Department of Chemistry and Biochemistry

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Assistant Professors
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Lecturer
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Mission Statement
The Department of Chemistry and Biochemistry offers the B.S. degree for a major in chemistry, with concentrations that meet the American Chemical Society Accredited Programs requirements for programs in biochemistry, materials chemistry and in chemistry/chemical education. In addition, the department offers a B.S. degree in biophysical chemistry. It also offers minors in chemistry, biochemistry and molecular biology, and materials science. The programs are designed to provide the theoretical and practical instruction in chemistry and related areas to prepare students for careers in chemistry, biochemistry, medicine, dentistry, paramedical areas, forensic sciences, chemical engineering and other technology based areas. The department also recognizes its responsibility to provide courses for non-chemistry majors who need a basic understanding of the principles of chemistry either for their chosen major or their general education.

Career Opportunities
- Graduate school in chemistry, biochemistry or related areas (ACS Certified Degrees preferred)
- Professional employment as a chemist or biochemist (ACS Certified Degrees preferred)
- Professional school (medical, dental, veterinary, pharmacy, business and law)
- Chemical engineering
- Environmental science
- Forensic science
- Immunology
- Industrial hygiene
- Pharmaceutical chemistry
- Pharmacology
- Production supervision
- Quality control
- Research assistant
- Scientific writing
- Some forms of development work
- Technical library science
- Toxicology

Co-curricular Activities and Organizations
- American Chemical Society Student Affiliate Chapter
- Alpha Chi Sigma Professional Fraternity (Coed)
- Iota Sigma Pi

Degree and Major Requirements

Bachelor of Science in Chemistry

Degree Requirements

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>41</td>
</tr>
<tr>
<td>Quantitative requirement (in addition to General Education)</td>
<td>3</td>
</tr>
<tr>
<td>Scientific Literacy requirement (in addition to General Education)</td>
<td>3-4</td>
</tr>
<tr>
<td>Major requirements and electives</td>
<td>70-74</td>
</tr>
<tr>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

1 The General Education program contains a set of requirements each student must fulfill. The number of credit hours necessary to fulfill these requirements may vary.
2 The quantitative and scientific literacy requirements are met by courses required in the major.

Students must complete all course work in one of the three concentrations listed to earn a bachelor’s degree in chemistry. The credit hours for major requirements will vary based on the chosen concentration.

Core Requirements for all Concentrations

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 131-132</td>
<td>General Chemistry I-II</td>
<td>6</td>
</tr>
<tr>
<td>CHEM 135L</td>
<td>Special General Chemistry Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 136L</td>
<td>Special General Chemistry Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 241-242</td>
<td>Organic Chemistry Lecture</td>
<td>6</td>
</tr>
<tr>
<td>CHEM 270</td>
<td>Inorganic Chemistry I</td>
<td>3</td>
</tr>
</tbody>
</table>

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Electives
The well-prepared student is encouraged to take as many of the additional departmental offerings as possible as electives with attention being given to junior and/or senior research projects.

Concentrations

Concentration I: American Chemical Society Certified Programs

Required Courses for all ACS Certified Programs
All ACS Certified Programs require a minimum of 400 hours of laboratory and research.

Core Chemistry Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 352. Instrumental Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 352L. Instrumental Analysis Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 432. Physical Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 438L. Physical Chemistry Laboratory</td>
<td>2</td>
</tr>
</tbody>
</table>

Required Cognate Courses for all ACS Certified Programs
In addition, to ensure a sound background in physics and mathematics the following courses are required.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 235-236. Calculus II</td>
<td>8-10</td>
</tr>
<tr>
<td>PHYS 240-250. University Physics I-II</td>
<td>6</td>
</tr>
<tr>
<td>PHYS 140L-150L. General Physics Laboratories</td>
<td>2</td>
</tr>
</tbody>
</table>

Program Specific Courses

ACS Certified Chemistry

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 470. Inorganic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 237. Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 238. Linear Algebra and Differential Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

ACS Certified Biochemistry

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 380. General Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>BIO 480. Molecular Biology</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 362. Biochemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 366L. Biochemistry Laboratory</td>
<td>2</td>
</tr>
</tbody>
</table>

Concentration II: General Program in Chemistry
Students following the general concentration must take, in addition to the core courses, the following:

Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 338L. Applied Physical Chemistry Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 352. Instrumental Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 352L. Instrumental Analysis Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>MATH 235-236. Calculus II</td>
<td>8-12</td>
</tr>
<tr>
<td>(or MATH 231, MATH 232 and MATH 236)</td>
<td></td>
</tr>
<tr>
<td>PHYS 240-250. University Physics I-II</td>
<td>6</td>
</tr>
<tr>
<td>PHYS 140L-150L. General Physics Laboratories</td>
<td>2</td>
</tr>
<tr>
<td>Upper division chemistry elective</td>
<td>3</td>
</tr>
</tbody>
</table>

Concentration III: Chemistry/Business Program

This program is designed for business-oriented chemistry students preparing for careers in patent law, technical sales, technical service and related areas. Students following the chemistry/business concentration must take, in addition to core courses, the following courses:

Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 338L. Applied Physical Chemistry Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>ACTG 244. Accounting for Non-Business Majors</td>
<td>3</td>
</tr>
<tr>
<td>COB 204. Computer Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECON 201. Principles of Economics (Micro)</td>
<td>3</td>
</tr>
<tr>
<td>ECON 200. Introduction to Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>FIN 345. Finance for the Non-financial Manager</td>
<td>3</td>
</tr>
<tr>
<td>MATH 220. Elementary Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 235-236. Calculus II</td>
<td>8-10</td>
</tr>
<tr>
<td>(or MATH 231, MATH 232 and MATH 236)</td>
<td></td>
</tr>
<tr>
<td>MGT 305. Management and Organizational Behavior</td>
<td>3</td>
</tr>
<tr>
<td>MKTG 380. Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 240-250. College Physics I-II</td>
<td>6</td>
</tr>
<tr>
<td>PHYS 140L-150L. General Physics Laboratories</td>
<td>2</td>
</tr>
<tr>
<td>Chemistry or approved science courses</td>
<td>5</td>
</tr>
<tr>
<td>Suggested Elective:</td>
<td></td>
</tr>
<tr>
<td>COB 218. Legal Environment of Business</td>
<td>3</td>
</tr>
</tbody>
</table>

Although business electives may be taken by students in this concentration, the total number of business credit hours may not exceed 27.

Recommended Schedule for Chemistry Majors

First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 131-132. General Chemistry I-II</td>
<td>6</td>
</tr>
<tr>
<td>CHEM 135L-136L. Special General Chemistry Laboratory (or CHEM 131L-132L)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 235-236. Calculus I-II</td>
<td>8</td>
</tr>
<tr>
<td>BIO 114. Organisms</td>
<td>4</td>
</tr>
<tr>
<td>General Education courses or electives</td>
<td>10</td>
</tr>
</tbody>
</table>

Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 270. Inorganic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 287L-288L. Integrated Inorganic/Organic Laboratory</td>
<td>4</td>
</tr>
</tbody>
</table>

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PHYS 240-250. University Physics I-II 6
PHYS 140L-150L. General Physics Laboratories 2
General Education courses or electives 9

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Third Year
CHEM 331. Physical Chemistry I 3
CHEM 351. Analytical Chemistry I 4
CHEM 352-352L. Instrumental Analysis with Laboratory 5
CHEM 361. Biochemistry I 3
CHEM 481-482. Literature and Seminar I-II 2
General Education courses or electives 13

30

Fourth Year
CHEM 432. Physical Chemistry II 3
CHEM 438L. Physical Chemistry Laboratory 2
General Education courses or electives 24

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Bachelor of Science in Biophysical Chemistry

Degree Requirements

Required Courses
General Education 1 41
Quantitative requirement (in addition to General Education) 2 3
Scientific Literacy requirement (in addition to General Education) 2 3-4
Major requirements and electives 86-88

1 The General Education program contains a set of requirements each student must fulfill. The number of credit hours necessary to fulfill these requirements may vary.
2 The quantitative and scientific literacy requirements are met by courses required for the major.

Major Requirements
CHEM 131-132. General Chemistry I-II 6
CHEM 135L Special General Chemistry Lab 1 1
CHEM 136L Special General Chemistry Lab 1 2
CHEM 270. Inorganic Chemistry 3
CHEM 241-242. Organic Chemistry 6
CHEM 287L-288L. Organic Laboratory 2 4
CHEM 351. Analytical Chemistry 3
CHEM 361. Biochemistry I 4
CHEM 363. Biophysical Chemistry (Literature & Seminar included) 3
CHEM 367. Biochemistry Laboratory (fall) 2
BIO 114. Organisms 4
BIO 214. Cell and Molecular Biology 4
MATH 237. Calculus III 4
PHYS 240-250. University Physics I-II 6
PHYS 140L-150L. General Physics Laboratory 2
General Education courses or electives 3

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Second Year
CHEM 331. Physical Chemistry I 3
CHEM 338L. Applied Physical Chemistry Laboratory 2
CHEM 339. Analytical Chemistry 4
CHEM 361. Biochemistry I 3
CHEM 367. Biochemistry Laboratory 2
MATH 239. Linear Algebra/Differential Equations 4
General Education courses or electives 14

32

Third Year
CHEM 363. Biophysical Chemistry 3
CHEM 368L. Biophysical Chemistry Laboratory 2
CHEM 432. Physical Chemistry II 3
BIO 480. Advanced Molecular Biology 4
General Education courses or electives 12

24

Fourth Year
CHEM 445. Polymer Chemistry
CHEM 470. Inorganic Chemistry II
BIO 324. Human Genetics
BIO 445. Neurobiology
BIO 475. Advanced Cell Biology
PHYS 260. University Physics III
PHYS 270. Modern Physics
PHYS 326. Biophysics
PHYS/MATS 381. Materials Characterization
MATH 318. Introduction to Probability and Statistics
BIO/MATH 342. Mathematical Models in Biology
BIO 494. Internship in Biology/497. Biological Research
MATH 497-498. Independent Study/499. Honors
ANY 300-400 level CHEM, PHYS or MATH course pre-approved by adviser

86-88

1 CHEM 131L/132L may be substituted.
2 CHEM 242L may be substituted.

Recommended Schedule for Majors

First Year
CHEM 131-132. General Chemistry I-II 6
CHEM 135L-136L Special General Chemistry Laboratory 3
CHEM 135L-136L Special General Chemistry Laboratory 3
CHEM 270. Inorganic Chemistry 3
CHEM 241-242. Organic Chemistry 6
CHEM 287L-288L. Organic Laboratory 2 4
CHEM 351. Analytical Chemistry 3
CHEM 361. Biochemistry I 4
CHEM 363. Biophysical Chemistry 3
CHEM 368L. Biophysical Chemistry Laboratory 2
PHYS 240-250. University Physics I-II 6
PHYS 270. Modern Physics 3
PHYS 326. Biophysics 2
PHYS/MATS 381. Materials Characterization 3
MATH 318. Introduction to Probability and Statistics 3
BIO/MATH 342. Mathematical Models in Biology 3
BIO 494. Internship in Biology/497. Biological Research 3
MATH 497-498. Independent Study/499. Honors 3
ANY 300-400 level CHEM, PHYS or MATH course pre-approved by adviser 3

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Second Year
CHEM 270. Inorganic Chemistry 3
CHEM 287L-288L. Integrated Inorganic/Organic Laboratory 3
BIO 214. Cell and Molecular Biology 4
MATH 237. Calculus III 4
PHYS 240-250. University Physics I-II 6
PHYS 270. Modern Physics 3
PHYS 326. Biophysics 2
PHYS/MATS 381. Materials Characterization 3
MATH 318. Introduction to Probability and Statistics 3
BIO/MATH 342. Mathematical Models in Biology 3
BIO 494. Internship in Biology/497. Biological Research 3
MATH 497-498. Independent Study/499. Honors 3
ANY 300-400 level CHEM, PHYS or MATH course pre-approved by adviser 3

32

Third Year
CHEM 331. Physical Chemistry I 3
CHEM 338L. Applied Physical Chemistry Laboratory 2
CHEM 339. Analytical Chemistry 4
CHEM 361. Biochemistry I 3
CHEM 367. Biochemistry Laboratory 2
MATH 239. Linear Algebra/Differential Equations 4
General Education courses or electives 14

32

Fourth Year
CHEM 363. Biophysical Chemistry 3
CHEM 368L. Biophysical Chemistry Laboratory 2
CHEM 432. Physical Chemistry II 3
BIO 480. Advanced Molecular Biology 4
General Education courses or electives 12

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Minor Requirements

Biochemistry and Molecular Biology
For more detailed information on this cross disciplinary minor, refer to the Biochemistry and Molecular Biology page.

Chemistry Minor
The requirements for a minor in chemistry are 24 credit hours in chemistry, distributed as follows:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 131-132. General Chemistry I-II</td>
<td></td>
</tr>
<tr>
<td>CHEM 131L-132L. General Chemistry Laboratories</td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry: One or two lectures and corresponding lab</td>
<td>4-8</td>
</tr>
<tr>
<td>CHEM 241 + CHEM 241L.</td>
<td></td>
</tr>
<tr>
<td>(or CHEM 241 + CHEM 242 + CHEM 242L)</td>
<td></td>
</tr>
<tr>
<td>Physical Chemistry: One lecture and corresponding lab</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 331 + CHEM 336L (or CHEM 432 + CHEM 438L)</td>
<td></td>
</tr>
<tr>
<td>Analytical Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 351. Analytical Chemistry</td>
<td></td>
</tr>
<tr>
<td>An approved three-credit CHEM elective</td>
<td>3</td>
</tr>
</tbody>
</table>

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In order to complete this minor, prerequisite courses in mathematics and physics are required. These courses collectively fulfill the nine-credit approved technical elective package for the Bachelor of Science in Engineering.

Materials Science Minor
Refer to Cross Disciplinary Programs for more detailed information on this cross disciplinary minor.

Credit by Examination
The chemistry and biochemistry department offers credit by examination for CHEM 131 and 132, General Chemistry I-II. Students who want permission to take the examination must apply to the department head. Details regarding approval to take the examination and examination dates will be provided when the application is received.

Teaching Licensure
Students interested in becoming teachers must meet specific curriculum requirements in their major as part of the undergraduate academic degree. Chemistry majors must also complete a course in biology and a course in geology. In addition to the general education and academic major requirements, chemistry majors desiring secondary teacher licensure must be admitted to teacher education, complete the pre-professional program in secondary education at the undergraduate level and the graduate level Master of Arts in Teaching degree.

It is critical that students seeking licensure consult regularly with both their education adviser and their major adviser to support their progression through the programs. For a full description of the program in secondary teaching, refer to the Department of Middle, Secondary and Mathematics Education, in addition to the College of Education/Professional Education Unit section of the catalog.