THE DISCIPLINE

Through discovery, design, creation, and transformation, chemical engineering is the engineering of systems at scales ranging from the molecular to the macroscopic that integrate chemical, physical, and biological elements in order to develop processes and produce materials and products for the benefit of society. Chemical Engineers are at the forefront of solving the major challenges to our society, from energy system decarbonization, ensuring environmental sustainability, and enabling flexible manufacturing for a circular economy, to discovering novel and improved materials for a variety of applications (e.g., batteries), and engineering targeted and accessible medicines.

STUDENT OPPORTUNITIES

Our Chemical Engineering students engage with nationally recognized faculty in a challenging and supportive environment. In addition to their academic coursework, they participate in many “beyond-the-classroom” experiences, including:

Industrial Experience: Most of our students participate in paid internships and co-ops (>20/hr) that allow them to gain the “real world” experience that prepare them for future careers in industry. Our major employers over the past ten years span a wide range of industrial sectors (below, left image).

Research Experience: Due to the low ~10:1 student-to-faculty ratio, significant research funding, and large research groups, our students have opportunities to conduct cutting edge research under the guidance of our faculty. Click on this link to see the list of faculty and explore their research areas, which fit broadly into several areas (below, middle image).

Study Abroad Experience: In addition to traditional study abroad experiences available to our students, our department has developed two Maymester international courses run by Chemical Engineering faculty: Next Energy in Germany and Sustainable Development in Engineering in Thailand (above, right image). In these courses students explore the course topics from a country-specific perspective, and then experience the actual practice of those concepts through a 2-week trip abroad.

Professional and Leadership Experience: Our department has a very active student chapter of the American Institute of Chemical Engineers (http://www.aiche.org/), which fosters their professional development and gives them the opportunity to network with professionals from across the country. A recent highlight was our 1st place in the ChemE Cube competition at the 2023 AIChE Annual Meeting in Orlando (https://www.aiche.org/community/awards/cheme-cube-competition), where our students designed a device that captures carbon dioxide directly from the air (right).
Comprehensive Degree

Building on the foundational math and science courses, the B.S.E. in Chemical Engineering covers the core of chemical engineering, preparing students for either an industrial position or to pursue advanced degrees in the field. These courses are:

**MATH AND SCIENCE**
- Calculus I and II
- Vector Calculus
- Differential Equations
- General Chemistry I and II and Labs
- Organic Chemistry 1 and 2 and Labs
- Physics 1 and 2 and Labs

**CHEMICAL ENGINEERING**
- Chemical Engineering Kinetics
- Introduction to Chemical Engineering
- Chemical Process Principles
- Thermodynamics
- Fluid Mechanics
- Heat-Flow Analysis
- Mass Transfer
- Separation Process Design
- Computational Methods for Engineers
- Chemical Engineering Lab I, II
- Chemical-Process Analysis and Design I, II
- Chemical-Process Dynamics and Control
- Process Safety, Health, and Loss Prevention

**ELECTIVES**
- Chemistry and Chem. Lab Electives
- Computer Programming Elective
- Engineering Electives
- Technical Electives
- Professional Development Elective

**GENERAL EDUCATION**
- Critical Reading and Composition
- Rhetoric and Composition
- Persuasive Communication
- Information Literacy
- Historical Thinking
- Foreign Language
- Social Sciences
- Values, Ethics and Social Responsibility
- Aesthetic and Interpretive Understanding
- Career Elective

Flexible Curriculum

A large number of elective credits allow students to tailor the undergraduate experience to their specific interests. Students may pursue concentrations (e.g., Energy, Materials, Biomolecular Engineering, etc.) or minors (Business Administration, Data Science, Chemistry, Computer Science, Math, etc.) within the required credit hours for the B.S.E degree. In addition, these electives can allow for more college coursework taken during high school to count towards the degree. Finally, Accelerated Graduate Study allows students to complete both B.S.E. and M.S. Degrees within five years.

**CONCENTRATIONS**
- Energy
- Materials
- Biomolecular Engineering
- Environmental Engineering
- Interdisciplinary Engineering
- Numerical Methods/Computing

**POPULAR MINORS**
- Business Administration
- Data Science
- Computer Science
- Chemistry
- Math

For additional information about Chemical Engineering and other programs in engineering and computing, visit [cec.sc.edu](http://cec.sc.edu).