NEW PROGRAM PROPOSAL FORM

Name of Institution: Coastal Carolina University

Name of Program (include degree designation and all concentrations, options, or tracks):

Engineering Science B.S., Physics Concentration

Program Designation:

☐ Associate's Degree ☐ Master's Degree

☒ Bachelor's Degree: 4 Year ☐ Specialist

☐ Bachelor's Degree: 5 Year ☐ Doctoral Degree: Research/Scholarship (e.g., Ph.D. and DMA)

☐ Doctoral Degree: Professional Practice (e.g., Ed.D., D.N.P., J.D., Pharm.D., and M.D.)

Consider the program for supplemental Palmetto Fellows and LIFE Scholarship awards?

☒ Yes

☐ No

Proposed Date of Implementation: Fall 2020

CIP Code: 14.1301

Delivery Site(s): Coastal Carolina University, Conway Campus and Traditional/face-to-face classroom instruction

Delivery Mode:

☒ Traditional/face-to-face
*select if less than 25% online

☐ Distance Education
☐ 100% online
☐ Blended/hybrid (50% or more online)
☐ Blended/hybrid (25-49% online)
☐ Other distance education (explain if selected)

Program Contact Information (name, title, telephone number, and email address):
Dr. Monica Gray
Associate Professor and Program Director - Engineering Science
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Institutional Approvals and Dates of Approval (include department through Provost/Chief Academic Officer, President, and Board of Trustees approval):

Internal Institutional Approval	**Date**
Department of Physics and Engineering Science	September 19, 2019
Curriculum Committee, College of Science	September 23, 2019
Dean, College of Science	October 29, 2019
Academic Affairs Committee	November 12, 2019
Faculty Senate	December 4, 2019
Board of Trustees	October 24, 2014
Provost	January 6, 2020

Background Information

State the nature and purpose of the proposed program, including target audience, centrality to institutional mission, and relation to the strategic plan.

The **Bachelor of Science in engineering science** program at Coastal Carolina University 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 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.

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.

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.

The proposed changes benefit current and future students as follows; by strengthening the alignment of the curriculum with ABET's accreditation Criterion 5 Curriculum requirements, thereby increasing the potential for positive accreditation action during the 2020-21 accreditation cycle. In addition, key career goals of a typical engineer are employment in industry and registration as a Professional Engineer, licensed to practice in a state or other jurisdiction. In general, graduation from an ABET accredited program is *sine qua non* of attaining both career outcomes.

These changes directly support CCU's mission to offer "undergraduate and graduate degree programs of national and/or regional significance in the arts and sciences, business, humanities, education, and health and human services." It further supports the Institution's mission by preparing knowledgeable, productive, and responsible graduates to contribute positively to society and to economic development.

Finally, these changes support Objective 1.4.5 of the Coastal Carolina University Strategic Plan 2016-2021: "CCU will support high-quality innovative programs and curricula aligned with student demands, accreditation and standards expectations, regulatory requirements, and supportive professional preparation".

In preparation for accreditation evaluation, the program submitted a Readiness Review to ABET. In response to feedback from ABET on the Readiness Review, several key changes were made to the curriculum to ensure compliance. Those changes and the underlying motivations are listed below:

- PHYS 212/L removed; to ensure compliance with ABET's accreditation requirement of at least 30 credits of College Mathematics and Science with laboratory experience.
- CSCI 135 added; programming course in the Python programing language to comply with ABET's accreditation requirement of 45 credits of Engineering Science topics (i.e., engineering science, computer science and engineering design)
- Four new engineering science courses are created and designated as required to comply with ABET's accreditation requirement of 45 credits of Engineering Science topics:
    1. ENGR 244 – Engineering Mechanics II: Dynamics
    2. ENGR 302 – Materials Science for Engineers
    3. ENGR 323 – Engineering Thermodynamics and Heat Transfer
    4. ENGR 333 – Engineering Fluid Mechanics

- A "Professional Enhancement" category of courses is created in the program with a required twelve (12) credit hours to complete to comply with ABET's accreditation requirement of 45 credits of Engineering Science topics as well as provide experiential educational opportunities to apply classroom theories to real-world problems. The Professional Enhancement category must be completed by all program students. The newly created, required courses in this category are:
    1. ENGR 199 – Cohort Grand Challenge I. Program students must complete this 1 credit 1st year, project-based engineering design course.
    2. ENGR 299 – Cohort Grand Challenge II. Program students must complete this 1 credit 1st year, project-based engineering design course.
    3. ENGR 495 – Engineering Internship. Program students must complete at least 3 credit hours of internship.
    4. Complete seven (7) credit hours of elective Professional Enhancement courses. These courses may include ENGR 203 – Engineering Professionalism and Pathways, repeated enrollment in ENGR 495 – Engineering Internship, independent research under faculty supervision in the new course ENGR 397 – Independent Research, or other credit-bearing professional development activities, with departmental approval, including, but not limited to Study Abroad, Research Abroad, Graduate Courses, Co-operative Education or other approved coursework.
- Organization of twelve (12) pre-existing, required credit hours of coursework into a "Physics Concentration"
- Several lists of elective mathematics and elective science coursework were removed to streamline the program.

Assessment of Need

Provide an assessment of the need for the program for the institution, the state, the region, and beyond, if applicable.

The need to modify the program is based on an assessment of four major issues. These are, the need to:

1. align the program curriculum with ABET's new accreditation curricular criterion effective July 2019, ahead of the Program's accreditation review during the 2020-2021 accreditation cycle,
2. align the program course offerings and course content with NCEES examination requirements. Specifically, the content requirements of the Fundamentals of Engineering (FE) Exam, the first exam in the licensure process for professional engineers.
3. respond to feedback from ABET on the Program's curriculum weaknesses, as part of the program's Readiness Review.
4. develop courses and program offerings comparable to similarly named, ABET-accredited programs nationally.

ABET accredits engineering programs both in the United States and globally. ABET accreditation provides assurance that a program meets quality standards established by the profession for which the program prepares its students. Further, ABET is a signatory of the Washington Accord which promulgate minimum accreditation standards and subsequently facilitates global mobility of engineers among the 28 signatories and provisional members. These updates satisfy ABET's accreditation requirements and thus open the door to national and global opportunities for the program's graduates.

Transfer and Articulation

This change should not affect existing agreements with Clemson University and Horry-Georgetown Technical College.

Employment Opportunities

Occupation	State		National		Data Type and Source
	Expected Number of Jobs (2016)	Employment Projection (2026)	Expected Number of Jobs (2018)	Employment Projection (2028)	
Architecture & Engineering	39,528	45,055	730,300	780,600	U.S. Bureau of Labor Statistics; SC Works Online
General Engineer	644	706	21,000	22,300	U.S. Bureau of Labor Statistics; SC Works Online
Electrical Engineering	2,083	2,339	51,200	58,500	U.S. Bureau of Labor Statistics; SC Works Online
Materials Engineer	505	582	3,600	3,800	U.S. Bureau of Labor Statistics; SC Works Online
Environmental Engineer	833	906	14,700	14,900	U.S. Bureau of Labor Statistics; SC Works Online
Industrial Engineers	6,901	8,579	21,600	26,700	U.S. Bureau of Labor Statistics; SC Works Online
Civil Engineers	5,946	6,648	169,000	180,300	U.S. Bureau of Labor Statistics; SC Works Online

Supporting Evidence of Anticipated Employment Opportunities

The US Bureau of Labor Statistics (BLS) projects a need for 780,600 engineers in all disciplines for the decade leading up to 2028. Significant growth is also anticipated for fields requiring a blend of physics principles with engineering practice, such as nanotechnology, materials science, and emerging device physics/engineering. As one example of the types of jobs available to engineers with integrated science training, materials scientists earn an average of $85,150 per year, which far exceeds the median salary for the region. As part of our curriculum revision, students are now required to complete at least one internship. The Program is actively recruiting engineering companies in the area to participate in internship activities. Currently several interns and graduates have been placed with area companies such as Teknoware, DRG, MIDCON, Glendinning and PSI Molded Plastics.

Description of the Program

Projected Enrollment			
Year	Fall Headcount	Spring Headcount	Summer Headcount
2020-2021	164	147	0
2021-2022	174	156	0
2022-2023	182	169	0
2023-2024	188	169	0
2024-2025	173	155	0

Note 1: Based on enrollment of 50 new students each fall and 0 new students each spring.
Note 2: Years one through four total headcounts based on 90% returning fall to spring and 85% returning spring to fall.
Note 3: CCU estimates the Engineering Science degree will be awarded during 2023-2024 academic year for new freshmen entering the program in fall 2020.
Transfer students, depending on their number of transfer credits, and currently enrolled students, who change their major and meet the degree requirements, could potentially graduate during the 2020-2021 academic year.

Besides the general institutional admission requirements, are there any separate or additional admission requirements for the proposed program? If yes, explain.

☐Yes

☒No

Curriculum

Curriculum Changes

Courses Eliminated from Program	Courses Added to Program	Core Courses Modified
PHYS 213 – Fundamentals of Physics I (3 credits)	CSCI 135 – Introduction to Programming (3 credits)	ENGR 399 Q - Integrated Science and Design (was 1-3 credits, now 2 credits)
ENGR 202 - Engineering Graphics (3 credits) and replaced with ENGR 102	ENGR 102 - Engineering Graphics Communication (3 credits)	ENGR 499 Q - Senior Design (was 3 credits, now 2 credits)
	ENGR 199 – Cohort Grand Challenge I (1 credits)	
	ENGR 244 – Engineering Mechanics II: Dynamics (3 credits)	
	ENGR 299 – Cohort Grand Challenge II (1 credits)	
	ENGR 302 – Materials Science for Engineers (3 credits)	
	ENGR 323 – Engineering Thermodynamics (3 credits)	
	ENGR 333 – Engineering Fluid Mechanics (3 credits)	
	ENGR 495 – Engineering Internship (3 credits)	

Courses Eliminated from Program	Courses Added to Program	Core Courses Modified
	ENGR 203 – Engineering Professionalism and Pathways (3 credits)	
	ENGR 356 – Supply Chain Engineering (3 credits)	

New Courses

ENGR 102 - Engineering Graphics Communication (3 credits). This course is a project-based introduction to engineering graphics using computer-aided design and drafting software. Topics include sketching, 3D part and assembly creation, and documented drawings. Students utilize the principles of engineering graphics to visualize, communicate, and analyze solutions to engineering problems.

ENGR 199 - Cohort Grand Challenge I (1 credits). Great engineering achievements such as safe drinking water and electricity have revolutionized society. While these achievements are remarkable, future engineers are faced with many more great challenges and opportunities yet to be realized. With input from people around the world, an international group of leading technological thinkers were asked to identify the Grand Challenges for Engineering in the 21st century. Their 14 game-changing goals for improving life on the planet, are introduced in this course as a means to introducing complex engineering problems, how to identify and formulate them by applying principles of engineering, science, and mathematics.

ENGR 299 - Cohort Grand Challenge II (1 credits). (Prereq: ENGR 199 or permission of the instructor). In this part II of the two-course sequence, students develop and propose solutions to their complex problem identified and formulated in ENGR 199 by applying principles of engineering, science, and mathematics. Solution must meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

ENGR 203 – Engineering Professionalism and Pathways (3). This course provides an overview of professional and ethical responsibilities of engineers; the impact of engineering solutions in global, economic, environmental, and societal contexts; contemporary issues; working in a diverse team environment, and life-long learning and career skills. This course will prepare students with fundamental knowledge to construct a plan to navigate their growth from undergraduate to an employee in the professions or academic workplace.

ENGR 244 - Engineering Mechanics II: Dynamics (3 credits). (Prereq: ENGR 234 or permission of the instructor). Kinematics of particles: coordinate systems, relative and dependent motions, Kinetics of particles: Newton's Second Law, Kinetics of particles: work and energy methods, Kinetics of particles: impulse and momentum methods, Kinematics of rigid bodies: absolute and relative motion, Review of mass moment of inertia, Planar kinetics of rigid bodies: Newton's Second Law, Planar kinetics of rigid bodies: work and energy methods, Planar kinetics of rigid bodies: impulse and momentum methods, Vibrations: free and forced.

ENGR 302 - Materials Science for Engineers (3 credits). (Prereq: junior standing or permission of the instructor) (3 hrs.) This introductory course in materials science is designed primarily for engineering students who wish to understand the relationships between a material's structure, processing and properties (electrical, mechanical, and thermal). All levels of structure are considered: from macro structures easily visible to the eye through electronic structure of atoms.

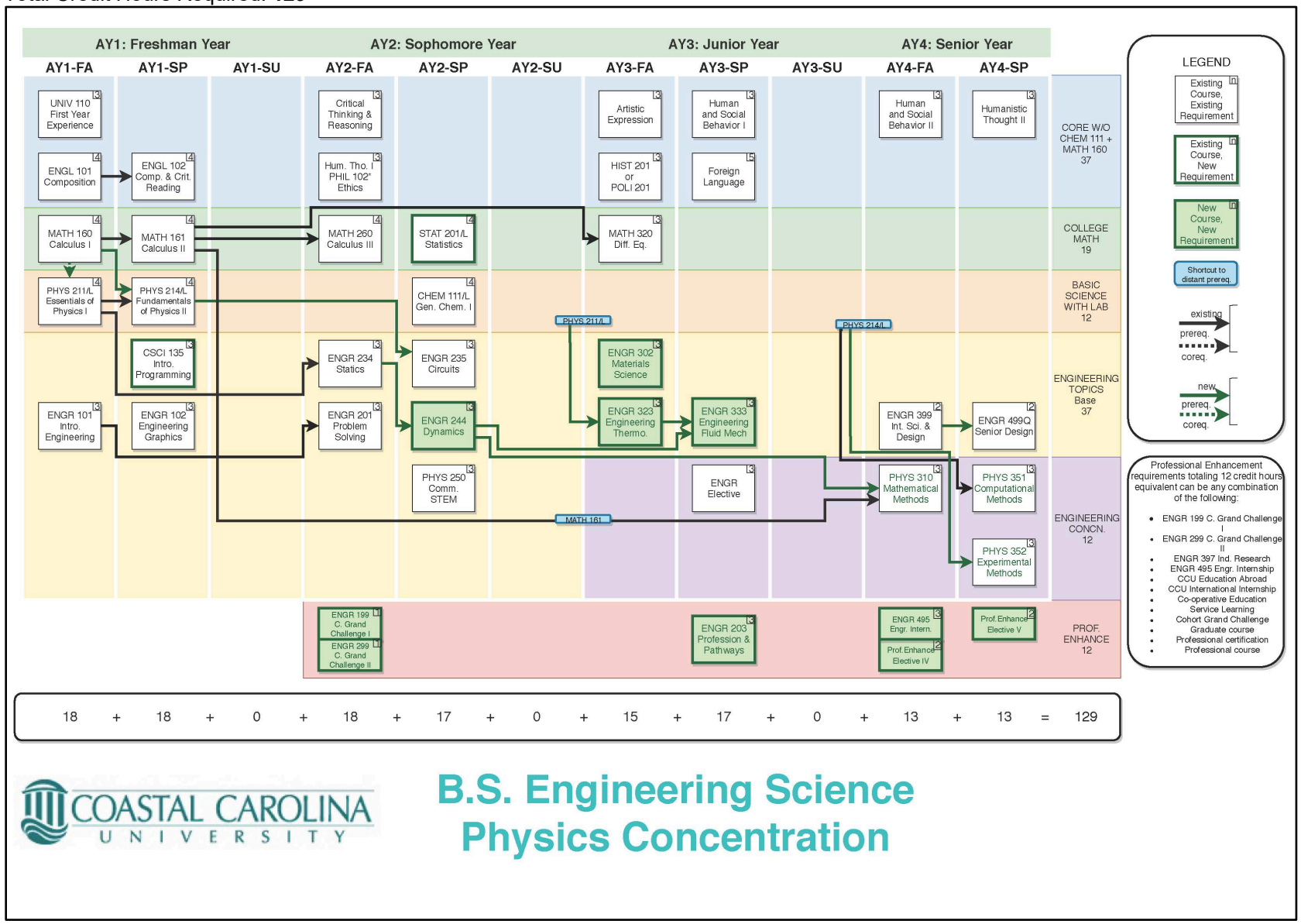
ENGR 323 - Engineering Thermodynamics and Heat Transfer (3 credits). (Prereq: PHYS 211/PHYS 211L with a grade of 'C' or better, or permission of the instructor) Introduction to thermodynamics and heat transfer: properties of liquids and gases, first and second law analysis, introduction to cycles for power and refrigeration, heat flow by conduction and radiation, and convective heat flow and heat exchangers.

ENGR 333 - Engineering Fluid Mechanics (3 credits). (Prereq: ENGR 244 and ENGR 323, or permission of the instructor) This course develops methods for analyzing fluid behavior while at rest or in motion starting from Newton's Laws and control volume concepts. Important representations for fluid kinematics are developed, such as streamlines, and students are introduced to the Reynolds Transport theorem. Energy and momentum methods of fluid dynamics problem solving are developed and applied to engineering problems in the design of pipe flow systems.

ENGR 356 – Supply Chain Engineering (3 credits). (Prereq: ENGR 201, or permission of the instructor) In this course, we will study manufacturing and logistic activities across the global supply chain. Emphasis is on supply chain technical design, implementation, and safety functions. Topics include transportation and distribution networks, inventory requirements, demand planning, materials handling and warehousing, supply chain contracts, manufacturing flexibility, product design, and using available SAP or other ERP systems.

ENGR 495 Engineering Internship (1-10 credits). (Course Restrictions: permission of major advisor and approved contract) Students are professionally supervised in an approved external or campus-based organization while working 50 hours during a semester for each credit hour enrolled. Three forms must be appended to this syllabus for a complete internship application. Students are required to read and sign form; Code of Professional and Ethical Conduct for Student Interns. Students must complete and sign the Internship Learning Contract and obtain signatures from the Employer Supervisor and Faculty Advisor OR Engineering Program Director. Finally, Students must obtain a Memorandum of Understanding signed by their Employer Supervisor and Academic Advisor or Engineering Program Director. During the internship period, students are required to maintain an Engineering Workplace Competencies Gap Analysis Worksheet and Internship Work Hours Log. The Employer Supervisor will also complete the Engineering Workplace Competencies Gap Analysis Worksheet to assess the student's performance. The course may be repeated for up to 10 total credit hours.

Total Credit Hours Required: **129**



COASTAL CAROLINA UNIVERSITY

B.S. Engineering Science
Physics Concentration

Total credits: 129

Curriculum by Year					
Course Name	**Credit Hours**	**Course Name**	**Credit Hours**	**Course Name**	**Credit Hours**
Year 1					
Fall		**Spring**		**Summer**	
ENGR 101	3	ENGR 102	3		
ENGL 101	4	ENGL 102	4		
UNIV 110	3	CSCI 135	3		
MATH 160	4	MATH 161	4		
PHYS 211/L	4	PHYS 214/L	4		
Total Semester Hours	**18**	Total Semester Hours	**18**	Total Semester Hours	
Year 2					
Fall		**Spring**		**Summer**	
Core (Critical Thinking)	3	STAT 201/201L	4		
Core (Humanistic Thought I – PHIL 102)	3	CHEM 111/111L	4		
MATH 260	4	ENGR 235	3		
ENGR 234	3	ENGR 244	3		
ENGR 201	3	PHYS 250	3		
Prof. Enhancement I (ENGR 199/299)	2				
Total Semester Hours	**18**	Total Semester Hours	**17**	Total Semester Hours	

Course Name	Credit Hours	Course Name	Credit Hours	Course Name	Credit Hours
Year 3					
Fall		**Spring**		**Summer**	
Core (Artistic Expression)	3	Core (Human &Social Behavior I)	3		
HIST 201/POLI 201	3	Foreign Language	5		
MATH 320	3	ENGR 333	3		
ENGR 302	3	Prof. Enhancement II (ENGR 203)	3		
ENGR 323	3	Concentration (Selective)	3		
Total Semester Hours	**15**	Total Semester Hours	**17**	Total Semester Hours	
Year 4					
Fall		**Spring**		**Summer**	
Core (Human &Social Behavior II)	3	Core (Humanistic Thought II)	3		
ENGRY 399	2	ENGRY 499Q	2		
Prof. Enhancement III (ENGR 495)	3	Prof. Enhancement V	2		
Prof. Enhancement IV	2	Concentration (PHYS 352)	3	Cognate/Concentration	
Concentration (PHYS 310)	3	Concentration (PHYS 351)	3		
Total Semester Hours	**13**	Total Semester Hours	**13**	Total Semester Hours	

Physics Concentration (12 Credits)

Complete the following courses:

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

Concentration Selective - Choose one:

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

Similar Programs in South Carolina offered by Public and Independent Institutions

Identify the similar programs offered and describe the similarities and differences for each program.

The engineering science program is classified under ABET's program criteria for Engineering, General Engineering, Engineering Physics, Engineering Science or similarly named program. There is only one such ABET accredited program in the state at Bob Jones University.

Program Name and Designation	Total Credit Hours	Institution	Similarities	Differences
Engineering, B.S.	132	Bob Jones University	General engineering program with discipline-inspired concentrations	Different concentrations (Bob Jones: Civil, Computer, Electrical and Mechanical concentrations versus Coastal currently has one: Physics concentration)

Faculty

Rank and Full- or Part-time	Courses Taught for the Program	Academic Degrees and Coursework Relevant to Courses Taught, Including Institution and Major	Other Qualifications and Relevant Professional Experience (e.g., licensures, certifications, years in industry, etc.)
Associate Professor (Full-time)	ENGR 199 ENGR 299 ENGR 201 ENGR 399 ENGR 499	Ph.D. Civil & Environmental Engineering; University of South Florida	P.E.
Full Professor (Full-time)	ENGR 323 ENGR 333 ENGR 244	Ph.D. Mechanical Engineering; Technion IIT (Haifa, Israel)	
Assistant Professor (Full-time)	ENGR 234 ENGR 244 ENGR 450	Ph.D. Nuclear Physics; Michigan State University	
Assistant Professor (Full-time)	ENGR 101 ENGR 235 ENGR 315 ENGR 321	Ph.D. Electrical Engineering; University of Illinois	
Teaching Associate (Part-time)	ENGR 102	B.E. Mechanical Engineering; Stony Brook University MS Mechanical Engineering (28 credit hours); Stony Brook University	10 years in industry
Engineering-in-Residence (Full-time)	ENGR 203 ENGR 356	M.S. Nuclear Engineering (materials & reactor physics); University of Virginia, Charlottesville	20 years in industry (supply chain)
Professor (Full-time)	ENGR 201 PHYS 250	Ph.D. Physics; Montana State University	
Assistant Professor (Full-time)	PHYS 351	Ph.D. Physics, interdisciplinary specialization in Computational Science	
Assistant Professor (Full-time)	PHYS 352	Ph.D. Physics; Rice University	
Senior Lecturer (Full-time)	PHYS 310	Ph.D. Physics; University of Alabama	
Senior Lecturer (Full-time)	PHYS 310	Ph.D. Physics; University of Kentucky	
Associate Professor (Full-time)	PHYS 301 (ENGR 244)	Ph.D. Physics; Duke University	
Teaching Associate (Full-time)	CSCI 135	M.S. Electrical and Computer Engineering; University of South Carolina M.S. Astronomy; University of Swinburne (Australia)	

Total FTE needed to support the proposed program:
Faculty: 7.67
Staff: .50
Administration: .14

Faculty, Staff, and Administrative Personnel

- Personnel reassignment:
  - A professor moved from CMSS to ESCI – to teach two new courses; ENGR 323 – Engineering Thermodynamics (3 credits) and ENGR 333 – Engineering Fluid Mechanics (3 credits) as well as continue to mentor engineering design capstone projects and assist with ABET accreditation efforts.
- Allocation of slotted positions in the ESCI program:
  - 1 Engineers-in-Residence,: establish Engineering Internship program; develop student handbook, liaison with Career Services and Employers, facilitate placement of engineering interns and monitor academic outcomes of interns
  - 1 Visiting International Scholar (leveraging current programming through Office of Global Initiatives – 1 semester appointment),: establish Engineering Capstone program; develop student handbook, liaison with community partners to contribute real-world problem to the Capstone Program pool, recruit employers to serve as project clients, judges and mentors.

YEAR	***NEW***		***EXISTING***		***TOTAL***	
	Headcount	***FTE***	***Headcount***	***FTE***	***Headcount***	***FTE***
Administration						
2020-2021	0	0.00	1	0.14	1	0.14
2021-2022	0	0.00	1	0.14	1	0.14
2022-2023	0	0.00	1	0.14	1	0.14
2023-2024	0	0.00	1	0.14	1	0.14
2024-2025	0	0.00	1	0.14	1	0.14
Faculty						
2020-2021	0	0.00	11	1.33	11	1.33
2021-2022	0	0.00	11	3.33	11	3.33
2022-2023	0	0.00	11	5.00	11	5.00
2023-2024	0	0.00	11	7.67	11	7.67
2024-2025	0	0.00	11	7.67	11	7.67
Staff						
2020-2021	0	0.00	1	0.50	1	0.50
2021-2022	0	0.00	1	0.50	1	0.50
2022-2023	0	0.00	1	0.50	1	0.50
2023-2024	0	0.00	1	0.50	1	0.50
2024-2025	0	0.00	1	0.50	1	0.50

Resources

Library and Learning Resources

Explain how current library/learning collections, databases, resources, and services specific to the discipline, including those provided by PASCAL, can support the proposed program. Identify additional library resources needed.

Kimbel Library and Bryan Information Commons has holdings of over 450,000 items in all formats. The library has access to over 120,000 periodicals: magazines, newspapers, scholarly journals, and

proceedings in print and online formats and provides access to its holdings and to over 140 online citation, abstracting, full-text and reference resources via the World Wide Web at (http://www.coastal.edu/library). Library instruction sessions are available to all academic departments covering general library usage as well as project or course-specific sessions for upper-level research-oriented courses. Coastal Carolina University fully supports and participates in Partnership Among South Carolina Academic Libraries (PASCAL), the state academic library consortium. Students have access to books from other South Carolina academic libraries through PASCAL Delivers, a rapid book delivery service provided by PASCAL.

Course-integrated library instruction sessions are available to all academic departments; the library also offers one-credit information literacy courses. Librarians offer appointments for in-depth research help. Kimbel Library operates on a 24/7 schedule during the fall and spring semesters; during that time, library staff members are available to assist students via phone, chat, or in-person at the help desk.

Engineering faculty provide input regarding selection of library resources, including both print and electronic resources. The Engineering Science Program has a designated library liaison who takes order requests and communicates with faculty when new resources are available.

Student Support Services

Explain how current academic support services will support the proposed program. Identify new services needed and provide any estimated costs associated with these services.

Advising
Advisers currently working within the College of Science and Department of Mathematics and Statistics are sufficient to provide support without additional cost. All university-wide academic support services (the Writing Center, Math Lab, Tutoring, Office of Disability Services, etc.) are available to these new majors, as they are to all students. Statistics professors have past and presently held hours during the Math Outreach program, thus incurring no additional costs for this resource.

Counseling Services
Counseling Services are offered to Coastal Carolina University students to assist students in defining and accomplishing their personal and academic goals. Services include:

- Treating mental health concerns
- Preventing psychological difficulties
- Educating students to live emotionally and behaviorally healthy lives, and
- Contributing to a healthy campus environment.

Services also include individual, couples and group counseling; psychiatric services; crisis intervention; assessment; nutritional counseling; drug and alcohol education; referrals; and consultation. The ultimate aim of Counseling Services is to produce graduates who are healthy citizens. Counseling Services adheres to the standard professional procedure regarding confidentiality of information and records are not part of any other Coastal Carolina University records.

Accessibility and Disability Services
Accessibility and Disability Services offers students with physical, psychological or learning disabilities accommodations and assistance. With appropriate documentation, counselors determine accommodations needed to assist students in taking full advantage of their Coastal Carolina University educational opportunities. Ongoing disability coaching is offered to assist students with disabilities to help ensure their success at Coastal Carolina University. To access services and accommodations, students should register with the office, obtain documentation of the disability and make an appointment with a staff member.

Physical Resources/Facilities

Identify the physical facilities needed to support the program and the institution's plan for meeting the requirements.

A computer teaching lab – an existing computer lab in Swain (under Gupta Science administration) has been identified to be repurposed for the program.

Equipment

In the first year, the program will need a 30 workstation computer lab and a SolidWorks Site License (estimated year one cost of $117,000). The second year will introduce various instruments for Thermodynamics and Fluids instruction and a portion of a new Machine Shop will be established to comply with ABET certification (estimated year two cost of $126,020). Year three will include instruments for the instruction of Circuits and Electronics (estimated year three cost of $79,400). The Machine Shop will be completed in year four (estimated year four cost of $71,000). In year five, an ANSYS Site License will be purchased (estimated year five cost of $20,000).

Impact on Existing Programs

Will the proposed program impact existing degree programs or services at the institution (e.g., course offerings or enrollment)? If yes, explain.

☐Yes

☒No

Financial Support

Sources of Financing for the Program by Year												
Category	**1st**		**2nd**		**3rd**		**4th**		**5th**		**Grand Total**	
	New	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**
Tuition Funding	$3,034,894	$3,034,894	$3,284,711	$3,284,711	$3,502,696	$3,502,696	$3,697,020	$3,697,020	$3,464,636	$3,464,636	$16,983,957	$16,983,957
Program-Specific Fees											$0	$0
Special State Appropriation											$0	$0
Reallocation of Existing Funds											$0	$0
Federal, Grant or Other Funding											$0	$0
Total	**$3,034,894**	**$3,034,894**	**$3,284,711**	**$3,284,711**	**$3,502,696**	**$3,502,696**	**$3,697,020**	**$3,697,020**	**$3,464,636**	**$3,464,636**	**$16,983,957**	**$16,983,957**

Sources of Financing for the Program by Year												
Category	**1st**		**2nd**		**3rd**		**4th**		**5th**		**Grand Total**	
	New	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**
Program Administration and Faculty/Staff Salaries	$185,536	$185,536	$411,199	$411,199	$608,459	$608,459	$928,905	$928,905	$947,483	$947,483	$3,081,582	$3,081,582
Facilities, Equipment, Supplies, and Materials	$117,000	$117,000	$126,020	$126,020	$79,400	$79,400	$71,000	$71,000	$20,000	$20,000	$413,420	$413,420
Library Resources		$0		$0		$0		$0		$0	$0	$0
Total	**$302,536**	**$302,536**	**$537,219**	**$537,219**	**$687,859**	**$687,859**	**$999,905**	**$999,905**	**$967,483**	**$967,483**	**$3,495,002**	**$3,495,002**

Net Total (Sources of Financing Minus Estimated Costs)	**$2,732,358**	**$2,732,358**	**$2,747,492**	**$2,747,492**	**$2,814,837**	**$2,814,837**	**$2,697,115**	**$2,697,115**	**$2,497,153**	**$2,497,153**	**$13,488,955**	**$13,488,955**

Note: New costs - costs incurred solely as a result of implementing this program. Total costs - new costs; program's share of costs of existing resources used to support the program; and any other costs redirected to the program.

Budget Justification

Program cost-effectiveness and return-on-investment are evaluated institutionally using an induced revenue/expense model. As shown in the Financial Support table, tuition revenues are based on a 15-credit course load for each student projected to enroll in the program. These revenues represent course revenues derived from both program and general education curriculum requirements. The expenses shown in the Financial Support table represent direct expenses necessary for delivering program courses and administration. Due to an undergraduate program's inducement of additional general education expenses, as well as overall institutional operational expenses, the university uses a 50% gross academic margin assessment to ensure that new programs will provide sufficient revenues to support their expense impact on institutional operations.

To derive gross academic margin, the university calculates total induced revenue ($16,983,957 for the period) minus total direct expenses ($3,495,002 for the period) divided by total induced revenue ($16,983,957 for the period). [(Revenue-Expenses)/Revenue]

For a program to be considered cost-effective, the university looks for undergraduate programs to produce a gross academic margin of 50% or better. The 50% threshold is due to undergraduate participation in the general education curriculum, as well as greater undergraduate reliance on university operational resources. This program's gross academic margin is 79.4% for the period, which indicates that it has a high likelihood of producing sustainable revenues.

Evaluation and Assessment

Program Objectives	Student Learning Outcomes Aligned to Program Objectives	Methods of Assessment
Assume leadership roles in professional and/or community life	1.An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics • ENGR 199 Cohort Grand Challenge I • ENGR 299 Cohort Grand Challenge II • ENGR 399 Integrated Science & Design • ENGR 499 Senior Design 3. An ability to communicate effectively with a range of audiences • ENGR 102 Engineering Graphics Communication • ENGR 201 Engineering Problem Solving • PHYS 250 Communicating STEM 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 • ENGR 101 Inquiring Minds Want to Design: Introduction to Engineering • ENGR 399 Integrated Science & Design • ENGR 499 Senior Design	Key Performance Indicators and rubrics applied to course embedded activities; Direct and Indirect methods

Program Objectives	Student Learning Outcomes Aligned to Program Objectives	Methods of Assessment
Be productive, responsible, healthy citizens with a global perspective Foster future generations of engineers through mentoring, service, and outreach	2.Aan 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 • ENGR 101 Inquiring Minds Want to Design: Introduction to Engineering • ENGR 201 Engineering Problem Solving • ENGR 499 Senior Design 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 • ENGR 203 Engineering Professionalism and Pathways • PHIL 102 Introduction to Ethics - For Engineers	Key Performance Indicators and rubrics applied to course embedded activities; Direct and Indirect methods
Engage in ongoing professional development activities including but not limited to graduate study, leadership training, certification and licensure	6.An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions • ENGR 302 Materials Science for Engineers • ENGR 333 Engineering Fluid Mechanics 7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies • ENGR 302 Materials Science for Engineers • ENGR 495 Engineering Internship	Key Performance Indicators and rubrics applied to course embedded activities; Direct and Indirect methods

Per ABET, program objectives are by definition, program's expectations of graduates with a few years of graduation.

Within a few years of graduation from CCU, 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, and
- be productive, responsible, healthy citizens with a global perspective.

The Engineering Science Program prepares undergraduate students for employment, entrepreneurship and/or advanced studies. The Program's three primary constituencies are: industry, alumni, and academia, which by default, comprise the program's External Advisory Board (EAB).

- **Industry**: industry partners that have or may hire our graduates as well as may collaborate on experiential educational opportunities and, contemporary projects and/or contracts,

- **Alumni**: graduates from the Engineering Science Program as well as from the Applied Physics Program, particularly those who went on to assume engineering roles in their careers.
- **Academia**: higher educational institutions that our graduates may attend to further their education and/or with whom we have articulation agreements.

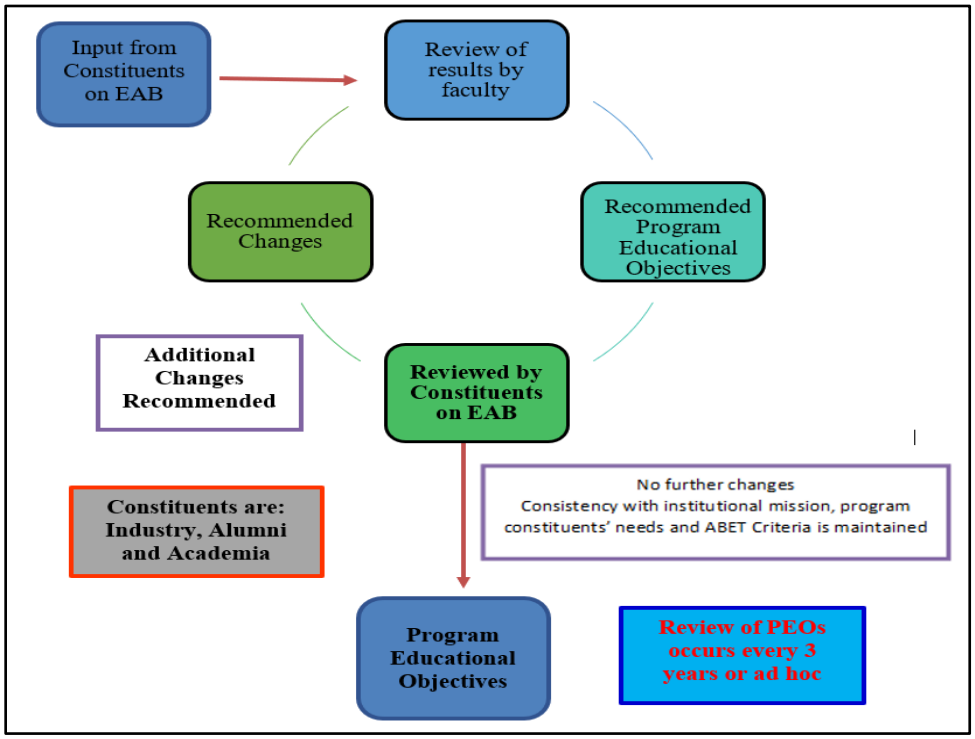


Figure 1: Process flow for review, evaluation and revision of PEOs

The EAB is tasked with the administration of the process for reviewing, evaluating and revising program educational objectives as shown in Figure 1 above. Initially, the PEOs were drafted by program faculty and submitted to various stakeholders for public review and comment. Thereafter, the PEOs will be reviewed by the EAB at least once every three years. The EAB will:

- Survey program constituents to determine their needs which will inform the continual improvement of the PEOs,
- The EAB is charged with the collection and summarization of feedback from constituents (as represented on the EAB or if needed, additionally from relevant stakeholders in the community),
- The results are reviewed by program faculty who will either accept any proposed changes or provide recommendations to the EAB,
- Both parties will ensure that any updates to the PEOs will be constituent with the institutional mission, the programs constituents' needs and ABET Criteria,
- Once both parties agree that no further change is necessary, the PEOs will be presented to the EAB for formal ratification.

One method of tracking employment will be via LinkedIn. All students enrolled in the introductory engineering (ENGR 101) and engineering professionalism and pathways (ENGR 203) courses are required to create a LinkedIn profile and become members of the Program's LinkedIn group, the Chantineers. Employment will also be tracked via alumni surveys.

Accreditation and Licensure/Certification

Will the institution seek program-specific accreditation (e.g., CAEP, ABET, NASM, etc.)? If yes, describe the institution's plans to seek accreditation, including the expected timeline.

☒Yes

☐No

The proposed modification is motivated by the goal to achieve ABET accreditation for the program during the 2020-21 accreditation cycle. ABET evaluates programs on a list of eight major criteria, including program educational outcomes, curriculum and students learning outcomes. The expected timeline to accreditation is as follows:

(1) July-November 2019: modify the program in response to issues addressed in the above section "Assessment of Need"
(2) January 31, 2020: submit Request for Evaluation to ABET
(3) July 1, 2020: submit the Program's Self-Study Report to ABET
(4) September - December 2020: ABET site-visit team on campus for 3 days
(5) Accreditation Decision (no later than August 31, 2021).

Will the proposed program lead to licensure or certification? If yes, identify the licensure or certification.

☒Yes

☐No

The program modification will enable students to pursue licensure as a Professional Engineer (PE) within a few years after graduation.

The most seamless process for becoming a PE starts with graduating from an ABET accredited program. The typical requirement for applying to be registered as a PE and, in some states to sit for the Fundamentals of Engineering (FE) exam, is that of being a graduate from an ABET accredited program. The proposed modifications affect or lead to professional engineering licensure as follows:

- these modifications strengthen the alignment of the curriculum with ABET's accreditation Criterion 5 Curriculum requirements, increases the potential for positive accreditation action during the 2020-21 accreditation cycle.
- the modifications ensured that all topics included in FE exam are covered in the curriculum.
- currently, professors in the program are preparing to take the FE exam as a first step towards PE licensure.
- We have developed a series of review sessions for seniors that meet every Tuesday night to prepare them to take the FE in their final year before graduation.

If the program is an Educator Preparation Program, does the proposed certification area require national recognition from a Specialized Professional Association (SPA)? If yes, describe the institution's plans to seek national recognition, including the expected timeline. **N/A**

☐Yes

☐No