

MECHANICAL ENGINEERING - CHEMICAL ENGINEERING CONCENTRATION

Department: Mechanical Engineering (<https://catalog.bradley.edu/undergraduate/engineering-technology/mechanical-engineering/>)

The baccalaureate program in mechanical engineering is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org> (<https://www.abet.org/>).

Mission and Objectives

The mission of the Mechanical Engineering Department is to produce mechanical engineering graduates who possess the acumen, competence, and skills needed to enter, succeed, and lead in professional practice and/or graduate school. The goal is to provide a learning and nurturing environment that stimulates faculty and students to collaborate in solving practical problems, motivates lifelong learning, and helps them reach their highest potential.

The program educational objectives of the department are that alumni meet the following goals within a few years of graduation from the mechanical engineering program:

1. Are in professional practice or are pursuing advanced studies in mechanical engineering or related fields.
2. Are using their educational foundation to engage in lifelong learning
3. Are engaged and adding value in multidisciplinary environments through local, regional, national or international practice to meet global technological and societal changing needs.

Student Outcomes

In order to meet these program educational objectives, students graduating from Bradley's mechanical engineering program will attain the following outcomes.

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to 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. an ability to communicate effectively with a range of audiences
4. an ability to 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. an ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Mechanical engineering is the broadest and most versatile of the engineering professions. Mechanical engineers are particularly concerned with the application of science and technology to translate ideas and theories into realistic engineering solutions that satisfy the needs of society, by using a combination of human, material, and economic resources. The broad discipline of mechanical engineering can be organized into two main branches, namely mechanical systems and thermal systems.

- Within mechanical systems, the following specialties may be pursued: applied mechanics, dynamic and control systems including robotics, materials, nanotechnology, and micro-electromechanical systems (MEMS).
- Within thermal systems, the following specialties may be pursued: energy systems, including aerospace, diesel and gasoline engine power, gas turbines, and solar energy, fluid dynamics, heat transfer, and air pollution control.
- Spanning both branches are the following specialties: bioengineering and computer and microprocessor applications

The concentration in chemical engineering is designed to introduce principles of chemical engineering to students majoring in Mechanical Engineering (<https://catalog.bradley.edu/undergraduate/programs/mechanical-engineering-major/>) and other disciplines. Completing this concentration will help students to understand chemical engineering aspects of industrial processes and pursue careers in process industries or enter a graduate program in chemical engineering.

The Chemical Engineering Concentration requires the complete Mechanical Engineering curriculum with the following exceptions and will require an additional two credit hours for graduation (132 credit hours):

The Chemical Engineering concentration replaces the following courses:

- Second chemistry course: must be CHM 116 General Chemistry II
- M E 301 Thermodynamics I is replaced with CHE 301 Chemical Engineering Thermodynamics
- M E 302 Thermodynamics II is replaced with CHE 302 Material and Energy Balances
- M E 415 Introduction to Heat Transfer is replaced with CHE 415 Transport Phenomena I

Code	Title	Hours
Approved Chemical Engineering Concentration Technical Electives		
CHM 117	General Chemistry II Laboratory	1.0
Select one of the following Organic Chemistry courses:		3.0-4.0
CHM 250	Concepts in Organic Chemistry	
CHM 252	Organic Chemistry I	
CHM 253	Organic Chemistry Laboratory I	
CHE 321	Chemical Reaction Engineering	
CHE 416	Transport Phenomena II	
Additional Technical Electives, depending on Organic Chemistry (select from the following):		4.0-5.0
See list under Approved Technical Elective Courses ¹		
CHM 256	Organic Chemistry II	
CHM 320	Quantitative Analysis	
CHM 360	Biochemistry	
CHM 416	Environmental Chemistry	
CHM 420	Instrumental Analysis	

CHM 440	Materials Chemistry
CHM 470	Physical Chemistry I
CHM 558	Topics in Organic Chemistry (Polymer Chemistry)

¹ Approved Technical Electives courses may be found here (<https://catalog.bradley.edu/undergraduate/programs/mechanical-engineering-major/>).