CHEMISTRY (CHS/CHM)

The Department of Chemistry awards two degrees at the baccalaureate level, the Bachelor of Arts in Chemistry and the Bachelor of Science in Chemistry, and three degrees at the graduate level, a non-thesis Master of Arts, the Master of Science and the Doctor of Philosophy. Each of the graduate degrees offers specialization in the areas of analytical chemistry, biochemistry, inorganic chemistry, organic chemistry and physical chemistry. In addition, a Master of Arts degree is offered as part of a carefully integrated accelerated B.A.-M.A. program. The chemistry faculty is comprised of 24 full-time members all of whom hold the Ph.D. degree. The combination of a large and strong faculty with a wide variety of courses and electives provides students with programs of study which can be tailored to fit individual needs while maintaining a sound background in all general aspects of chemistry.

Majors in chemistry are well-prepared to enter a wide range of chemical careers as well as many interdisciplinary activities that are the hallmark of modern science and technology. These include teaching and research in academic, government and private settings, bio-medical research and clinical practice, environmental activities, materials science, law, business and other professions. The Bachelor of Science is particularly designed for students wishing to continue with graduate training in chemistry and closely-allied disciplines and graduates are certified for membership in the American Chemical Society. The Bachelor of Arts provides opportunities for curricula individually tailored to meet many career objectives.

General Requirements for the Majors in Chemistry

The required sequence of Chemistry courses should be started immediately in the freshman year; the mathematics and physics requirements should be completed before the junior year as preparation for CHM 3400 Elementary Physical Chemistry I (B.A. degree) or CHM 4410 Physical Chemistry I (B.S. degree), courses which are to be taken in the third year. CHM 4410 is a prerequisite to other advanced courses required for the B.S. degree in chemistry. CHM 4060 “Use of Chemical Literature” also is a prerequisite to several B.S. degree courses.

A grade of C or better is required in each chemistry course and each supporting course specified for a chemistry degree. All courses in a chemistry program must be taken with a letter grade (A,B,C,D,F) except those courses which are graded S/U only. (D and F grades earned in attempting to satisfy chemistry major requirements will be used in calculating the major GPA.) Nine hours of upper-level chemistry courses must be completed at USF.

Liberal Arts Requirement. The student is required to complete the university’s Liberal Arts Requirement. Chemistry and Mathematics courses required for chemistry degrees satisfy the Liberal Arts requirements in the areas of Natural Science and Quantitative Methods.

Free Electives. Courses above or above the required courses should be taken to complete a 120-hour program. Recommended courses are listed in the degree requirements below. Additional courses in computer programming, economics, management, engineering, statistics, writing, and other applied disciplines are strongly recommended to strengthen the degree for subsequent professional employment.

Transfer Credit: It is strongly recommended that students transferring from community/junior colleges to the University of South Florida complete whole sequences of chemistry courses, such as general and organic chemistry, before the transfer. Even though courses may carry the same common course number, topics may vary sufficiently from school to school to leave the transfer student ill-prepared to proceed within a sequence.

Prerequisites (State Mandated Common Prerequisites) for Students Transferring from a Community College: Students should complete the following prerequisite courses listed below at the lower level prior to entering the university. These include two semesters each of General Chemistry lecture and lab, Organic Chemistry lecture and lab, Calculus, and General Physics lecture and lab. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of “C” is the minimum acceptable grade.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>MAC 2311</td>
<td>Calculus I or MAC 2281 Eng Calculus I</td>
<td>3</td>
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<td>MAC 2312</td>
<td>Calculus II or MAC 2282 Eng Calculus II</td>
<td>3</td>
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<tr>
<td>CHM 2210/2210L</td>
<td>Organic Chem I &amp; Lab or CHM 2210C</td>
<td>3</td>
</tr>
<tr>
<td>CHM 2211/2211L</td>
<td>Organic Chem II &amp; Lab or CHM 2211C</td>
<td>3</td>
</tr>
<tr>
<td>PHY 2048/2048L</td>
<td>Gen Physics I &amp; Lab or PHY 2048C, or</td>
<td>3</td>
</tr>
<tr>
<td>PHY 2049/2049L</td>
<td>Gen Physics II &amp; Lab or PHY 2049C, or</td>
<td>3</td>
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Please be aware of the immunization, foreign language, and continuous enrollment policies of the university. This is a non-limited access program with the above courses recommended.

BA in Chemistry (CHM)

The B.A. degree in Chemistry provides a course of study for students whose careers will require a thorough understanding of chemistry required for a variety of professional activities such as in health-related professions, science teaching, business, law and other areas. Inherent in this program is a high degree of flexibility which permits tailoring a course of study to the student’s own educational objectives. The B.A. student whose goals change in the direction of graduate study should supplement this curriculum by addition and/or substitution of a selection of advanced courses from the B.S. program. Prerequisites are included in the list below.

Required Chemistry Courses

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<tr>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>CHM 2045</td>
<td>General Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHM 2045L</td>
<td>General Chemistry I Lab</td>
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<tr>
<td>CHM 2046</td>
<td>General Chemistry II</td>
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<td>CHM 2046L</td>
<td>General Chemistry II Lab</td>
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<td>CHM 2210</td>
<td>Organic Chemistry I</td>
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<td>Organic Chemistry I Lab</td>
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<tr>
<td>CHM 2211</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHM 2211L</td>
<td>Organic Chemistry II Lab</td>
<td>2</td>
</tr>
<tr>
<td>CHM 3120C</td>
<td>Elementary Analytical Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHM 3400</td>
<td>Elementary Physical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHM 3401</td>
<td>Elementary Physical Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHM 3402L</td>
<td>Elementary Physical Chemistry Lab</td>
<td>1</td>
</tr>
<tr>
<td>CHM 3610</td>
<td>Intermediate Inorganic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHM 3610L</td>
<td>Intermediate Inorganic Chem. Lab</td>
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</table>

Required Chemistry Electives

<table>
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<tr>
<th>Course Code</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>CHM 3410</td>
<td>Elementary Physical Chemistry II</td>
<td>3</td>
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<tr>
<td>CHM 3402L</td>
<td>Elementary Physical Chemistry Lab</td>
<td>1</td>
</tr>
<tr>
<td>CHM 3610</td>
<td>Intermediate Inorganic Chemistry I</td>
<td>3</td>
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<tr>
<td>CHM 3610L</td>
<td>Intermediate Inorganic Chem. Lab</td>
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</tbody>
</table>

*Content varies each semester.

Required Supporting Courses (14-16 cr. hrs.)

<table>
<thead>
<tr>
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<th>Credit Hours</th>
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<tbody>
<tr>
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<td>Calculus I or MAC 2281 Eng Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>MAC 2312</td>
<td>Calculus II or MAC 2282 Eng Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>PHY 2053</td>
<td>Gen Physics I &amp; Lab or PHY 2048C, or</td>
<td>3</td>
</tr>
<tr>
<td>PHY 2053L</td>
<td>Gen Physics II &amp; Lab or PHY 2049C, or</td>
<td>3</td>
</tr>
</tbody>
</table>

*Content varies each semester.

Suggested courses: BCH 3023, BCH 3023L, CHS 4300, CHM 4060, CHM 4070, CHM 4130, CHM 4611, CHM 4970, CHM 4932.*
BA in Chemistry, emphasis in Biochemistry (CHM)

The Chemistry B.A. offers a unique opportunity for students to pursue later studies and/or professional emphasis in Biochemistry and Biotechnology along with a strong foundation in the chemical knowledge and skills that are essential to these areas. The following schedule of courses meets the requirements for a B.A. in Chemistry and provides core courses in other disciplines basic to biochemistry and biotechnology. Prerequisites are included in the list below.

**Required Chemistry Courses** (30 cr. hrs.)
- CHM 2045 General Chemistry I (3)
- CHM 2045L General Chemistry I Lab (1)
- CHM 2046 General Chemistry II (3)
- CHM 2046L General Chemistry II Lab (1)
- CHM 2210 Organic Chemistry I (3)
- CHM 2210L Organic Chemistry I Lab (2)
- CHM 2211 Organic Chemistry II (3)
- CHM 2211L Organic Chemistry II Lab (2)
- CHM 3120C Elementary Analytical Chemistry I (4)
- BCH 3023 Introductory Biochemistry (3)
- CHS 4300 Fundamentals of Clinical Chem. (3)
- CHS 4301L Fundamentals of Clinical Chem. Lab (2)

**Required Chemistry Electives.** (9 cr. hrs.)
- Minimum of 9 hrs. selected from the following:
  - CHM 3400 Elementary Physical Chemistry I* (3)
  - CHM 3401 Elementary Physical Chemistry II* (3)
  - CHM 3610 Intermediate Inorganic Chemistry I* (3)
  - CHM 3610L Intermediate Inorganic Chem. I Lab* (1)
  - CHM 4060 Use of the Chemical Literature (1)
  - CHM 4300 Biomolecules I (3)
  - CHM 4302 Selected Topics in Chemistry (3)
  - CHS 4301L Fundamentals of Clinical Chem. Lab (2)

**Required Supporting Courses** (22-24 cr. hrs.)
- MAC 2311 (4) or MAC 2312 (4)
- PHY 2053 (3)
- PHY 2054L (1)
- BSC 2010 (3)
- BSC 2010L (1)
- MAC 2281 (3)
- MAC 2282 (3)
- PHY 2053L (1)
- PHY 2054 (3)
- PHY 2054L (1)
- PHY 2053L (1)
- PHY 2054 (3)
- PHY 2054L (1)

Other suggested electives important for advanced studies in biochemistry: CHM 4932*, CHM 4070, PCB 5023, PCB 5025, STA 2023, MCB 5030, PCB 4253, PCB 5845, EVR 2001.

*Content varies each semester.

BS in Chemistry (CHS)

The Bachelor of Science in Chemistry is a rigorous program that supplies the foundation in chemistry required for both the student who begins a chemical vocation immediately upon graduation as well as the one who pursues advanced study in chemistry or related areas. In accord with this goal, the curriculum for the B.S. degree in Chemistry meets the requirements for degree certification by the American Chemical Society. Because of the strong base developed in this curriculum, the B.S. in Chemistry also provides entry into other chemistry-related advanced studies. Prerequisites are included in the list below.

**Required Chemistry Courses** (50 cr. hrs.)
- CHM 2045 General Chemistry I (3)
- CHM 2045L General Chemistry I Lab (1)
- CHM 2046 General Chemistry II (3)
- CHM 2046L General Chemistry II Lab (1)
- CHM 2210 Organic Chemistry I (3)
- CHM 2210L Organic Chemistry I Lab (2)
- CHM 2211 Organic Chemistry II (3)
- CHM 2211L Organic Chemistry II Lab (2)
- CHM 3120C Elementary Analytical Chemistry I (4)
- BCH 3023 Introductory Biochemistry (3)
- CHS 4300 Fundamentals of Clinical Chem. (3)
- CHS 4301L Fundamentals of Clinical Chem. Lab (2)
- CHM 2046L General Chemistry II Lab (1)
- CHM 2210 Organic Chemistry I Lab (2)
- CHM 2211 Organic Chemistry II (3)
- CHM 2211L Organic Chemistry II Lab (2)
- CHM 3120C Elementary Analytical Chemistry I (4)
- BCH 3023 Introductory Biochemistry (3)
- CHS 4300 Fundamentals of Clinical Chem. (3)
- CHS 4301L Fundamentals of Clinical Chem. Lab (2)
- CHM 2046L General Chemistry II Lab (1)
- CHM 2210 Organic Chemistry I Lab (2)
- CHM 2211 Organic Chemistry II (3)
- CHM 2211L Organic Chemistry II Lab (2)
- CHM 3120C Elementary Analytical Chemistry I (4)
- BCH 3023 Introductory Biochemistry (3)
- CHS 4300 Fundamentals of Clinical Chem. (3)
- CHS 4301L Fundamentals of Clinical Chem. Lab (2)

*Other suggested electives important for advanced studies in health professional vocations: BSC 2011, PCB 3063, PCB 5235, PCB 5252, STA 2023, MCB 3030, PCB 4723, ZOO 4753, ZOO 3713, MCB 4502, CHM 4932*, PCB 4253, PCB 5845.

*Content varies each semester.

BA in Chemistry, emphasis for Health Professions (CHM)

A chemistry core is essential for preparation for medical, dental, veterinarian and other health-related professions. The B.A. in Chemistry includes this core as well as the flexibility to incorporate the other science courses required for admission to programs in the health professions. The course of study outlined below incorporates the goals for health-related careers. Prerequisites are included in the list below.

**Required Chemistry Courses** (30 cr. hrs.)
- CHM 2045 General Chemistry I (3)
- CHM 2045L General Chemistry I Lab (1)
- CHM 2046 General Chemistry II (3)

*Content varies each semester.
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Required Supporting Courses (20-23 cr. hrs.)
MAC 2311 (4) or MAC 2312 (4)
MAC 2313 (4)
PHY 2048 (3) or PHY 2049 (3)

Required natural science or engin. elective (3-6 hrs.)
Chemistry of Materials, Polymer Chemistry, Spectroscopy, & Computer in Chemistry.

*Note: CHM 4932 content varies each semester. Recent topics include: Chemical Archaeology, Content varies each semester.

Other suggested chemistry electives: CHM 4970, BCH 3023L, CHM 4070, CHM 4932*.

MINOR IN CHEMISTRY
Minimum of 24 total hours. Students apply for a minor when submitting a graduation application (i.e., there is no need to "declare" a minor).

Required Chemistry Courses (14 cr. hrs.)
CHM 2045 General Chemistry I (3)
CHM 2045L General Chemistry I Lab (1)
CHM 2046 General Chemistry II (3)
CHM 2046L General Chemistry II Lab (1)
CHM 2210 Organic Chemistry I (3)
CHM 2210L Organic Chemistry I Lab (2)
CHM 20460 Use of Chemical Lit. (1)
OR
CHM 4932 Selected Topics in Chemistry (1)

Chemistry Electives (Minimum 10 hrs.)
Choose 10 hours of structured classes, applicable to the major.

NOTE: In all laboratory classes the lecture is PR/CR.
BCH 3023 Introductory Biochemistry (3)
BCH 3023L Basic Biochemistry Lab (2)
CHM 2211 Organic Chemistry II (3)
CHM 2211L Organic Chemistry II Lab (2)
CHM 3120C Elementary Analytical Chemistry (4)
CHM 3610 Intermediate Inorganic Chemistry (3)
CHM 3610L Intermediate Inorganic Chem. Lab (1)
CHM 3400 Elementary Physical Chemistry (3)
CHM 4300 Biomolecules (3)
CHM 4932 Selected Topics in Chemistry* (1-3)
CHS 4300 Fund. Clinical Chemistry (3)

*Note: CHM 4932 content varies each semester. Recent topics include: Chemical Archaeology, Applied Spectroscopy, NMR, Toxic Substances, Antibiotics, Analytical Environmental Methods, Chemistry of Materials, Polymer Chemistry, Spectroscopy, & Computer in Chemistry.

ENVIRONMENTAL CONCENTRATION
Chemical science is a core component of environmental science both in the analysis of environmental conditions and in the solution of environmental problems. B.A. and B.S. chemistry majors wishing to concentrate on environmental concerns should complete the following required courses and seriously consider taking one or more of the suggested electives.

Required Supporting Courses
BSC 2010 Biology I - Cellular Processes
BSC 2011 Biology II - Diversity
GLY 2010 Dynamic Earth: Intro to Physical Geography
GLY 2010L Dynamic Earth Laboratory
EVR 2001 Introduction to Environmental Science
EVR 2001L Environmental Science Lab

Suggested Electives
EVR 2861 Introduction to Environmental Policy
EVR 4910 Environmental Science and Policy Project
GLY 2030 Environmental Geology

Teacher Education Programs
For information concerning the degree programs for secondary school teachers, see College of Education section in this Catalog and junior college teachers, see USF Graduate Catalog.

Combined BA-MA Program Admission
Regular admission to the program will normally occur towards the end of the sophomore year or early in the junior year, or at transfer from junior college. Students who have completed not less than ten semester credit hours of chemistry courses, and have maintained a "B" average in chemistry courses and overall, may apply. Applications will be considered individually and applicants may be called for interview. Provisional admission may be granted to incoming freshmen whose academic background and performance indicate the likelihood of their meeting the regular requirements in due course. It should be noted that, in view of the heavy research component and orientation of the program, and the limitations of facilities and individual faculty time available for research direction, admission to the program is by no means automatic upon meeting minimum requirements.

COURSE REQUIREMENTS
Undergraduate: The B.A. coursework curriculum (q.v.) is augmented as follows:
1. CHM 4410, 4412, and 4130C (or CHS 4310C) replace CHM 3400, 3401 and 3402C.
2. Chemistry coursework hours (excluding research) total 42 rather than 24.
Graduate: Not less than 20 credit hours of formal, regularly scheduled chemistry graduate courses, including not less than two of the five core courses (BCH 5065, CHM 5225, CHM 5425, CHM 5621, CHM 6150). At least 10 of the credit hours must be at the 6000 level. The core course requirement may be waived in part or entirely by recommendation of the supervisory committee on the basis of past work, performance on a test, or substitution of more comprehensive and advanced courses.

RESEARCH AND THESIS
Graduate: Not less than 20 credit hours of formal, regularly scheduled chemistry graduate courses, including not less than two of the five core courses (BCH 5065, CHM 5225, CHM 5425, CHM 5621, CHM 6150). At least 10 of the credit hours must be at the 6000 level. The core course requirement may be waived in part or entirely by recommendation of the supervisory committee on the basis of past work, performance on a test, or substitution of more comprehensive and advanced courses.

SUPERVISION AND PROMOTION
A supervisory committee consisting of two faculty members will be appointed for each student admitted to the program. A carefully planned individual timetable will be worked out and progress will be monitored each semester. Continuation from the senior year into the graduate year will be contingent upon the maintenance of the "B" average in chemistry and overall, and upon satisfactory recommendation by the student's research director. Diagnostic and qualifying examinations will not be required of students in this program. The supervisory committee during the graduate year will consist of three faculty members, including the research director.