College of Arts and Sciences

Chemistry

B.S. in Biochemistry

Admission to the Program

Formal admission to the major requires a grade point average of 2.00 (on a 4.00 scale). The department counsels freshmen and transfer students, as well as declared biochemistry majors.

University Requirements

- A total of 120 credit hours
- 6 credit hours of college writing
- 3 credit hours of college mathematics or the equivalent by examination

General Education Requirements

- A total of ten courses, consisting of one foundation course and one second-level course in an approved sequence from each of the five curricular areas
- No more than 6 credit hours may be taken in the same discipline

Major Requirements

- 72 credit hours with grades of C or better

Course Requirements

- BIO-110 General Biology I 5:1 (4)
- BIO-210 General Biology II 5:2 (4)
- BIO-300 Cell Biology with Laboratory (4)
- BIO-356 Genetics with Laboratory (5)
- BIO-440 Microbiology with Laboratory (4)
- BIO-583 Molecular Biology (3)
- CHEM-110 General Chemistry I 5:1 (4)
- CHEM-210 General Chemistry II 5:2 (4)
- CHEM-310 Organic Chemistry I (3)
- CHEM-312 Organic Chemistry I Laboratory (1)
- CHEM-320 Organic Chemistry II (3)
- CHEM-322 Organic Chemistry II Laboratory (1)
- CHEM-410 Biophysical Chemistry (3)
- CHEM-411 Biophysical Chemistry Laboratory (1)
- CHEM-460 Instrumental Analysis (3)
- CHEM-461 Instrumental Analysis Laboratory (2)
- CHEM-508 Human Biochemistry Laboratory (1)
- CHEM-560 Biochemistry I (3)
- CHEM-561 Biochemistry II (3)
- MATH-221 Calculus I (4)
- MATH-222 Calculus II (4)
- PHYS-110 University Physics I 5:1 (4)
- PHYS-210 University Physics II 5:2 (4)

University Honors Program

All University Honors students must complete at least 12 credit hours of advanced-level (300-level and above) Honors courses including a 3 to 6 credit hour Honors Senior Capstone Project. Students may graduate with University Honors in the major if they complete at least 12 advanced-level Honors courses including the Senior Capstone Project in the department. Each department has three levels of University Honors requirements: Level I Options (100-200-level Honors classes); Level II Options (300-level and above Honors classes); and Level III Options (Honors Senior Capstone). The department Honors coordinator advises students in the University Honors Program regarding departmental options. For more information, go to www.american.edu/academic.depts/honors/ .

B.S. in Chemistry

Admission to the Program

Formal admission to the major requires a grade point average of 2.00 (on a 4.00 scale). The department counsels freshmen and transfer students, as well as declared chemistry majors.

University Requirements

- A total of 120 credit hours
- 6 credit hours of college writing
- 3 credit hours of college mathematics or the equivalent by examination

General Education Requirements

- A total of ten courses, consisting of one foundation course and one second-level course in an approved sequence from each of the five curricular areas
- No more than 6 credit hours may be taken in the same discipline

Major Requirements

- 68 credit hours with grades of C or better

Course Requirements

- CHEM-110 General Chemistry I 5:1 (4)
- CHEM-210 General Chemistry II 5:2 (4)
- CHEM-310 Organic Chemistry I (3)
- CHEM-312 Organic Chemistry I Laboratory (1)
- CHEM-320 Organic Chemistry II (3)
- CHEM-322 Organic Chemistry II Laboratory (1)
- CHEM-350 Quantitative Analysis (3)
- CHEM-351 Quantitative Analysis Laboratory (2)
- CHEM-410 Biophysical Chemistry (3)
- CHEM-411 Biophysical Chemistry Laboratory (1)

- CHEM-460 Instrumental Analysis (3)
- CHEM-461 Instrumental Analysis Laboratory (2)
- CHEM-510 Advanced Physical Chemistry (3)
- CHEM-511 Advanced Physical Chemistry Laboratory (2)
- CHEM-550 Advanced Inorganic Chemistry (3)
- CHEM-552 Inorganic Chemistry Laboratory (1)
- CHEM-560 Biochemistry I (3)
- CHEM-561 Biochemistry II (3)
- MATH-221 Calculus I (4)
- MATH-222 Calculus II (4)
- MATH-313 Calculus III (4)
- PHYS-110 University Physics I 5:1 (4)
- PHYS-210 University Physics II 5:2 (4)
- At least 3 credit hours from the following:
  CHEM-490 Independent Study Project (1–6)
  CHEM-498 Honors: Senior Year (1–3)
  CHEM-499 Honors: Senior Year (1–3)

University Honors Program

All University Honors students must complete at least 12 credit hours of advanced-level (300-level and above) Honors courses including a 3 to 6 credit hour Honors Senior Capstone Project. Students may graduate with University Honors in the major if they complete at least 12 advanced-level Honors courses including the Senior Capstone Project in the department. Each department has three levels of University Honors requirements: Level I Options (100-200-level Honors classes); Level II Options (300-level and above Honors classes); and Level III Options (Honors Senior Capstone). The department Honors coordinator advises students in the University Honors Program regarding departmental options. For more information, go to www.american.edu/academic.depts/honors/ .

Minor in Biochemistry

- 35 credit hours with grades of C or better and at least 12 credit hours unique to the minor

Course Requirements

- BIO-110 General Biology I 5:1 (4)
- BIO-210 General Biology II 5:2 (4)
- BIO-300 Cell Biology with Laboratory (4)
- CHEM-110 General Chemistry I 5:1 (4)
- CHEM-210 General Chemistry II 5:2 (4)
- CHEM-310 Organic Chemistry I (3)
- CHEM-312 Organic Chemistry I Laboratory (1)
- CHEM-320 Organic Chemistry II (3)
- CHEM-322 Organic Chemistry II Laboratory (1)
- CHEM-508 Human Biochemistry Laboratory (1)
- CHEM-560 Biochemistry I (3)
- CHEM-561 Biochemistry II (3)

Minor in Chemistry

- 24 credit hours with grades of C or better and at least 12 credit hours unique to the minor

Course Requirements

- CHEM-110 General Chemistry I 5:1 (4)
- CHEM-210 General Chemistry II 5:2 (4)
- CHEM-310 Organic Chemistry I (3)
- CHEM-312 Organic Chemistry I Laboratory (1)
- CHEM-320 Organic Chemistry II (3)
- CHEM-322 Organic Chemistry II Laboratory (1)
- 8 credit hours from the following with the approval of the department chair:
  CHEM-350 Quantitative Analysis (3)
  CHEM-351 Quantitative Analysis Laboratory (2)
  CHEM-410 Biophysical Chemistry (3)
  CHEM-411 Biophysical Chemistry Laboratory (1)
  CHEM-460 Instrumental Analysis (3)
  CHEM-461 Instrumental Analysis Laboratory (2)
  CHEM-510 Advanced Physical Chemistry (3)
  CHEM-511 Advanced Physical Chemistry Laboratory (2)
  CHEM-560 Biochemistry I (3)
  CHEM-561 Biochemistry II (3)

Combined B.S. and M.S. in Chemistry

Admission to the Program

Undergraduate chemistry majors should apply for admission to the B.S./M.S. program by the end of the junior year. Admission is open to undergraduates whose overall grade point average and grade point average in chemistry courses is 3.00 or higher. Applications must be accompanied by two letters of recommendation and a statement of purpose.

Students should discuss their interest in the program with members of the faculty before submitting a formal application. Interested students are encouraged to enroll in CHEM-490 Independent Study Project to conduct independent study research before applying.

Requirements

- All requirements for the B.S. in Chemistry or Biochemistry
  Undergraduate students may apply up to 9 credit hours of approved graduate-level course work in chemistry and STAT-514 Statistical Methods to satisfy the requirements for both degrees.
- All requirements for the M.S. in Chemistry, including a minimum of 18 credit hours completed in residence in graduate status after the undergraduate degree has been awarded.

M.S. in Chemistry

Admission to the Program

Applicants must have earned a degree equivalent to fulfilling the requirements for a B.S. in Chemistry or Biochemistry with a 3.00 cumulative grade point average (on a 4.00 scale) in chemistry from a college accredited by the American Chemical Society or equivalent. Graduate Record Examination (GRE) scores are required. All applications must be approved by the faculty of the Department of Chemistry.

Degree Requirements

- 30 credit hours of approved graduate work
  The entire course of study must constitute a unified program. Each student must have a proposed curriculum approved by the department's academic advisor and the department chair within one semester after entering the program.
- Tool of research: an examination in German, French, Russian, or statistics.
- One comprehensive examination
- Research requirement:
  CHEM-797 Master's Thesis Research (6) *or*
  CHEM-797 Master's Thesis Research (3) *and*
  CHEM-691 Internship in Chemistry (3)
  with grades of B or better
  A thesis of publishable quality based on original chemical laboratory research must be presented at a public seminar and defended before the students's committee immediately thereafter. A research proposal must be accepted by the student's thesis committee at least one semester prior to the oral defense of the thesis.

Course Requirements

Skills Courses (9 credit hours)

- CHEM-602 Research Method Design (3)
- CHEM-605 Research Seminar (3)
- STAT-514 Statistical Methods (3) or speciality skills course approved by advisor

Concepts Courses (15 credit hours)

- 15 credit hours from the following:
  CHEM-510 Advanced Physical Chemistry (3)
  CHEM-520 Advanced Organic Chemistry I (3)
  CHEM-540 Advanced Analytical Chemistry (3)
  CHEM-561 Biochemistry II (3)
  CHEM-635 Topics in Biological and Organic Chemistry (3) (may be taken twice with different topic)
  CHEM-655 Topics in Inorganic and Analytical Chemistry (3) (may be taken twice with different topic)
  CHEM-660 Topics in Environmental Chemistry (3) (may be taken twice with different topic)

Research Courses (6 credit hours)

- CHEM-797 Master's Thesis Research (6)
  or
  CHEM-797 Master's Thesis Research (3) *and*
  CHEM-691 Internship in Chemistry (3)