

# Department of Chemistry

**Chairperson: Michael Morton**

**Major in Chemistry (B.S. or B.A.)**

**Specialized Program of Study in Biochemistry (B.S.)**

**Minor in Chemistry**

## Mission

The Department of Chemistry, consistent with the mission of the College, offers a rigorous program in both the classroom and the laboratory providing for the curricular needs of four constituencies:

Chemistry majors, majors in the Specialized Program of Study in Biochemistry, other science majors and pre-professional students, and non-science majors. The Department program emphasizes hands-on instrumentation experiences and undergraduate research, enabling majors to successfully enter directly into a scientific career or into graduate programs in higher pre-professional learning. The Department provides support courses for science majors and pre-professional students necessary for the completion of their science programs. In addition, the Department offers enrichment to the education of non-science majors by providing courses designed to develop their science and quantitative skills and literacy. Finally, the Department, consistent with a mission of the College, strives to provide programs that are accessible to the physically challenged.

## Goals

1. Chemistry majors and chemistry majors with a specialized program of study in biochemistry, will have a firm foundation in chemical principles as well as a higher level understanding in each of the chemistry subdisciplines: analytical, organic, inorganic, and physical.
2. Majors will have a working knowledge of chemical instrumentation and laboratory techniques and be able to use those skills to design and conduct independent work.
3. Majors will know how to search primary chemical literature, follow and learn from scientific presentations, and give effective oral reports on chemical topics.
4. Majors will leave with the skills to maintain themselves professionally, including the skills necessary to employ computer information systems, E-mail, and navigating the "information network".
5. Majors will leave directly into employment or higher education or with at least a plan for further career development.
6. Other science majors will have a firm foundation in chemical principles as mandated by their professional career choices.
7. Non-science majors will leave with a substantially enhanced chemical literacy and a facility with simple lab techniques and quantitative skills.

## Major in Chemistry

The Chemistry major (leading to either a B.A. or a B.S.) is a catalog major in which certain courses of study are required and others selected by the student with the guidance of a faculty advisor. Successful completion of the major with a G.P.A. of 2.0 or above satisfies the requirements for Bachelor of Arts or Bachelor of Science in Chemistry. The requirements for a B.A. and a B.S. with a major in Chemistry are defined in a following section. The elective courses will depend on the student's goals. With an appropriate set of electives, the student may focus on specific career objectives such as professional training (e.g. Medicine, Dentistry, Pharmacy, Law, Business), Graduate School (Chemistry, Biochemistry, Pharmacology, Environmental Science) or more immediate employment (Lab Technician, Teacher, Chemical Marketing or Management).

The Chemistry Program emphasizes laboratory training. Laboratories are designed to develop skill and self-reliance in the use of laboratory equipment and analytical instruments.

## **Major in Chemistry with a Specialized Program of Study in Biochemistry**

The major in Chemistry with a specialized Program of Study in Biochemistry (leading to a B.S.) is a catalog major in which certain courses of study are required and others selected by the student with the guidance of a faculty advisor. This specialized program of study in Biochemistry is designed to be interdisciplinary between chemistry and biology where the student receives a solid grounding in fundamentals of both molecular biology and chemistry. Successful completion of the major with a G.P.A. of 2.0 or above satisfies the requirements for Bachelor of Science in Chemistry with a Specialized Program of Study in Biochemistry.

The requirements for a B.S. major in Chemistry with a Specialized Program of Study in Biochemistry are defined in a following section.

The elective courses will depend on the student's goals. With an appropriate set of electives, the student may focus on specific career objectives such as professional training (e.g. Medicine, Dentistry, Pharmacy) or careers in the health sciences as well as graduate school (e.g. Biochemistry, Pharmacology, Toxicology, Immunology).

## **Honors in Chemistry**

Majors in Chemistry or in Chemistry with a specialized Program of Study in Biochemistry working toward a B.S. may receive a degree with the designation "Honors in Chemistry" or "Honors in Chemistry/ Biochemistry" upon application to and approval by the chemistry faculty and after successful completion of the following, which are in addition to the usual major requirements. To be eligible for honors, a student must:

1. Maintain a 3.3 G.P.A. or better in the courses required for the major, and a 3.0 or better in all college courses.
2. Complete during the senior year, with a grade point average of 3.3 or better, two semesters (8 credit hours) of research CHE 497 Honors Research in association with a member of the chemistry faculty. A semester spent in research/seminar such as those offered by the U. S. Department of Energy (SERS), by universities, or by national laboratories, may qualify in part for meeting the requirement. All honors research projects require pre-approval of the chemistry faculty.
3. Submit the results of the research as an honors thesis.
4. Preside over a seminar on the honors thesis of at least 30 minutes duration to all interested members of the College Community.
5. Defend the honors thesis in an oral examination before an honors examination committee consisting of the supervising member of the chemistry faculty and a minimum of two other faculty members. The honors examination committee will be appointed by the Chemistry Department Chairperson in consultation with the student no later than the beginning of the student's final regular semester.

Application for the "honors" designation should be completed and approved by the regular date for advanced registration for the fall semester of the student's senior year.

## **Contract Major in Chemistry**

For students whose needs are different from the standard major in Chemistry, a contract major may be arranged in consultation with the Chemistry Department Chair. A contract major differs from a standard Chemistry major in that it combines courses from chemistry with courses from related disciplines to build a major that integrates an interdisciplinary theme. Some examples of contract majors include chemistry and business, chemistry and pre-law, chemistry and mathematics, and other as appropriate to the interests and goals of the individual students. Total major credits and/or course are of the appropriate quantity with either the standard B.A. or B. S. in chemistry.

## Minor in Chemistry

A student majoring in another discipline may obtain a minor in chemistry by taking a total of six courses including associated laboratories, as described in a following section.

## B.S. Major in Chemistry, 61-63 credits

### Core Requirements: 32 credits

CHE 210 Essential Concepts of Chemistry (General Chemistry I)	3
CHE 210L General Chemistry Laboratory	1
CHE 215 Introduction to Structural Inorganic Chemistry (General Chemistry II)	3
CHE 215L Introduction to Structural Inorganic Chemistry Laboratory	1
CHE 220 Introductory Organic Chemistry	3
CHE 220L Introductory Organic Chemistry Laboratory	2
CHE 350 Organic Chemistry II	3
CHE 350L Organic Chemistry II Laboratory	2
CHE 315 Analytical Chemistry	4
CHE 340 Advanced Inorganic Chemistry	4
CHE 401 Thermodynamics and Kinetics	3
CHE 401L Physical Chemistry Techniques	1
CHE 455 Senior Seminar	2

### Elective Chemistry Courses:

Two additional 300-400 level Chemistry Courses, one with Lab	7
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### Support Courses:

MAT 221 Calculus I	4
MAT 222 Calculus II	4

### Additional Support Courses:

PHY 201 College Physics I	4
PHY 202 College Physics II	4
OR	
PHY 211 General Physics I	4
PHY 212 General Physics II	4

**It is highly recommended that Chemistry majors take PHY211/ PHY212 and two of the following:** 6-8

MAT 205 Statistics.	
MAT 312 Linear Algebra	
CIS 225 Databases	
CIS 224 Introduction to Web Design	

Premed students or students interested in a more diversified scientific background should take BIO 201 and 202 in place of or in addition to the two above courses chosen.

## B.S. Major in Chemistry with a Specialized Program of Study in Biochemistry, 63 credits

### Required Courses:

#### B.S. Chemistry Major Core Requirements: 32 credits

CHE 365 Biochemistry I: Biomolecules	3
CHE 365L Biomolecules Laboratory	2
CHE 410 Biochemistry II: Enzymes and Primary Metabolism	3
And one additional Chemistry course at the 300-400 level	3

### Support Courses:

BIO 201 Concepts in Biology I	4
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BIO 204 Concepts in Biology II	4
BIO 327 Genetics	4

**One Additional Biology Elective (or approved substitute)**

chosen from BIO 348, 365, or 441	4
PHY 201 College Physics I	4

Premed students should take PHY 202 in addition to the above and should either take MAT 221/222 or MAT 115 and 205.

**B.A. Major in Chemistry, 47 credits**

**Core Requirements: 21 credits**

CHE 210 Essential Concepts of Chemistry (General Chemistry I)	3
CHE 210L General Chemistry Laboratory	1
CHE 215 Introduction to Structural Inorganic Chemistry	3
CHE 215L Introduction to Structural Inorganic Chemistry Laboratory (General Chemistry II)	1
CHE 220 Introductory Organic Chemistry	3
CHE 220L Introductory Organic Chemistry Laboratory	2
CHE 350 Organic Chemistry II	3
CHE 350L Organic Chemistry II Laboratory	2
CHE 455 Senior Seminar	2

**Additional Chemistry Courses:**

Two approved Chemistry Electives at the 300-400 level, one with Lab	7
CHE 315 Analytical Chemistry	4

**Support Courses: 16 credits, consisting of the following:**

Either: PHY 201 and 202 Or: PHY 211 and 212	8
Plus 8 credits from: MAT 221, 222, BIO 201, 202, 203, CIS 125, CIS 224	

**Independent Study Opportunities**

Besides the course described later in this document, the chemistry faculty offers various opportunities for individualized, independent activities for chemistry majors. These include Special Studies in Chemistry, Teaching Practicum in Chemistry, Guided Independent Study, and Honors Research (see the section above).

1. Special Studies (CHE X90, 1-4 credits each) are courses not regularly taught but which are offered when the unique combination of faculty and student interests suggests that an important learning experience may occur. Examples of such topics are Advances Environmental Monitoring and Interpretation of Spectral Analysis.
2. The Teaching practicum in Chemistry (CHE X98, 1-4 credits) allows students, especially those preparing to be teachers, to gain experience by performing and serving as teaching assistants in certain chemistry courses. The practicum is also an excellent opportunity for students preparing for graduate and professional school admissions tests such as GRE, DAT, and MCAT, to enhance their preparation for the chemistry portions of those tests by working in the tutor / mentor role general and organic chemistry.
3. The Guided Independent Study (CHE X99, 1-4 credits) is for students interested in research and exploring a specialized topic outside the scope of the normal curriculum. The student should approach a member of the chemistry faculty whose research interests or area of specialty match his/hers own interests and inquire about possibilities. If the faculty member judges that the student's preparation and motivation warrant an independent study, the student and the faculty

member will develop a research project or appropriate parameters to allow the exploration of a topic. After approval by the chemistry faculty and the division chair, the project becomes an official guided independent study. Upon completion of the project, the student will have acquired such skills as hands on experience with experimental design, data collection and analysis and literature searches.