Department of Chemistry

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Professors
- D. Amenta, T. DeVore, D. Downey, J. Gilje, J. Leary

Associate Professors
- B. Augustine, G. MacDonald

Assistant Professors
- K. Caran, K. Layman, S. Lewis, K. Minbiole, B. Reisner, R. Rivera-Hainaj

Adjunct Professor
- J. Sullivan

Lecturer
- D. Warnaar

Mission Statement
The Department of Chemistry offers the B.S. degree for a major in chemistry, biochemistry and in chemistry/chemical education. It also offers minors in chemistry, biochemistry, and material 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
- Professional employment as a chemist or biochemist (ACS Certified Degrees might be preferred for these two options)
- Professional School (Medical, Dental, Veterinary, Pharmacy, Business and Law)
- Forensic Science
- Industrial hygiene
- Environmental science
- Toxicology
- Technical library science
- Scientific writing
- Pharmacology
- Pharmaceutical chemistry
- Immunology
- Quality control
- Production supervision
- Research assistant
- Some forms of development work
- Chemical Engineering

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

Degree and Major Requirements
Bachelor of Science in Chemistry

Degree Requirements
Required courses Credit Hours
General Education1 41-44
Mathematics course 3
Social science or natural science course(s) 3-4
Major requirements (listed below) and electives 70-74

120

NOTE: The credit hours for major requirements will vary based on the chosen concentration.
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.

Major Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</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 Lab(^1)</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 136L</td>
<td>Special General Chemistry Lab(^1)</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 270</td>
<td>Inorganic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 331</td>
<td>Physical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 341-342</td>
<td>Organic Chemistry Lecture</td>
<td>6</td>
</tr>
<tr>
<td>CHEM 351</td>
<td>Analytical Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 361</td>
<td>Biochemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 387L-388L</td>
<td>Integrated Inorganic/Organic Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 481-482</td>
<td>Literature and Seminar I-II</td>
<td>2</td>
</tr>
</tbody>
</table>

\(^1\)CHEM 131L and 132L may be substituted

Electives

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

Concentrations

Concentration I: American Chemical Society Accredited Programs

Required Courses for all ACS Certified Degrees

Core Chemistry Courses
CHEM 352. Instrumental Analysis
CHEM 352L. Instrumental Analysis Laboratory
CHEM 432. Physical Chemistry II
CHEM 438L. Physical Chemistry Laboratory

In addition, to ensure a sound background in physics, mathematics and technical writing the following courses are required:
MATH 235-236. Calculus I-II (or Math 231, 232, 236) 8 - 12
PHYS 240-250. University Physics I-II 6
PHYS 140L-150L. General Physics Laboratory 2
TSC 210. Introduction to Technical and Scientific Communication 3

These courses may not be taken credit/no-credit.

Program-Specific Courses

ACS Certified Chemistry Major:
CHEM 300. Numerical Methods in Chemistry
CHEM 470. Inorganic Chemistry II

ACS Certified Biochemistry Major:
BIO 380. General Microbiology
BIO 480. Molecular Biology
CHEM 362. Biochemistry II
CHEM 366L. Biochemistry Laboratory

This program also meets the recommended undergraduate degree requirements of the American Society for Biochemistry and Molecular Biology for a major in Biochemistry.

ACS Certified Materials Chemistry
CHEM 275. Introduction to Material Science
CHEM 445. Polymers Chemistry
PHYS 381. Substituted for CHEM438L/Materials Characterization Lab
MATH 237. Calculus III
PHYS 381. Substituted for CHEM438L/Materials Characterization Lab
MATH 238. Linear Algebra/Diff. Equations
ISAT 432. Materials Design & Selection

ACS Certified Degree in Chemical Education:
See "Licensure Programs," Page 195.

Concentration II: General

Students following the general concentration must take, in addition to the core courses, the following:

CHEM 336L. Applied Physical Chemistry Laboratory 1
CHEM 352. Instrumental Analysis 3
CHEM 352L. Instrumental Analysis Laboratory 2
Department of Chemistry

MATH 235-236. Calculus I-II 1  8
PHYS 240-250. University Physics I-II 1  6
PHYS 140L-150L. General Physics Laboratory  2
TSC 210. Introduction to Technical and Scientific Communication  3
Upper division chemistry lecture elective  3

1 Students electing the general concentration are urged to take the same physics and mathematics courses recommended under Concentration I; however, in special cases, MATH 205-206 and PHYS 140-150 may be substituted with approval of the student’s department adviser.

Concentration III: Chemistry/Business

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:

COB 241. Financial Accounting  3
COB 242. Managerial Accounting  3
CHEM 338L. Applied Physical Chemistry Laboratory  1
ECON 201. Principles of Economics (Micro)  3
GECON 200. Introduction to Macroeconomics  3
FIN 345. Managerial Finance  3
MATH 205-206. Introductory Calculus I-II  6
MGT 305. Management and Organizational Behavior  3
MKTG 380. Principles of Marketing  3
PHYS 140-150. College Physics I-II  6
PHYS 140L-150L. General Physics Laboratory  2
TSC 210. Introduction to Technical and Scientific Communication  3
Chemistry or approved science courses  5

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 Majors

<table>
<thead>
<tr>
<th>First Year</th>
<th>Credit Hours</th>
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</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 131L – 132L)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 235-236. Calculus I-II</td>
<td>8</td>
</tr>
<tr>
<td>General Education courses or electives</td>
<td>14</td>
</tr>
<tr>
<td><strong>31</strong></td>
<td></td>
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<table>
<thead>
<tr>
<th>Second Year</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CHEM 270. Inorganic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 341-342. Organic Chemistry Lecture</td>
<td>6</td>
</tr>
<tr>
<td>CHEM 387L-388L. Integrated Inorganic/Organic Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 240-250. University Physics I-II</td>
<td>6</td>
</tr>
<tr>
<td>PHYS 140L-150L. General Physics Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>General Education courses or electives</td>
<td>9</td>
</tr>
<tr>
<td><strong>30</strong></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Third Year</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CHEM 331. Physical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 351. Analytical Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 352-352L. Instrumental Analysis with Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 481-482. Literature and Seminar I and II</td>
<td>2</td>
</tr>
<tr>
<td>TSC 210. Introduction to Technical and Scientific Communication</td>
<td>3</td>
</tr>
<tr>
<td>General Education courses or electives</td>
<td>14</td>
</tr>
<tr>
<td><strong>31</strong></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 361. Biochemistry I</td>
<td>3</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>
<tr>
<td>General Education courses or electives</td>
<td>21</td>
</tr>
<tr>
<td><strong>29</strong></td>
<td></td>
</tr>
</tbody>
</table>

Minor Requirements

Biochemistry and Molecular Biology Minor

See Page 81 for the description of the interdisciplinary biochemistry minor.
Chemistry Minor

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

CHEM 131-132. General Chemistry I-II
CHEM 131L-132L. General Chemistry Laboratories

Choose from the following:
CHEM 221-221L. Concepts of Organic Chemistry with Laboratory
CHEM 341-342-346L. Organic Chemistry Lecture with Laboratory
CHEM 331. Physical Chemistry I
CHEM 351. Analytical Chemistry

Choose from the following:
CHEM 336L. Applied Physical Chemistry Laboratory
CHEM 432. Physical Chemistry II with
CHEM 438L. Physical Chemistry Laboratory

An approved elective such as:
CHEM 270. Inorganic Chemistry I
CHEM 361. Biochemistry I
Or any 3 credit 300 or 400 level chemistry course

In order to complete this program, prerequisite courses in mathematics and physics are required.

Material Sciences Minor

See Page 90 for the description of the interdisciplinary material sciences minor.

Credit by Examination

The chemistry 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

In addition to the general education and academic major requirements, chemistry majors desiring secondary teacher licensure must complete the Master of Arts in Teaching degree.
Chemistry majors must also complete a course in biology and a course in geology. It is necessary to be admitted to the teacher education program prior to enrolling in professional education courses. See the information beginning on Page 193 for teacher education admission and retention policies and procedures, and Secondary Education requirements.
Students seeking licensure are encouraged to consult regularly with an education adviser. For a full description of the program in secondary teaching, refer to the College of Education.