

MAJOR IN CHEMICAL AND BIOLOGICAL ENGINEERING, ADVANCED MATERIALS CONCENTRATION

An education in chemical and biological engineering provides the intellectual foundation for our graduates to work on solutions to society's biggest problems (both current and future problems). For example, our graduates could go on to develop innovative materials and products, to design new devices to improve animal or human health or environmental health, and to design processes for the safe production of chemicals and biochemicals, the production of alternative energy sources, and prevention of hazardous waste. The possibilities are limitless. Chemical and biological engineering is a powerful blend of basic sciences and the skills to quantitatively describe, predict, and control all changes of matter. Our curriculum is based on the sciences of physics, chemistry, biology, and mathematics. It includes engineering science and design methods, as well as humanities and social sciences. The Chemical and Biological Engineering program provides an environment that promotes a sense of professionalism, the development of project management skills, and an appreciation for the value of life-long learning. Graduates of our program are well prepared to enter a variety of professions, or to pursue further advanced education. The broad, strong scientific basis of chemical and biological engineering has kept our graduates consistently near or at the top in salary and demand among B.S. graduates.

Advanced Materials Concentration

The Advanced Materials concentration aims to educate students on understanding the relationship between the properties of a material and its molecular structure. This knowledge will provide students with the principles and tools to either modify existing materials for enhanced performance, or to generate new materials with tailored properties for addressing issues of high relevance in modern society, such as those related to efficiency, health, and sustainability. Examples include smart biomaterials that are responsive to external stimuli, bio-inspired materials, biodegradable and sustainable materials, materials for additive manufacturing, nano-engineered materials, and materials for extreme environments. The coursework in this concentration encompasses a wide range of disciplines, including polymer science and engineering, nanotechnology, biomaterials science, and tissue engineering.

The Chemical and Biological Engineering major is accredited by the Engineering Accreditation Commission of ABET (<http://abet.org>).

Learning Objectives

Upon successful completion, students will be able to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Communicate effectively with a range of audiences.
4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the

impact of engineering solutions in global, economic, environmental, and societal contexts.

5. Function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives.
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.