
Chemistry

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[Print Version of Catalog](#) ■

Department of Chemistry and Biochemistry

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

Required Courses	Credit Hours
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	70-74
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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. Some courses that are required for this major will meet General Education requirements.

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 six 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 Credit Hours
all concentrations**

CHEM 131-132 . General Chemistry I-II	6
CHEM 135L . Special General Chemistry Laboratory ¹	1
CHEM 136L . Special General Chemistry Laboratory ¹	2
CHEM 241-242 . Organic Chemistry Lecture	6
CHEM 270 . Inorganic Chemistry I	3
CHEM 287L-288L . Integrated Inorganic/Organic Laboratory	4
CHEM 331 . Physical Chemistry I	3
CHEM 351 . Analytical Chemistry	4
CHEM 361 . Biochemistry I	3
CHEM 481-482 . Literature and Seminar I-II	2
MATH 235-236 . Calculus I-II (or MATH 231, 232 and 236)	8-10
PHYS 240-250 . University Physics I-II	6
PHYS 140L-150L . General Physics Laboratories	2

50-52

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 attention being given to junior and/or senior research projects.

Three credits of undergraduate research ([CHEM 390/497/499](#)) may be used to satisfy chemistry elective requirements if the research project is completed with the same faculty mentor over multiple semesters.

Concentrations

Concentration I: American Chemical Society Certified Curriculum in Chemistry

All ACS Certified Programs require a minimum of 400 hours of laboratory and research. Students completing concentration I must complete the courses below in addition to core courses.

Required Courses	Credit Hours
CHEM 352 . Instrumental Analysis	3
CHEM 352L . Instrumental Analysis Laboratory	2
CHEM 432 . Physical Chemistry II	3
CHEM 438L . Physical Chemistry Laboratory	2
CHEM 470 . Inorganic Chemistry II	3
MATH 237 . Calculus III	4
MATH 238 . Linear Algebra and Differential Equations	4
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Concentration II: American Chemical Society Certified Curriculum in Biochemistry

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

All ACS Certified Programs require a minimum of 400 hours of laboratory and research. Students completing concentration II must complete the courses below in addition to core courses.

Required Courses	Credit Hours
CHEM 352 . Instrumental Analysis	3
CHEM 352L . Instrumental Analysis Laboratory	2
CHEM 362 . Biochemistry II	3
CHEM 366L . Biochemistry Laboratory	2

CHEM 432 . Physical Chemistry II	3
CHEM 438L . Physical Chemistry Laboratory	2
BIO 140 . Foundations I	4
BIO 240 . Genetics	4
BIO 380 . General Microbiology	4
BIO 480 . Molecular Biology	4
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Concentration III: American Chemical Society Certified Curriculum in Materials Chemistry

All ACS Certified Programs require a minimum of 400 hours of laboratory and research. Students completing concentration III must complete the courses below in addition to core courses.

Required Courses	Credit Hours
CHEM 352 . Instrumental Analysis	3
CHEM 352L . Instrumental Analysis Laboratory	2
CHEM 432 . Physical Chemistry II	3
CHEM 375 . Introduction to Materials Science	3
CHEM 445 . Polymer Chemistry (with laboratory)	4
CHEM 485 . Science of the Small or PHYS 381 . Materials Characterization Lab	3-4
MATH 237 . Calculus III	4
MATH 238 . Linear Algebra and Differential Equations	4
ISAT 432 . Selection and Use of Engineering Materials	3
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Concentration IV: American Chemical Society Certified Curriculum in Chemical Education

All ACS Certified Programs require a minimum of 400 hours of laboratory and research. Students completing concentration IV must complete the courses below in addition to core courses.

Required Courses	Credit Hours
CHEM 352 . Instrumental Analysis	3
CHEM 352L . Instrumental Analysis Laboratory	2
CHEM 432 . Physical Chemistry II	3
CHEM 438L . Physical Chemistry Laboratory	2
ACS Certified Chemical Education Courses: See Licensure Programs.	

Concentration V: General Program in Chemistry

Students completing concentration V must complete the courses below in addition to core courses.

Courses	Credit Hours
CHEM 336L . Applied Physical Chemistry Lab	2
CHEM 352 . Instrumental Analysis	3
CHEM 352L . Instrumental Analysis Laboratory	2
Upper division chemistry elective	3
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Concentration VI: 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 completing concentration VI must complete the courses below in addition to core courses.

Courses	Credit Hours
CHEM 336L . Applied Physical Chemistry Laboratory	2

ACTG 244 . Accounting for Non-Business Majors	3
COB 204 . Computer Information Systems	3
ECON 201 . Principles of Economics (Micro)	3
ECON 200 . Introduction to Macroeconomics	3
FIN 345 . Finance for the Non-financial Manager	3
MATH 220 . Elementary Statistics	3
MGT 305 . Management and Organizational Behavior	3
MKTG 380 . Principles of Marketing	3
Approved chemistry, science and/or COB ¹ courses	5
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1 [COB 218](#). Legal and Ethical Environment of Business is a suggested elective. 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	Credit Hours
CHEM 131-132 . General Chemistry I-II	6
CHEM 135L-136L . Special General Chemistry Laboratory (or CHEM 131L-132L)	2-3
MATH 235-236 . Calculus I-II	8
BIO 140 . Foundations I	4
General Education courses or electives	10
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Second Year	Credit Hours
CHEM 241-242 . Organic Chemistry Lecture	6
CHEM 270 . Inorganic Chemistry I	3

CHEM 287L-288L . Integrated Inorganic/Organic Laboratory	4
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	Credit Hours
CHEM 331 . Physical Chemistry I	3
CHEM 351 . Analytical Chemistry	4
CHEM 352-352L . Instrumental Analysis with Laboratory	5
CHEM 361 . Biochemistry I	3
CHEM 481-482 . Literature and Seminar I-II	2
Courses in the concentration, General Education or electives	13
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Fourth Year	Credit Hours
Courses in the concentration, General Education or electives	29
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Bachelor of Science in Biophysical Chemistry

Degree Requirements

Required Courses	Credit Hours
General Education ¹	41
Quantitative requirement (in addition to General Education) ²	3
Scientific Literacy requirement (in addition to General Education) ²	3-4

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. Some courses that are required for this major will meet General Education requirements.

2 The quantitative and scientific literacy requirements for this degree are met by courses required for the major. As a result, the total credit hours earned for the degree will be 131.

Major Requirements

	Credit Hours
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	3
CHEM 363 . Biophysical Chemistry (Literature & Seminar included)	3
CHEM 367L . Biochemistry Laboratory (fall)	2
CHEM 368L . Biophysical Chemistry Laboratory (spring)	2
CHEM 331 . Physical Chemistry I	3
CHEM 432 . Physical Chemistry II	3
CHEM 336L . Applied Physical Chemistry Laboratory	2
BIO 140 . Foundations I.	4
BIO 240 . Genetics	4
BIO 480 . Advanced Molecular Biology	4
Physics and Mathematics Background Courses	24
MATH 235-237 . Calculus I-III (or MATH 231 , MATH 232 , MATH 236 , MATH 237)	
MATH 238 . Linear Algebra with Differential Equations	
PHYS 240-250 . University Physics I-II	
PHYS 140L-150L . General Physics Laboratory	
Choose at least two of the following electives:	6-8
CHEM/PHYS/MATS 375 . Introduction to Materials Science	
CHEM 362 . Biochemistry II (Special Topics)	
CHEM 440 . Intermediate Organic	
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
[CHEM 390](#). Problems in Chemistry /497. Undergraduate Chemical Research/499. Honors
[BIO 494](#). Internship in Biology/497. Biological Research
[PHYS 398](#). Independent Study in Physics /498R. Undergraduate Research in Physics/499. Honors
[MATH 497-498](#). Independent Study/499. Honors
 ANY 300-400 level CHEM, PHYS or MATH course pre-approved by adviser

85-87

- 1 [CHEM 131L/132L](#) may be substituted.
- 2 [CHEM 242L](#) may be substituted.

Recommended Schedule for Majors

First Year	Credit Hours
CHEM 131-132 . General Chemistry I-II	6
CHEM 135L-136L . Special General Chemistry Laboratory (or CHEM 131L-132L)	2-3
BIO 140 . Foundations I	4
MATH 235-236 . Calculus I-II	8
General Education courses or electives	12
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	32-33

Second Year	Credit Hours
CHEM 241-242 . Organic Chemistry Lecture	6
CHEM 270 . Inorganic Chemistry	3
CHEM 287L-288L . Integrated Inorganic/Organic Laboratory	4
BIO 240 . Genetics	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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Third Year	Credit Hours
CHEM 331 . Physical Chemistry I	3
CHEM 336L . Applied Physical Chemistry Laboratory	2
CHEM 351 . Analytical Chemistry	4
CHEM 361 . Biochemistry I	3
CHEM 367 . Biochemistry Laboratory	2
MATH 238 . Linear Algebra/Differential Equations	4
General Education courses or electives	14
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Fourth Year	Credit Hours
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 [Biochemistry and Molecular Biology](#).

Chemistry Minor

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

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