CHEMISTRY, BS

Chair

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Faculty

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Program Description

Chemistry, the science concerned with the composition, structure, properties, and reactions of matter, especially of atomic, elemental, and molecular systems, is taught through courses in analytical, biological, inorganic, organic, and physical chemistry and through direct participation in original research. Undergraduate majors in chemistry may elect one of three programs, two leading to a B.A. degree, with an emphasis in either chemistry or biological chemistry, and one to the B.S. degree. Either B.A. degree program requires fewer credits in chemistry than the B.S. option, and yet provides a foundation in the discipline adequate for either immediate professional engagements or for graduate studies. Students studying for a B.S. degree in chemistry gain a more extensive background as they fulfill a broader range of requirements; they must file a petition with the department chair indicating their intent to secure the B.S. degree before it can be awarded.

Students interested in a B.S. degree in biochemistry should see the biochemistry section here (https://coursecatalog.syracuse.edu/undergraduate/arts-sciences/biochemistry-bs/).

For information about certification to teach chemistry at the secondary school level, see Education/Arts and Sciences (dual program) (https://coursecatalog.syracuse.edu/graduate/education/science-chemistry-education-preparation-ms/) in this section of the catalog.

Student Learning Outcomes

1. Develop quantitative and qualitative problem solving skills in core disciplines of chemistry
2. Develop accurate and safe laboratory techniques, recognize hazards and wastes, disseminate results
3. Train on modern instrumentation, interpret results, analyze data.
4. Communicate effectively, work in small groups, perform database literature reviews.
5. Design experiments using ethical behavior, understand impact of Chemistry on society

B.S. Degree Requirements

To declare and remain a B.S. major in Chemistry (including Medicinal Chemistry track), a student must satisfy either of the following two requirements:

1. Earn a grade of C+ or better in General Chemistry lecture and laboratory courses (CHE 106 General Chemistry Lecture I/CHE 107 General Chemistry Laboratory I/CHE 116 General Chemistry Lecture II/CHE 117 General Chemistry Laboratory II or honors equivalents, or AP credit for CHE 106 General Chemistry Lecture I/CHE 107 General Chemistry Laboratory I/CHE 116 General Chemistry Lecture II/CHE 117 General Chemistry Laboratory II) **and** earn a grade of C or better in CHE 275 Organic Chemistry I;
   -or-
2. Earn a grade of A- or better in a General Chemistry lecture course (CHE 106 General Chemistry Lecture I/CHE 116 General Chemistry Lecture II/CHE 109 General Chemistry Lecture I (Honors and Majors)/CHE 119 General Chemistry Lecture II (Honors and Majors)) taken at Syracuse University.

Students declared in the Chemistry BS program (including the Medicinal Chemistry track) earning less than a C+ in the following courses: CHE 106, CHE 107, CHE 116, CHE 117 (or honors equivalent) and/or less than a C in CHE 275, will be placed on "Major Probation:"

Students on "major probation" must successfully pass the following courses with a C+ or better:

General Chemistry lecture and laboratory (CHE 106 (https://syr.acalogadmin.com/preview/preview_program.php?catoid=40&poid=20077&returnto=5029#tt4431)/107 (https://syr.acalogadmin.com/preview/preview_program.php?catoid=40&poid=20077&returnto=5029#tt3438)/116 (https://syr.acalogadmin.com/preview/preview_program.php?catoid=40&poid=20077&returnto=5029#tt9882)/117 (https://syr.acalogadmin.com/preview/preview_program.php?catoid=40&poid=20077&returnto=5029#tt1286) or honors equivalent) and/or a C or better in CHE 275 (https://syr.acalogadmin.com/preview/preview_program.php?catoid=40&poid=20077&returnto=5029#tt4867) in their next attempt. Failure to complete the respective course on the second attempt with the minimum grade requirement will result in "Major suspension". These courses must be retaken at Syracuse University. Students in the category of Major suspension will be required to change their major with the college.

Group 1

Code	Title	Credits
Select one of the following:		6
CHE 106 & CHE 116	General Chemistry Lecture I and General Chemistry Lecture II	
CHE 109 & CHE 119	General Chemistry Lecture I (Honors and Majors) and General Chemistry Lecture II (Honors and Majors)	
Select one of the following:		2
CHE 107 & CHE 117	General Chemistry Laboratory I and General Chemistry Laboratory II	
CHE 129 & CHE 139	General Chemistry Laboratory I (Honors and Majors) and General Chemistry Laboratory II (Honors and Majors)	
CHE 275	Organic Chemistry I	3
CHE 276	Organic Chemistry I Laboratory	2
CHE 325	Organic Chemistry II	3
CHE 326	Organic Chemistry II Laboratory	2
CHE 346	Physical Chemistry I	3
CHE 347	Physical-Analytical Chem Lab	2
CHE 356	Physical Chemistry II	3

CHE 357	Physical Chemistry Laboratory	2
CHE 411	Inorganic Chemistry	3
CHE 422	Inorganic Laboratory Technique	1
CHE 450	Introduction to Chemical Research (at least 3 credits)	1-4
CHE 335	Chemical and Biochemical Analysis with Laboratory	4
or CHE 444	Forensic Chemical Analysis	
BCM 475	Biochemistry I	3

Group 2

At least 3 credits in a lecture course chosen from

Code	Title	Credits
CHE 412	Metals in Medicine	3
CHE 414	Introduction to Medicinal Chemistry	3
CHE 427	Organic Chemistry of Biological Molecules	3
CHE 436	Advanced Physical Chemistry	3
CHE 474	Structural and Physical Biochemistry	3
CHE 546	Molecular Spectroscopy and Structure	1-9
CHE 575	Organic Spectroscopy	3
BCM 476	Biochemistry II	3

selected graduate courses with the instructor's approval

Group 3

One year of calculus and physics

Code	Title	Credits
MAT 295 & MAT 296	Calculus I and Calculus II	6
PHY 211	General Physics I	3
PHY 212	General Physics II	3
PHY 221	General Physics Laboratory I	1
PHY 222	General Physics Laboratory II	1

Additional Information

If taken in an appropriate area of research, additional credit in CHE 450 Introduction to Chemical Research beyond the 3 credits required in (1) above may be substituted for up to 4 laboratory credits with the department's approval.

B.S. Degree Requirements: Medicinal Chemistry Track

At least 40 credits in chemistry are required for the B.S. degree with the Medicinal Chemistry Track. Each student's course of study should include the following:

Code	Title	Credits
At least 40 credits in Chemistry		
Select one of the following:		6
CHE 106 & CHE 116	General Chemistry Lecture I and General Chemistry Lecture II	
CHE 109 & CHE 119	General Chemistry Lecture I (Honors and Majors) and General Chemistry Lecture II (Honors and Majors)	
Select one of the following:		2
CHE 107 & CHE 117	General Chemistry Laboratory I and General Chemistry Laboratory II	
CHE 129 & CHE 139	General Chemistry Laboratory I (Honors and Majors) and General Chemistry Laboratory II (Honors and Majors)	
CHE 275	Organic Chemistry I	3
CHE 276	Organic Chemistry I Laboratory	2
CHE 325	Organic Chemistry II	3
CHE 326	Organic Chemistry II Laboratory	2
CHE 335	Chemical and Biochemical Analysis with Laboratory	4
CHE 412	Metals in Medicine	3
CHE 414	Introduction to Medicinal Chemistry	3
CHE 427	Organic Chemistry of Biological Molecules	3
CHE 450	Introduction to Chemical Research (at least 3 credits)	1-4
CHE 474	Structural and Physical Biochemistry	3
CHE 477	Proteins and Nucleic Acids Lab	3
At least 4 credits in Biology		
BIO 121	General Biology I	3
BIO 122	General Biology I Laboratory	1
Electives		
Select at least 3 credits of the following:		3
CHE 346	Physical Chemistry I	
CHE 356	Physical Chemistry II	
CHE 411	Inorganic Chemistry	
CHE 436	Advanced Physical Chemistry	
CHE 444	Forensic Chemical Analysis	
CHE 546	Molecular Spectroscopy and Structure	
CHE 575	Organic Spectroscopy	
BCM 475	Biochemistry I	
BCM 476	Biochemistry II	
BCM 484	Biomolecular Modeling	
BEN 433	Drug Delivery	
BIO 409	General Microbiology	
BIO 422	Bioinformatics for Life Scientists	
BIO 447	Basic Immunology	
BIO 462	Molecular Genetics	
BIO 463	Molecular Biotechnology	
BIO 464	Applied Biotechnology	
BIO 465	Molecular Biology Laboratory	
BIO 501	Biology of Cancer	
FSC 453	Forensic Toxicology	
One Year of Calculus		
Select one of the following:		6
MAT 285 & MAT 286	Life Sciences Calculus I and Life Sciences Calculus II	
MAT 295 & MAT 296	Calculus I and Calculus II	
PHY 211	General Physics I	3
PHY 212	General Physics II	3
PHY 221	General Physics Laboratory I	1
PHY 222	General Physics Laboratory II	1

If taken in an appropriate area of research, additional credit in CHE 450 Introduction to Chemical Research beyond the 3 credits required in (1) above may be substituted for up to 4 laboratory credits with the department's approval.

Students who receive a score of 5 on the AP chemistry exam will receive credit for CHE 106 General Chemistry Lecture I/CHE 116 General Chemistry Lecture II and CHE 107 General Chemistry Laboratory I/CHE 117 General Chemistry Laboratory II (8 credits)[1]

[1] Pre-medical students should consult with Health Professions Advising before accepting AP chemistry credit.

Degree with Distinction

Distinction in Chemistry is awarded by the chemistry department upon completion of the chemistry major and a high-quality chemistry thesis. The thesis will be evaluated and judged by a committee consisting of the research advisor and two other chemistry faculty members. Other requirements include a minimum cumulative GPA of 3.4 by the end of the senior year, and a minimum cumulative GPA of 3.4 in chemistry department courses. See Professor Totah for additional requirements.

College of Arts and Sciences Requirements

For all Arts and Sciences|Maxwell students, successful completion of a bachelor's degree in this major requires a minimum of 120 credits, 96 of which must be Arts and Sciences|Maxwell credits, completion of the Liberal Arts Core (https://coursecatalog.syracuse.edu/undergraduate/arts-sciences/#text) requirements, and the requirements for this major (30 credits) that are listed above.

Dual Enrollments:

Students dually enrolled in **Newhouse*** and Arts and Sciences|Maxwell will complete a minimum of 122 credits, with at least 90 credits in Arts and Sciences|Maxwell coursework and an Arts and Sciences|Maxwell major.

*Students dually enrolled in the College of Arts and Sciences|Maxwell as first year students must complete the Liberal Arts Core (https://coursecatalog.syracuse.edu/undergraduate/arts-sciences/#text). Students who transfer to the dual program after their first year as singly enrolled students in the Newhouse School will satisfy general requirements for the dual degree program by completing the Newhouse Core Requirements.

Undergraduate University Requirements

The following requirements and experiences apply to all Syracuse University Undergraduate matriculated degree programs.

- IDEA Course Requirement (https://coursecatalog.syracuse.edu/undergraduate/idea-course-requirement/)
- First Year Seminar (https://coursecatalog.syracuse.edu/undergraduate/courses/fys/)