

# CHEMICAL ENGINEERING

## UNIVERSITY OF SOUTH CAROLINA

### 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.

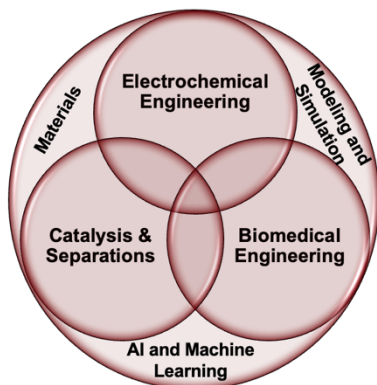
### STUDENT OPPORTUNITIES

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:



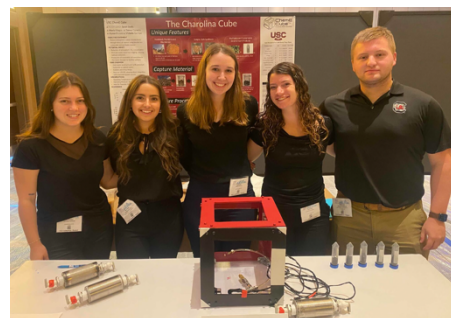
**Industrial Experience:** Most of our students participate in paid ( $\geq$ \$25/hr) full-time summer internships and multi-semester co-ops that allow them to gain the “real world” experience that prepares them for future careers in industry. Our major employers over the past ten years span a wide range of industrial sectors (below, left image).

**Research Experience:** Due to the low  $\sim$ 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 ChE faculty: Energy and Sustainability 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 1<sup>st</sup> place in the ChemE Cube competition at the 2023 AIChE Annual Meeting in Orlando (<https://www.aiche.org/rapid/education-workforce-development/cheme-cube-competition>), where our students designed a device that captures carbon dioxide directly from the air (right).



# CHEMICAL ENGINEERING

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### 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

#### ELECTIVES

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

#### CHEMICAL ENGINEERING

Introduction to Chemical Engineering  
Chemical Process Principles  
Thermodynamics  
Fluid Mechanics  
Heat-Flow Analysis  
Mass Transfer

#### GENERAL EDUCATION

Critical Reading and Composition  
Rhetoric and Composition  
Persuasive Communication  
Information Literacy  
Historical Thinking

Chemical Engineering Kinetics

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

Foreign Language

Social Sciences

Values, Ethics and Social Responsibility

Aesthetic and Interpretive Understanding

Career Elective

~27

AVERAGE SIZE OF  
CHEMICAL ENGINEERING  
UNDERGRADUATE CLASS

~200

UNDERGRADUATE CHEMICAL  
ENGINEERING STUDENTS

### 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  
Chemistry  
Data Science  
Environmental and Sustainability Engineering  
Computer Science  
Math



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



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