CHEMISTRY MAJOR

MAJOR DESCRIPTION

The Major in Chemistry provides students with a solid foundation in the chemical sciences and experience with practical laboratory skills. Students will apply the scientific method to develop and test hypotheses, perform lab experiments, critically analyze data, and communicate findings. The Chemistry department offers two pathways for completing the major: The Standard Chemistry Track (A-track) is appropriate for students who are interested in studying chemistry with the breadth and depth of a traditional chemistry major The Biological Chemistry Track (B-track) is intended for students who prefer to focus their studies on biochemistry and chemical biology at the molecular level.

The Chemistry program appeals to students who have a strong interest in science and how matter behaves at the molecular level, have an aptitude for mathematics and data analysis, can grasp abstract concepts, and are attentive to detail and precision.

Chemistry majors typically continue their studies in a doctoral program, medical school, or other advanced education programs, though many students have gone on to pursue diverse career opportunities in fields such as scientific research, chemical engineering, pharmaceuticals, materials science, environmental studies, patent examination, technical writing, forensic science, and education.

ADMISSION TO THE MAJOR

To declare the chemistry major students must have earned a grade of C or better in all 100- and 200-level chemistry courses completed at the time of declaration.

MAJOR REQUIREMENTS

The Chemistry Department offers two general pathways to completing the major. The Standard Chemistry Track (A-track) is appropriate for most students whose interests lie primarily in the synthesis and characterization of molecules and their applications in important scientific problems. Students with focused interests in biochemistry and chemical biology at the molecular level may elect to complete the Biological Chemistry Track (B-track) major.

Regardless of which track is pursued, students who intend to be multiple majors or to study abroad are strongly encouraged to consult with the chemistry faculty as early as possible for planning an appropriate plan of study.

FOR BOTH TRACKS

All students majoring in chemistry should complete a year of general chemistry, preferably CHEM143/CHEM144 (although CHEM141/CHEM142 also fulfills this requirement), and the associated laboratory course, CHEM152. Students who have been granted Advanced Placement credit are exempt, however, and may choose to begin their study at Wesleyan with CHEM251. A year of organic chemistry (CHEM251/CHEM252) and the concurrent laboratories (CHEM257/CHEM258) is required for all majors. Chemistry majors must also complete two semesters of Chemistry Symposium, CHEM521/CHEM522.

THE STANDARD CHEMISTRY TRACK (A-TRACK)

A-track Required Chemistry Courses: To complete the A-track chemistry major students must, in addition to the common requirements noted above, complete a year of physical chemistry (CHEM337/CHEM338) and one year of advanced laboratory (CHEM375/CHEM376).

A-track Chemistry Electives: The A-track major requires completing a total of at least three credits from **300**-level courses (other than CHEM337/CHEM338). Students who have not completed CHEM144 must take CHEM361 as one of their **300**-level electives. One of the three **300**-level electives may be replaced by a total of 2.0 credits in research courses (CHEM409, CHEM410, CHEM423, or CHEM424). All chemistry courses counted toward the major (except for seminars, colloquia, or research tutorials) must be taken with an A–F grading mode. Seminars or journal clubs may not be used as electives.

A-track Other Required Courses: In addition to the required chemistry courses, students must either (i) complete calculus courses through MATH122, (ii) receive an Advanced Placement score of a 4 or 5 on the BC calculus exam, or (iii) place into a course beyond MATH122 on the Math Placement Exam. Students must also complete the equivalent of one year of physics (PHYS111/PHYS112 or PHYS113/PHYS116, or an Advanced Placement score of a 4 or 5 on the AP physics exam).

THE BIOLOGICAL CHEMISTRY TRACK (B-TRACK)

B-track Required Courses: To complete the B-track chemistry major students must, in addition to the common requirements noted above, complete one year of biology (BIOL181/BIOL182), MB&B208, CHEM383, and CHEM381. The standard physical chemistry sequence, CHEM337/CHEM338, may be substituted for CHEM381 and the second semester of this sequence may be used as one of the three required electives. One year of advanced laboratory (CHEM375/CHEM376) is also required. (MB&B395/CHEM395 may be substituted for one semester of CHEM375/CHEM376 by petition to the chemistry curriculum committee.)

B-track Chemistry Electives: The B-track major requires completing a total of at least two elective credits from 300-level courses (if the student takes the CHEM337/CHEM338 sequence only the second semester may be used as an elective). Students who have not completed CHEM144 must take CHEM361 as one of their 300-level electives. One of the 300-level electives may be replaced by a total of 2.0 credits in research courses (CHEM409, CHEM410, CHEM423, or CHEM424). All chemistry courses counted toward the major (except for seminars, colloquia, or research tutorials) must be taken with an A–F grading mode. Seminars or journal clubs may not be used as electives.

While any other 300-level (or higher) chemistry courses (excluding CHEM383, CHEM381, and CHEM375/CHEM376) may be used as electives for B-track chemistry majors, the following courses are particularly appropriate: CHEM309, CHEM/MB&B321, CHEM/MB&B325, CHEM/MB&B386, and CHEM390/MB&B340.

B-track Other Required Courses: In addition to the required chemistry courses, students must either (i) complete calculus courses through MATH122, (ii) receive an Advanced Placement score of a 4 or 5 on the BC calculus exam, or (iii) place into a course beyond MATH122 on the Math Placement Exam. Students must also complete MB&B208 (prior to CHEM383).

ADDITIONAL CONSIDERATIONS FOR ALL CHEMISTRY MAJORS

A chemistry major planning graduate work in chemistry usually takes at least one additional 300-level chemistry course (excluding CHEM337/CHEM338) and two semesters of undergraduate research tutorials, CHEM409, CHEM410, CHEM423, or CHEM424. When feasible, an intensive continuation of research during at least one summer is encouraged. Financial support for summer research is usually available through the Research in the Sciences Program. The preparation

of a senior thesis based on this research is an extremely valuable capstone experience and is strongly recommended.

A chemistry major planning to attend medical school, teach in a secondary school, or do graduate work in such fields as biochemistry, geochemistry, environmental science, or chemical physics may petition the chemistry curriculum committee to replace one of the elective requirements with an appropriate course offered by a Wesleyan science or mathematics department. A similar substitution may be requested when appropriate as part of an interdepartmental major.

COURSES FOR NON-MAJORS

The Chemistry Department offers a variety of 100-level general education courses, including CHEM141 and CHEM142, which non-science students should consider in their program to meet general education expectations in NSM. All of these courses are appropriate for students who have little or no previous background in chemistry.

Scientists majoring in areas other than chemistry can prepare themselves better for work in their discipline by having a grounding in chemistry, which will enable them to understand molecular phenomena. The Chemistry Department offers two yearlong tracks of General Chemistry (CHEM141/CHEM142 or CHEM143/CHEM144). The CHEM143/CHEM144 sequence requires some prior chemistry and provides a more in-depth introduction and represents a better preparation for science majors. The CHEM141/CHEM142 sequence requires no previous exposure to chemistry. CHEM152 is taken concurrently with CHEM141 and CHEM143 in the fall semester or with CHEM142 or CHEM144 in the spring semester. CHEM251/CHEM252 normally follows General Chemistry. The laboratory courses, CHEM257 and CHEM258, are usually taken concurrently with CHEM251/CHEM252, respectively. The two courses, General Chemistry and Organic Chemistry, plus the laboratory sequence, CHEM152, CHEM257, CHEM258, satisfy requirements for admission to medical, dental, and veterinary schools.

STUDENT LEARNING GOALS

Students graduating with a BA degree in chemistry should be able to:

· **Apply the scientific method.** The student should understand how to develop and test scientific hypotheses.

· **Understand data.** The student should understand how chemical data is produced, interpreted, and applied.

· **Perform laboratory experiments.** The student should have the ability to carry out standard chemical experimental procedures safely and successfully.

· **Apply quantitative tools.** The student should be able to select and apply appropriate quantitative techniques (e.g., calculus, statistics, chemical group theory, or computational modeling) to chemical questions.

· **Use the primary literature.** The student should be able to search for and understand publications from the primary scientific literature.

· **Critically evaluate scientific claims.** The student should be able to critique claims and arguments made in the chemical literature.

· **Communicate.** The student should be able to present chemical data and their interpretation effectively in written, visual, and oral formats.

· **Practice science with integrity.** The student should adhere to established professional ethical standards in the generation, documentation, and presentation of chemical data.

· **Appreciate chemistry as an interdisciplinary science.** The student should understand how to apply chemical perspectives to topics from related fields.

STUDY ABROAD

A semester abroad is possible if adequately planned in advance. Students should discuss plans with a chemistry faculty member as early as possible.

ADVANCED PLACEMENT

For freshmen and new students to receive 2 credits:

Score of AP 5. Students can receive 2.00 credits by completing one full year of organic chemistry (CHEM251 and CHEM252) with a minimum grade of B. No credit will be granted if a student completes any of the following courses: CHEM141, CHEM142, CHEM143, or CHEM144.

For freshmen and new students to receive 1 credit:

Score of AP 5. Students can receive 1.00 credit by completing CHEM144 with a minimum grade of B. No credit will be granted if a students takes either CHEM141, CHEM142, or CHEM143.

Score of AP 4. Students can receive 1.00 credit by either completing CHEM144 with a minimum grade of B or completing a full year of organic chemistry (CHEM251 & CHEM252) with a minimum grade of B. No credit will be granted if a student completes any of the following courses: CHEM141, CHEM142, or CHEM143.

Special note: AP students who intend to major in chemistry should consult with the department chair as soon as possible.

ADVANCED PLACEMENT CREDIT FOR THE INTERNATIONAL BACCALAUREATE (IB) COURSES IN CHEMISTRY

For freshmen and new students to receive 2 credits:

Score of IB 6 or 7. Students can receive 2.00 credits by completing one full year of organic chemistry (CHEM251 and CHEM252) with a minimum grade of B. No credit will be granted if a student completes any of the following courses: CHEM141, CHEM142, CHEM143, or CHEM144.

For freshmen and new students to receive 1 credit:

Score of IB 6 or 7. Students can receive 1.00 credit by completing CHEM144 with a minimum grade of B. No credit will be granted if a students takes either CHEM141, CHEM142, or CHEM143.

Score of IB 5. Students can receive 1.00 credit by either completing CHEM144 with a minimum grade of B, or completing a full year of organic chemistry (CHEM251 & CHEM252) with a minimum grade of B. No credit will be granted if a student completes any of the following courses: CHEM141, CHEM142, or CHEM143.

Score of IB 4. Students are not eligible to receive Wesleyan credit.

Note: A chemistry major is required to study inorganic chemistry. The requirement can be met by taking either CHEM144 or CHEM361 or both.

Special note: AP students who intend to major in chemistry should consult with the department chair as soon as possible.

ENGLISH A-LEVELS

For freshmen and new students:

Students with a grade of A on the Chemistry A-Levels can receive 1 credit by completing CHEM144 with a minimum grade of B or completing the yearlong organic chemistry (CHEM251 and CHEM252) with a grade of B or higher. No credit will be granted if the student has completed any of the following courses: CHEM141, CHEM142, or CHEM143.

Special note: Students with Chemistry AP, IB, or A-Levels scores who intend to major in chemistry should consult with the department chair as soon as possible.

LANGUAGE REQUIREMENT

There is no language requirement for the chemistry major.

TRANSFER CREDIT

Not all general chemistry or organic chemistry courses taken at other institutions will satisfy the criteria for transfer credit to Wesleyan. It is the students' responsibility to find an acceptable course(s) and to have the course(s) preapproved by the Chemistry Department. Below are general guidelines for requests for transfer of credit for general and organic chemistry.

For Transfer of Credit:

· The instructor of the equivalent Wesleyan course (CHEM141 or CHEM142 for General Chemistry and CHEM251/CHEM252 for Organic Chemistry) for the current academic year must approve all transfer of credit requests. Such approvals are solely at his/her discretion.

· Permission should be requested **before** the course is taken. The student should submit:

o the Permission to Transfer Credit From Another College or University form (https://www.wesleyan.edu/studentaffairs/pdfs/Permission%20Transfer%20Credit%20form.pdf) available on the Office of Student Affairs website,

o the title, author(s), and edition of the textbook used in the course,

o the syllabus for the course, including which specific chapters of the textbook are actually covered in the course,

o the length of each lecture meeting,

o the total number of actual class hours, *excluding* time taken for examinations, and

o the name and contact information for the course instructor.

These materials must be compiled by the student and sent to the faculty member currently teaching the equivalent Wesleyan course; simply sending a copy of the syllabus or a link to a course website is not sufficient.

· The student must achieve at least a B- to get credit for the course.

· Courses taken elsewhere may not be counted toward a chemistry major at Wesleyan (except by special petition to the Curriculum Committee of the Chemistry Department).

· The Chemistry Department will not normally accept an online chemistry course for Wesleyan credit.

ADDITIONAL INFORMATION

Undergraduate research. Research is an important part of the program for most majors. Wesleyan's small but excellent graduate program makes it possible for majors to work at the cutting edge of discovery in chemistry. Every tenured/tenure-track faculty member is involved in significant research. Undergraduates participating in the departmental research program normally attend a research seminar in their area, and most research groups have weekly meetings to discuss new results. Students involved in significant research have an opportunity to continue in the BA/MA program.

Seminars. Seminars are a vital part of the intellectual life of the Chemistry Department. Weekly departmental colloquia on Friday afternoons (CHEM521/CHEM522) bring accomplished scientists from other universities, research laboratories, and industry to campus and provide opportunities for informal meetings and discussions. In addition, chemistry students and faculty speak at weekly research seminars in chemical physics, organic/inorganic chemistry, and biochemistry. Programs for each semester are available on the chemistry website.

HONORS

Honors are awarded by the faculty on the basis of the evaluation of a senior thesis.

CAPSTONE EXPERIENCE

The recommended capstone experience is a significant research project culminating in a senior thesis. Successful completion of the Integrated Lab sequence CHEM375/CHEM376 is considered an alternative capstone for other students.