CHEMISTRY MAJOR (B.A.)

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

Description

Chemistry Major (B.A.) Description

The B.A. degree exposes students to the major fields of chemistry but provides more flexibility in course selection than the B.S. degree. The curriculum offers a comprehensive introduction to chemistry's traditional subdisciplines (analytical, inorganic, organic, and physical chemistry) via foundational classroom and laboratory experiences. Undergraduate research is an option, but not a requirement for this degree. The B.A. degree is directed towards students who have interdisciplinary interests and are not planning to either attend a traditional graduate program in chemistry or find immediate employment in the chemical industry. Instead, this degree is geared toward students who plan to attend graduate school in an interdisciplinary field where chemical knowledge will be beneficial, and students who are interested in chemistry but plan to pursue post-graduate degrees in the health sciences, education, business, or other pre-professional programs. With careful selection of elective courses, the B.A. degree may also lead to American Chemical Society certification.

Requirements

Required Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 400</td>
<td>Freshman Seminar</td>
<td>1</td>
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<tr>
<td>CHEM 403</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 404</td>
<td>General Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 517</td>
<td>Quantitative Analysis and Quantitative Analysis Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 547</td>
<td>Organic Chemistry I and Organic Chemistry Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 548</td>
<td>Organic Chemistry II and Organic Chemistry Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 574</td>
<td>Chemistry Across the Periodic Table and Experiential Inorganic Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>CHEM 683</td>
<td>Physical Chemistry I and Physical Chemistry Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 684</td>
<td>Physical Chemistry II and Physical Chemistry Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 762</td>
<td>Instrumental Methods of Chemical Analysis and Instrumental Methods of Chemical Analysis Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 798</td>
<td>Senior Seminar 1</td>
<td>1</td>
</tr>
<tr>
<td>MATH 425</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 426</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 407</td>
<td>General Physics I</td>
<td>4</td>
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<tr>
<td>or PHYS 403</td>
<td>Introduction to Physics I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; PHYS 402</td>
<td>Introduction to Physics II</td>
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</tbody>
</table>

Total Credits 58

Degree Plan

This is the suggested degree plan for B.A. 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
Discovery Course
Discovery Course

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 407  General Physics I    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
Language 1 (first semester of an elementary foreign language sequence) 4

The B.A. requires either 2 semesters of elementary foreign language or 1 semester of intermediate (or higher).

Discovery Course

Credits 4

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
Language 2 (second semester of an elementary foreign language sequence) 4

Credits 15

Total Credits 15

1 CHEM 798 Senior Seminar satisfies the Discovery Capstone experience requirement. Students work with the instructor to prepare presentations based on a research project or chemistry-related professional engagement. This is a Writing Intensive course.
### Course Title Credits

#### Third Year

**Fall**

- CHEM 683 Physical Chemistry I 3
- CHEM 685 Physical Chemistry Laboratory 2
- Advanced Chemistry Elective - Advisor's Discretion. Can be CHEM 696, 708, 774, 755, 776, 795 or 799. 3
- Discovery Course 4
- Discovery Course 4

**Total Credits** 16

#### Spring

- CHEM 684 Physical Chemistry II 3
- CHEM 685 Physical Chemistry Laboratory 2
- CHEM 762 Instrumental Methods of Chemical Analysis 3
- CHEM 763 Instrumental Methods of Chemical Analysis Laboratory 2
- Discovery Course 4

**Total Credits** 14

#### Fourth Year

**Fall**

- Discovery Course 4
- Elective Course 4
- Elective Course 4
- Elective Course 4

**Total Credits** 16

**Spring**

- CHEM 798 Senior Seminar 1
- Elective Course 4
- Elective Course 4
- Elective Course 4

**Total Credits** 17

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### Student Learning Outcomes

At the time of graduate, a student should be able to:

- **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.