

## **Chemical and Biomolecular Engineering**

### **Undergraduate Education Mission Statement**

To educate future leaders in chemical engineering who effectively combine their broad knowledge of mathematics, physics, chemistry and biology with their engineering analysis and design skills for the creative solution of problems in chemical and biological technology and for the synthesis of innovative (bio)chemical processes and products.

### **Undergraduate Program Educational Objectives**

The Educational Objectives of the Chemical Engineering Programs are to produce chemical and biomolecular engineering alumni who:

1. Draw readily on a rigorous education in mathematics, physics, chemistry, and biology in addition to the fundamentals of chemical engineering to solve creatively problems in chemical and biological technology.
2. Incorporate social, ethical, environmental and economical considerations, including the concept of sustainable development, into chemical and biomolecular engineering practice.
3. Lead or participate successfully on multidisciplinary teams assembled to tackle complex multifaceted problems that may require implementation of both experimental and computational approaches and a broad array of analytical tools.
4. Pursue graduate study and achieve a MS or PhD in the sciences and engineering, and/or achieve success as professionals in chemical and biomolecular engineering as well as related fields including business, medicine and environmental protection.

### **Undergraduate Program Outcomes**

Chemical engineering graduates will demonstrate

- (a) An ability to apply knowledge of mathematics, physics, chemistry, biology, and chemical and biological engineering, especially for the integration of molecular- to micro-scale information into macro-scale analysis and design of chemical and biological processes and products
- (b) An ability to design and conduct experiments, to apply modern computational approaches, and to analyze and interpret data
- (c) An ability to design a chemical or biological system, component, or process that meets technical and economical design objectives with consideration of environmental, social and ethical issues, as well as sustainable development goals
- (d) An ability to function on multi-disciplinary teams
- (e) An ability to identify, formulate and solve complex chemical and biological engineering problems
- (f) An understanding of professional and ethical responsibility
- (g) An ability to communicate effectively, both orally and in writing
- (h) An understanding of the impact of engineering solutions in a global and societal context
- (i) A recognition of the need for, and an ability to engage in life-long learning
- (j) A knowledge of contemporary issues
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice, including chemical and biochemical analytical systems and computational approaches
- (l) A working knowledge of advanced chemistry and biology and of chemical reaction engineering
- (m) A working knowledge of thermodynamics and of material and energy balances
- (n) A working knowledge of transport phenomena and of separation operations
- (o) A working knowledge of process dynamics and control