Program Level Learning Outcomes for the Chemistry and Biochemistry Majors

Preamble

Majors in chemistry and biochemistry provide training for students planning careers in the chemical and biological sciences and also for those in biology, health related disciplines, earth sciences, secondary education, business, journalism and law. Approximately one quarter of the UO undergraduate population will take a course in the Department of Chemistry and Biochemistry. The Department’s curriculum is designed to satisfy the diverse needs of all these students.

Chemistry and biochemistry graduates complete an integrated, rigorous program that includes foundational course work in chemistry and biochemistry and additional course work in related fields. The ACS-certified degree further emphasizes laboratory experience and the development of professional skills. Undergraduate research and other educational activities outside the traditional classroom are essential components of these majors. Undergraduate majors also benefit from taking graduate courses in synthetic, physical, materials, computational chemistry, biochemistry molecular biology and modern instrumental techniques.

Graduates of our program will have a robust set of fundamental competencies that are knowledge-based, performance/skills-based, and affective.

Foundational knowledge/theory

All our graduates will be able to:
• Master a broad set of chemical concepts concerning the fundamentals in the basic areas of the discipline (organic, inorganic, analytical, physical and biochemistry). Students will demonstrate an understanding of structure, chemical properties, and reactions of chemicals and biomolecules.
• Demonstrate a firm foundation in the conceptual, quantitative, and computational thinking that underlies the theories and models that form the basis for reasoning about molecular systems. Students should be able to connect this theoretical understanding to the experimental methods used to test those theories and models.
• Demonstrate excellent critical thinking and problem solving abilities. S/he will be able to integrate chemical concepts and ideas learned in lecture courses with skills learned in laboratories to formulate hypotheses, propose and perform experiments, collect data, compile and interpret results and draw reasonable and logical conclusions. In addition, graduates will be able to rationally estimate the solution to a problem, apply appropriate techniques to arrive at a solution, test the correctness of the solution, and interpret their results.
Performance/Skills-Based

All our graduates will be able to:

• Employ critical thinking and the scientific method to design, carry out, record, analyze and communicate the results of chemical/biochemical experiments. This includes the ability to identify or create an appropriate model, formulate a hypothesis, choose an appropriate set of tools and techniques, and design an experiment that tests the hypothesis and analyze the results from that experiment drawing sound scientific conclusions from the results obtained. In this context, they must be able to locate, identify and critically evaluate the chemical/biochemical literature.

• Develop the interpersonal skills to function cooperatively in a team setting.

• Handle, synthesize, purify, and characterize new and existing substances. This includes knowing the proper procedures and regulations for the safe handling, use and disposal of chemicals.

• Be proficient in the use of both classical and modern tools (e.g., instrumentation, techniques, software) for analysis of chemical systems. Demonstrate effective scientific communication skills, both orally and in writing, to a range of audience levels and for a variety of purposes.

• Understand how scientific information is shared between peers in modern science, including responsible conduct for acknowledging prior and current contributions.

Affective

All our graduates will be able to:

• Demonstrate an awareness of the benefits and impacts of chemistry related to the environment, society, and other disciplines outside the scientific community. Be prepared to contribute solutions to society’s challenges at the intersection of science and society.

• Successfully pursue their career objectives in advanced education in professional and/or graduate schools, in a scientific career in government or industry, in a teaching career in the school systems, or in a related career following graduation.

• Understand and apply ethics and values to all professional activities.