Program Learning Outcomes
Department of Chemistry and Biochemistry
California State University, Los Angeles

Program Goals: Overview
Students obtaining a baccalaureate chemistry or biochemistry degree should have upon graduation:

- General familiarity with the following areas in chemistry: analytical, biochemical, inorganic, organic and physical
- The ability to work effectively and safely in a laboratory environment
- The ability to use the power of computers in applications in chemistry
- The ability to communicate effectively, both orally and in writing
- The ability to think critically and analyze chemical problems
- The ability to work in teams as well as independently
- The understanding of how science and society are linked and the importance of science in modern society
- The ability to initiate their career following graduation

The preceding goals can partially be met by:

- Having timely and effective advising of students
- Providing capstone experiences for students with independent projects strongly encouraged
- Providing opportunities for students and faculty to interact with alumni and with professional chemists
- Having dialogues with colleagues in departments servicing chemistry students
- Providing modern laboratory experiences
- Providing modern computing resources involving chemical applications

Program Goal 1. Knowledge of Chemical Principles and Facts; Appreciation for Chemistry and Biochemistry as Disciplines
Students obtaining a baccalaureate degree in chemistry degree should be able to:

- Demonstrate a mastery of critical thinking skills, problem-solving skills and data analysis skills leading to the ability to develop and test a hypothesis
- Design experiments or model systems to test hypotheses
- Apply fundamental chemical principles to gather and explain data
- Assess the relative validity of several possible solutions to a problem
- Demonstrate knowledge of chemical principles appropriate to a chemistry degree program
- Demonstrate a mastery of factual chemical knowledge concerning the properties of substances, molecules and atoms

Program Goal 2. Laboratory Knowledge and Skills
Students obtaining a baccalaureate degree in chemistry or biochemistry should have upon graduation:

- The basic analytical and technical skills to work effectively in the various fields of chemistry
- The skill to perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions
• The ability to synthesize, separate and characterize compounds using published reaction protocols, standard laboratory equipment, and modern instrumentation
• Knowledge and understanding of the issues of safety regulations, ethics and societal issues in the use of chemicals in their laboratory work

**Program Goal 3. Computer, Library and Oral and Written Communication Information Skills**

Students obtaining a baccalaureate degree in chemistry or biochemistry:

• Should be able to demonstrate effective use of the library and other information resources in chemistry, including:
  o Finding chemical information utilizing the primary literature
  o Critically and ethically evaluating chemical information
  o Finding and evaluating chemical information utilizing secondary sources such as the Internet

• Should be able to demonstrate effective use of computers in chemistry applications, including:
  o The use of a computer as a tool in writing, drawing chemical structures and data analysis to communicate scientific information
  o Being versed with the applications of computers in the modeling and simulation of chemical phenomena
  o Demonstrating an appreciation of the applications of computers in data acquisition and processing

• Be able to communicate scientific information via technical writing and oral presentations. Students must practice effective writing and oral communication throughout the chemistry curriculum

• Be able to communicate scientific information in oral and written formats to both scientists and nonscientists

**Program Goals 4., Ethics and Society in Science**

Students obtaining a baccalaureate degree in chemistry or biochemistry should:

• Have an understanding of current ethical issues in chemistry and be able to apply ethical principles in classes and research

• Be able to express the impact of science and society in both specific and general terms

**Program Goal 5: Quantitative Reasoning Skills**

Students obtaining a baccalaureate chemistry or biochemistry degree should be able to:

• Demonstrate quantitative reasoning skills (proficiency in algorithmic and calculation skills

• Ability to accurately collect and interpret numerical data

• Ability to solve problems competently using extrapolation, approximation, precision, accuracy, rational estimation and statistical validity

• Ability to relate theories involving numbers and the practice of the theory

• Understanding application of the scientific method (formulating hypotheses and arriving at appropriate answers and conclusions)