

## **Engineering Science, B.S.**

The Bachelor of Science in Engineering Science Program trains future leaders who will develop and implement sustainable solutions to global challenges. It does so by employing high quality teaching and engaged learning, creative research, community outreach, entrepreneurship and innovation in engineering sciences and design.

Engineering science is a broad-based, interdisciplinary area of study that integrates scientific and mathematical concepts, and engineering principles with the arts, humanities and social sciences, to sustainably solve contemporary challenges and advance the well-being of global society.

Engineering science is ideal preparation for graduates who will lead national and international multidisciplinary teams on a diverse array of engineering projects in industry as well as through entrepreneurial endeavors. Engineering science is also an excellent background for those who wish to pursue careers in other professions such as law, education, medicine, business, politics and public service.

At Coastal Carolina University, engineering science is offered as an undergraduate engineering degree through the Gupta College of Science. The engineering science program is a four-year curriculum that includes a general education component, foundational mathematics and science and engineering courses, two-course minor cornerstone design sequence and an area of concentration. The engineering science program currently offers a physics concentration; electrical, civil and other concentrations are being developed. All areas of concentration culminate in a two-term major capstone design experience. Upon completing all requirements, students are awarded a Bachelor of Science (B.S.) in engineering science with their selected area of concentration.

The vision of the engineering science program is to:

- Increase participation of underrepresented and minority groups and address the persistent degree attainment gap in engineering
- Create a learning and professional environment where diversity is celebrated as seminal to program success and where all students, particularly underrepresented and minority groups, thrive and excel
- Develop future leaders who are knowledgeable and are able to apply scientific and engineering principles to impact the well-being of the global society and the environment.

### **Program Educational Objectives**

The engineering science program prepares undergraduate students for employment, entrepreneurship and/or advanced studies. The program provides students with a broad education that emphasizes excellence in the application of scientific and engineering principles to sustainably solve societal grand challenges. The program's three primary constituencies are: industry, alumni and academia.

Within 3-5 years of graduation, graduates are expected to:

- Engage in ongoing professional development activities including but not limited to graduate study, leadership training, certification and licensure
- Foster future generations of engineers through mentoring, service and outreach
- Assume leadership roles in professional and/or community life
- Be productive, responsible, healthy citizens with a global perspective.

### **Student Learning Outcomes**

After completing the program in engineering science, students will demonstrate:

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

### **Degree Requirements (129 Credits)**

#### **Core Curriculum Requirements**

Core Curriculum (38-40 Total Credit Hours)

#### **Graduation Requirements**

- Graduation Requirements (3-6+ Credits) \*

#### **Foundation Courses (32-43 Credits) \***

Complete the following courses:

- ENGR 101 - Inquiring Minds Want to Design: An Introduction to Engineering (3 credits)\*
- ENGR 102 - Engineering Graphics Communication (3 credits)
- PHYS 211 - Essentials of Physics I (3 credits) AND
- PHYS 211L - Essentials of Physics I Laboratory (1 credit)

- PHYS 214 - Fundamentals of Physics II (3 credits) AND
- PHYS 214L - Fundamentals of Physics II Laboratory (1 credit)
- CHEM 111 - General Chemistry I (3 credits) \* AND
- CHEM 111L - General Chemistry Laboratory I (1 credit) \*
- MATH 160 - Calculus I (4 credits) \* OR
- MATH 160A - Calculus I A (2 credits) AND
- MATH 160B - Calculus I B (2 credits)
- MATH 161 - Calculus II (4 credits) OR
- MATH 161A - Calculus II A (2 credits) AND
- MATH 161B - Calculus II B (2 credits)
- MATH 260 - Calculus III (4 credits)
- MATH 320 - Elementary Differential Equations (3 credits)
- PHIL 102 - Introduction to Ethics (3 credits) \*
- CSCI 135 - Introduction to Programming (3 credits)
- STAT 201 - Elementary Statistics (3 credits) \*AND
- STAT 201L - Elementary Statistics Computer Laboratory (1 credit) \*

Note:

\* Course credit hours only count once toward the total university graduation credit hour requirements. Click on Credit Sharing for more information.

### **Major Requirements (52 Credits)**

Complete the following courses:

- ENGR 199 - Cohort Grand Challenge I (1 credit)
- ENGR 299 - Cohort Grand Challenge II (1 credit)
- ENGR 201 - Engineering Problem Solving (3 credits)
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- ENGR 234 - Engineering Mechanics I: Statics (3 credits)
- ENGR 244 - Engineering Mechanics II: Dynamics (3 credits)
- ENGR 235 - Electric Circuits (3 credits)
- ENGR 250 - Communicating STEM (3 credits)
- ENGR 302 - Materials Science for Engineers (3 credits)
- ENGR 323 - Engineering Thermodynamics and Heat Transfer (3 credits)
- ENGR 333 - Engineering Fluids Mechanics (3 credits)
- ENGR 399 Q - Integrated Science and Design (2 credits)
- ENGR 495 - Engineering Internship (1-10 credits)
- ENGR 499 Q - Senior Design (2 credits)

**Professional Enhancement Electives: Complete 7 credit hours or equivalent 350 working hours in any of the following (7 Credits):**

- ENGR 397 - Independent Research (1-7 credits)

- ENGR 495 - Engineering Internship (1-10 credits)
- UNIV 495 Q - Internship (1 to 12 credits)

AND/OR any of the below, with department approval:

- CCU Education Abroad
- CCU International Internship
- Co-operative Education
- Service Learning
- Graduate Course
- Professional Certification
- Professional Course

Select ONE Program Concentration and complete the ~~associated three (3) required and one (1) elective course~~: **required courses**:

Physics Concentration (12 Credits)

Complete the following required courses in the Physics Concentration (9 Credits):

- PHYS 310 - Mathematical Methods for Physicists and Engineers (3 credits)
- PHYS 351 - Computational Methods for Physicists and Engineers (3 credits)
- PHYS 352 - Experimental Methods for Physicists and Engineers (3 credits)

Choose one from the following (3 Credits):

- ENGR 315 - Electric Power and Renewable Energy (3 credits)
- ENGR 321 - Electronics (3 credits)
- ENGR 450 - Radiation Detection and Measurement (3 credits)

Innovation Design Concentration (12 Credits)

Complete the following required courses in the Innovation Design Concentration (12 Credits):

- MGMT 324 - Idea Generation in the Innovation Process (3 credits)
- MGMT 325 - Communicating Novel Ideas in Dynamic Settings (3 credits)
- MGMT 424 - Feasibility and Commercialization of Novel Ideas (3 credits)
- ENGR 356 - Supply Chain Engineering (3 credits)

**Electives (0 Credits)**

**Total Credits Required: 129**