

# Department of Chemistry and Biochemistry

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## Professors

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## Associate Professors

B. Augustine, S. Lewis, G. MacDonald, D. Mohler, B. Reisner

## Assistant Professors

K. Caran, K. Layman, V. Mariani, K. Minbiole

## Lecturer

D. Warnaar

## Mission Statement

The Department of Chemistry and Biochemistry offers the B.S. degree for a major in chemistry, biochemistry and in chemistry/chemical education. 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)

## Degree and Major Requirements

### Bachelor of Science in Chemistry

### Degree Requirements

Required Courses	Credit Hours
General Education <sup>1</sup>	41
Quantitative requirement (in addition to General Education)	3
Scientific Literacy requirement (in addition to General Education)	3-4
Major requirements (listed below) and electives	70-74
	<u>120</u>

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

<sup>1</sup> 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

	Credit Hours
CHEM 131-132. General Chemistry I-II	6
CHEM 135L. Special General Chemistry Lab <sup>1</sup>	1
CHEM 136L. Special General Chemistry Lab <sup>1</sup>	2
CHEM 331. Physical Chemistry I	3
CHEM 341-342. Organic Chemistry Lecture	6
CHEM 351. Analytical Chemistry	4
CHEM 361. Biochemistry I	3
CHEM 370. Inorganic Chemistry I	3
CHEM 387L-388L. Integrated Inorganic/Organic Laboratory	4
CHEM 481-482. Literature and Seminar I-II	2

<sup>1</sup> CHEM131L 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 and mathematics 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

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

#### Program-Specific Courses

ACS Certified Chemistry Major:

CHEM 300. Numerical Methods in Chemistry	1
CHEM 470. Inorganic Chemistry II	3

ACS Certified Biochemistry Major:

BIO 380. General Microbiology	4
BIO 480. Molecular Biology	4
CHEM 362. Biochemistry II	3
CHEM 366L. Biochemistry Laboratory	2

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 Materials Science	3
CHEM 445. Polymer Chemistry	4
PHYS 381. Substituted for CHEM 438L/Materials Characterization Lab	3
MATH 237. Calculus III	4
MATH 238. Linear Algebra/Diff. Equations	4
ISAT 432. Materials Design & Selection	3

ACS Certified Degree in Chemical Education:

See "Licensure Programs," Page 66.

### 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

Choose one:

MATH 235-236. Calculus I-II	8
MATH 231-232. Calculus with Functions I-II and	
MATH 236. Calculus II	12

PHYS 240-250. University Physics I-II<sup>1</sup>

PHYS 140L-150L. General Physics Laboratory

Upper division chemistry elective

<sup>1</sup> Students electing the general concentration are urged to take the same physics courses recommended under Concentration I; however, in special cases, 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 336L. Applied Physical Chemistry Laboratory	1
ECON 201. Principles of Economics (Micro)	3
GECON 200. Introduction to Macroeconomics	3
FIN 345. Managerial Finance	3
MATH 231-232 or MATH 235. Introductory Calculus I-II <sup>1</sup>	8 or 4
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
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.

<sup>1</sup> Additionally, MATH 236 is strongly recommended.

### Recommended Schedule for Majors

First Year	Credit Hours
CHEM 131-132. General Chemistry I-II	6
CHEM 135L-136L. Special General Chemistry Laboratory (or 131L-132L)	3
MATH 235-236. Calculus I-II	8
General Education courses or electives	14
	<hr/> 31

Second Year	Credit Hours
CHEM 341-342. Organic Chemistry Lecture	6
CHEM 370. Inorganic Chemistry I	3
CHEM 387L-388L. Integrated Inorganic/Organic Laboratory	4
PHYS 240-250. University Physics I-II	6
PHYS 140L-150L. General Physics Laboratory	2
General Education courses or electives	9
	<hr/> 30

Third Year	Credit Hours
CHEM 331. Physical Chemistry I	3
CHEM 351. Analytical Chemistry	4
CHEM 352-352L. Instrumental Analysis with Laboratory	5
CHEM 481-482. Literature and Seminar I-II	2
General Education courses or electives	16
	<hr/> 30

Fourth Year	Credit Hours
CHEM 361. Biochemistry I	3
CHEM 432. Physical Chemistry II	3
CHEM 438L. Physical Chemistry Laboratory	2
General Education courses or electives	21
	<hr/> 29

## Minor Requirements

### Biochemistry and Molecular Biology Minor

See Page 107 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 370. 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.

### Materials Science Minor

See Page 121 for the description of the interdisciplinary material sciences 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.