

CHEMISTRY (BS)

Bachelor of Science

Chemistry is the study of matter and its transformations at a molecular level. Chemistry helps us understand how and why matter reacts in our world to produce new compounds. It is an area of study that is required by disciplines such as health science, biology, nanotechnology, material science, biochemistry, earth science, biotechnology, and chemical engineering. Discovery of new compounds and materials has been the key to technological and medical advancements from computers to drugs, all of which makes our world a better place in which to live. Skills in research, instrumentation, and communication are critical in the field of chemistry.

The chemistry major consists of core classes in general chemistry, organic chemistry, analytical chemistry, and physical chemistry. Students will also have advanced chemistry courses such as biochemistry, inorganic chemistry, instrumentation methods, and chemical research methods. Students will have hands-on experience with modern instrumentation such as PXRD (Powder X-ray Diffraction), AA (atomic absorption), and FTIR (Fourier Transform Infrared). Students with a chemistry degree can find employment in manufacturing, medicine, pharmaceuticals, government, technology, testing laboratories, and education.

Program Requirements

| Code | Title | Credits |
|---------------------------------|--|-----------|
| Required Core Courses | | |
| CHM-1310 & 1310Z | General Chemistry I and General Chemistry I Laboratory | 4 |
| CHM-1320 & 1320Z | General Chemistry II and General Chemistry II Laboratory | 4 |
| CHM-2410 & 2410Z | Organic Chemistry I and Organic Chemistry I Laboratory | 4 |
| CHM-2420 & 2420Z | Organic Chemistry II and Organic Chemistry II Laboratory | 4 |
| CHM-2450 & 2450Z | Analytical Chemistry and Analytical Chemistry Laboratory | 4 |
| CHM-3510 & 3510Z | Physical Chemistry I and Physical Chemistry I Laboratory | 4 |
| CHM-3520 | Physical Chemistry II | 3 |
| CHM-3555 & 3555Z | Biochemistry and Biochemistry Laboratory | 4 |
| CHM-3570 | Inorganic Chemistry of Materials | 4 |
| CHM-3650 & 3650Z | Instrumental Methods of Analysis and Instrumental Methods of Analysis Laboratory | 4 |
| CHM-4500 | Chemical Research Methods | 1 |
| Required Support Courses | | |
| MTH-2210 | Calculus and Analytic Geometry I | 4 |
| MTH-2220 | Calculus and Analytic Geometry II | 4 |
| PHY-2240 & 2240Z | Physics I (Calculus Based) and Physics I (Calculus Based) Laboratory | 4 |
| PHY-2250 & 2250Z | Physics II (Calculus Based) and Physics II (Calculus Based) Laboratory | 4 |
| Total Credits | | 56 |

Undergraduate Degree Requirements

A student who graduates from Aurora University with a baccalaureate degree will have met the following requirements:

- Completion of all requirements for an approved major (with no grades lower than "C").
- Overall completion of at least 120 semester hours of coursework with a GPA of at least 2.0 on a 4.0 scale (a course may be utilized only once in application toward a degree requirement, unless otherwise noted in the academic regulations). The 120 semester hours of coursework must include:
 - At least 52 semester hours completed at a senior college.
 - Residency Requirement - At least 30 semester hours completed at Aurora University, including the last 24 semester hours in the degree, and including at least 18 semester hours in the major. (Portfolio assessment credit, life and vocational experience credit, off-campus experience credit, examination credit, participation credit, and block credit, shall not count toward the residency requirement).
 - Upper-Division Requirement - A minimum of 30 semester hours numbered 3000 or above. Of these 30 semester hours, 15 semester hours must lie within the major and 15 semester hours must be completed at Aurora University.
- Completion of all General Education requirements (with no grades lower than "C"), as follows:
 - Quantitative and Formal Reasoning competency requirement (<https://catalog.aurora.edu/regulations-policy-catalog/academic-regulations-procedures/general-education/#satisfy-quantitative-reasoning-requirement>)
 - ENG-1000 Introduction to Academic Writing
 - IDS-1200 Discover What Matters or IDS-3040 Global Justice
 - IDS-1150 First Year Experience - *Not required for Transfer or AU Online students*)
 - Satisfactory participation in the junior-year mentoring and assessment process designed to guide students to successful completion of their degree and to encourage planning for next steps beyond graduation. (IDS-3500 Junior Mentoring Program I and IDS-3550 Junior Mentoring Program II - *Not required for ADC or AU Online students but may be designated electives for AU Online students admitted with fewer than 15 hours of transfer credit.*)
 - Distribution Requirements
Students will complete one approved course¹ from each of the following categories:
 - Artistic Literacy
 - Cultural Literacy
 - Human Inquiry
 - Scientific Inquiry

In addition to the above, ADC and Online students will also complete one approved course¹ from the following category:

- Discovery and Reflection

¹ Only courses that are approved to meet the distribution requirement can be used toward this requirement. See the list of approved courses (<https://catalog.aurora.edu/regulations-policy-catalog/academic-regulations-procedures/general-education/#approved-courses-gen-ed-distribution>) for available options. Courses taken to meet

distribution requirements are 4 semester hours apiece, with the following exceptions:

- An approved transfer course of at least 2.50 semester hours can be used to satisfy a distribution requirement.
- Courses with co-requisite laboratory components may be used to satisfy a distribution requirement, provided that the student successfully complete both the three-credit-hour course and the single-credit-hour lab component.

Learning Outcomes

The Chemistry major includes four outcomes to address conceptual knowledge, laboratory skills, communication skills, and an understanding of ethical/social issues as they pertain to the chemical sciences.

- a. Students will demonstrate understanding and application of conceptual and theoretical knowledge of foundational areas of chemistry.
 - Understand and apply basic concepts of general chemistry such as matter, atomic structure, hybridization, thermodynamics, chemical reactions, kinetics, acid and base, and redox chemistry
 - Understand and apply basic concepts of organic chemistry such as functional groups, bonding, reaction types, mechanisms, synthesis, and spectroscopy
 - Understand and apply basic concepts of analytical chemistry such as quantitative chemical analysis, titrimetric analysis, statistics treatment of data, and instrumental methods
 - Understand and apply basic concepts of physical chemistry such as chemical kinetics, thermodynamics, mechanisms, and quantum mechanics
 - Understand and apply basic concepts of inorganic chemistry such as symmetry, bonding, and chemical reactivity
 - Understand experimental design
- b. Students will demonstrate technical instrumentation skills including those for research methods.
 - Accurately apply and demonstrate safety laboratory protocol for the experiments
 - Demonstrate sample preparation and accurate data recording
 - Demonstrate the use of equipment and glassware in chemistry laboratory
 - Demonstrate the understanding of chemistry research methods from data collection and analysis
- c. Students will demonstrate science communication skills.
 - Communicate application of chemistry topics through writing assignments such as lab reports, proposal writing, white paper, and public communication infographics
 - Communicate application of chemistry topics through oral presentations
 - Communicate application of chemistry topics through collaborative projects with diverse team members
- d. Students will demonstrate understanding of ethics and social issues in the sciences.
 - Demonstrate the ability to apply chemical concepts to global issues relating to our environment