Engineering Science, B.S.

**~~Mission Statement~~**

~~The mission of the Engineering Science program is to train problem solvers who can integrate science and engineering principles. Engineering science is the study of the combined disciplines of engineering, the applied sciences, and mathematics. This combination of disciplines results in graduates that can bring a deep understanding of science and broad training in engineering design and practice together to solve new challenges. The focus of the program is on general problem solving combined with fundamental scientific and engineering skills and content knowledge, resulting in graduates having the ability to keep pace with the continuous innovations occurring with technology, and the multidisciplinary approach required for many emerging technical challenges. The program’s faculty is committed to providing meaningful undergraduate experiences for both majors and non-majors through high-quality, student-centered teaching and undergraduate research/design mentoring. Students completing a degree in Engineering Science should be well prepared for either a general engineering career or graduate school in engineering, applied science, or a related discipline.~~

**~~Student Learning Outcomes~~**

~~After completing the program in Engineering Science, students will demonstrate:~~

~~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 and inclusive 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.~~

~~The Engineering Science program at CCU focuses on the application of the applied sciences integrated with engineering principles to create technical solutions to problems. Through either a major or minor, students can easily merge their interest in engineering with other disciplines taught in the College of Science such as biology, chemistry, computer science, marine science, mathematics and/or physics. Engineering Science students can also pursue one of the dual-degree engineering programs with either Clemson University or Horry Georgetown Technical College.~~

~~All students pursuing a major in Engineering Science complete a foundation in mathematics and basic sciences, followed by more advanced courses in engineering and applied science. The major requirements focus on the following core academic competencies: (1) problem solving and communication, (2) epistemological methodologies, (3) design practice, and (4) technical practice. Students pursuing the minor in Engineering Science complete a basic curriculum in general engineering. Students must earn a grade of~~ **~~C or better~~** ~~in all Foundation and Major Requirement courses.~~

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-term first-year design experience and an area of concentration. The engineering science program currently offers a physics concentration; electrical and other concentrations are being developed. All areas of concentration include a culminating 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 its 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:

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 and inclusive 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.

**Degree Requirements (~~120~~129 Credits)**

**Core Curriculum Requirements**

Core Curriculum (38-40 Total Credit Hours)

**Graduation Requirements**

Graduation Requirements (3-7+ Credits) \*

**Foundation Courses (~~27-45~~32-43 Credits) \***

Complete the following courses:

ENGR 101 - ~~Introduction to Engineering~~ 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 213 - Fundamentals of Physics I (3 credits) AND~~

~~PHYS 213L - Fundamentals 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) \*

MATH 161 - Calculus II (4 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)

**~~Choose one from the following: (3-4 Credits)~~**

~~MATH 174 - Introduction to Discrete Mathematics (3 credits)~~

~~MATH 242 - Modeling for Scientists I (3 credits) AND~~

~~MATH 242L - Modeling for Scientists I Laboratory (1 credit)~~

~~MATH 344 - Linear Algebra (3 credits)~~

STAT 201 - Elementary Statistics (3 credits) \* AND

STAT 201L - Elementary Statistics Computer Laboratory (1 credit) \*

**~~Choose one from the following (4 Credits)~~**

~~CHEM 112 - General Chemistry II (3 credits) AND~~

~~CHEM 112L - General Chemistry Laboratory II (1 credit)~~

~~MSCI 111 - Introduction to Marine Science (3 credits) \* AND~~

~~MSCI 111L - The Present-Day Marine Environment Laboratory (1 credit) \*~~

~~BIOL 121 - Biological Science I (3 credits) \* AND~~

~~BIOL 121L - Biological Science I 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 (~~45-50~~52 Credits)**

Complete the following courses:

ENGR 199 – Cohort Grand Challenge I (1 credits)

ENGR 299 – Cohort Grand Challenge II (1 credits)

ENGR 201 - Engineering Problem Solving (3 credits)

~~ENGR 202 - Engineering Graphics (3 credits)~~

ENGR 234 – Engineering Mechanics I: Statics (3 credits)

ENGR 244 – Engineering Mechanics II: Dynamics (3 credits)

ENGR 235 - Electric Circuits (3 credits)

ENGR 302 – Materials Science for Engineers (3 credits)

ENGR 323 – Engineering Thermodynamics (3 credits)

ENGR 333 – Engineering Fluid Mechanics (3 credits)

PHYS 250 - Communicating STEM (3 credits)

~~PHYS 310 - Mathematical Methods in Physics (3 credits)~~ (moved, see below)

~~PHYS 351 - Computational Methods in Physics (3 credits)~~ (moved, see below)

~~PHYS 352 - Experimental Methods in Physics (3 credits)~~ (moved, see below)

ENGR 495 – Engineering Internship (3 credits)

ENGR 399 Q~~\*~~ - Integrated Science and Design ~~(1 to 3 credits) (3 credits required)~~(2 credits)

ENGR 499 Q - Senior Design ~~(3 credits)~~(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 (1-7 credits)

UNIV 495 – University Internship (1-7 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 courses:**

1. **Physics Concentration (12 Credits)**

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

PHYS 310 - Mathematical Methods in Physics (3 credits)

PHYS 351 - Computational Methods in Physics (3 credits)

PHYS 352 - Experimental Methods in Physics (3 credits)

**Choose ~~four~~one from the following: (~~12-16~~3 Credits)**

ENGR 315 - Electric Power and Renewable Energy (3 credits)

ENGR 321 - Electronics (3 credits)

~~ENGR 430 - Fluid Mechanics (3 credits)~~

ENGR 450 - Radiation Detection and Measurement (3 credits)

~~PHYS 301 - Analytical Mechanics (3 credits)~~

~~PHYS 302 - Electricity and Magnetism (3 credits)~~

~~PHYS 303 - Quantum Mechanics (3 credits)~~

~~PHYS 341 - Thermodynamics and Statistical Mechanics (3 credits)~~

~~CSCI 210 - Computer Organization and Programming (3 credits)~~

~~CSCI 310 - Introduction to Computer Architecture (3 credits)~~

~~CSCI 330 - Systems Analysis & Software Engineering (3 credits)~~

~~CSCI 473 - Introduction to Parallel Systems (3 credits)~~

~~CSCI 485 - Introduction to Robotics (3 credits)~~

~~Other 300 level or above Science or Engineering courses with prior approval from the department (3-4 Credits)~~

**Electives (~~0-20~~ 0 Credits)**

**Total Credits Required: ~~120~~ 129**