chemistry I	3
CHEM 685	Physical Chemistry Laboratory	2
CHEM 755	Advanced Organic Chemistry	3

CHEM 774	Inorganic Chemistry	3
CHEM 777	Advanced Synthesis and Characterization	3
Discovery Course		4
	Credits	18
	Total Credits	18

Course	Title	Credits
Third Year		
Spring		
CHEM 684	Physical Chemistry II	3
CHEM 686	Physical Chemistry Laboratory	2
CHEM 762	Instrumental Methods of Chemical Analysis	3
CHEM 763	Instrumental Methods of Chemical Analysis Laboratory	2
Elective Course		4
Discovery Course		4
	Credits	18
	Total Credits	18

Course	Title	Credits
Fourth Year		
Fall		
CHEM 776	Physical Chemistry III	3
CHEM 799	Senior Thesis ((first semester of a yearlong experience))	4
BMCB 658	General Biochemistry	3
Elective Course		4
	Credits	14
	Total Credits	14

Course	Title	Credits
Fourth Year		
Spring		
CHEM 798	Senior Seminar	1
CHEM 799	Senior Thesis ((second semester of a yearlong experience))	4
Elective Courses (2 courses at 4 credits each)		8
	Credits	13
	Total Credits	13

Student 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.