



UNIVERSITY OF
SOUTH CAROLINA

Office of Institutional Research, Assessment & Analytics

December 14, 2023

Dr. Kevin Sightler, Director of Substantive Change
Commission on Colleges
Southern Association of Colleges and Schools
1866 Southern Lane
Decatur, GA 30033-4097

Dear Dr. Sightler:

The University of South Carolina Columbia is submitting the attached prospectus for approval of a new program at the current degree level that is a significant departure from current programs. The B.S. in Industrial Engineering Program will be offered in Fall 2024. The B.S. in Industrial Engineering is a 120 credit-hour program and will be administered through in-person classes on the USC Columbia campus.

The University of South Carolina has prepared a prospectus to request approval to offer the B.S. in Industrial Engineering Program. Should you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Douglas Miles

Donald Miles, Executive Director OIRAA
SACSCOC Accreditation Liaison

Enclosure

Substantive Change Cover Sheet

Submit to SACSCOC,
Substantive Change, 1866
Southern Lane, Decatur, GA
30033. One copy only;
electronic media preferred.
Do not email submissions
or send copies to staff.

Note:

1. Include a completed cover sheet with each submission; please don't submit a cover sheet only.
2. Submit substantive changes as separate submissions except as permitted by policy.
3. Submit substantive changes defined in policy only; others are not reviewable.
4. For best results, download this form and complete with [Adobe Reader](#). Hover mouse over fields for guidance.

INSTITUTIONAL INFORMATION

INSTITUTION (NO ABBREVIATIONS PLEASE)

CITY + STATE/PROVINCE
Columbia, SC

University of South Carolina Columbia

SUBSTANTIVE CHANGE RESTRICTION

1. Is the institution currently on Warning, Probation, or Probation for Good Cause?	<input type="radio"/> Yes	<input checked="" type="radio"/> No
2. Was the institution placed on Warning, Probation, or Probation for Good Cause on or after September 3, 2020, and subsequently removed from sanction?	<input type="radio"/> Yes	<input checked="" type="radio"/> No
3. Is the institution currently under provisional certification for participation in federal financial aid programs?	<input type="radio"/> Yes	<input checked="" type="radio"/> No
If ANY are "Yes" the institution is on SUBSTANTIVE CHANGE RESTRICTION . Additional and/or different requirements may apply; consult policy.		<input type="radio"/> Yes

SUBMISSION INFORMATION

SUBSTANTIVE CHANGE TYPE (SELECT FROM DROP-DOWN LIST: SUBMIT ONLY TYPES DEFINED IN POLICY)

SUBMISSION DATE

Program Change: New Program-Approval



12/14/2023

SUBSTANTIVE CHANGE DESCRIPTION (BRIEF SUMMARY)

INTENDED IMPLEMENTATION

Prospectus for approval of B.S. Industrial Engineering Program

08/01/2024

OFF-CAMPUS INSTRUCTIONAL SITES SUBMITTED IN THIS SUBSTANTIVE CHANGE

Site Name, Physical Address, City, State/Province, ZIP or Postal Code, and Country/Territory

1.	
2.	
3.	
4.	
5.	
There are more than 5 sites in this submission → <input type="checkbox"/>	

PROGRAMS SUBMITTED IN THIS SUBSTANTIVE CHANGE

Include credential AND discipline: e.g., Associate of Arts in English, Bachelor of Science in Physics, Certificate in Office Management, etc.

1.	Bachelor of Science in Industrial Engineering
2.	
3.	
4.	
5.	
There are more than 5 programs in submission → <input type="checkbox"/>	

SUBMITTED

I certify the information on this form is correct and accurately represents the current status of the institution at the time of submission.

FOR OFFICE USE

SUBMITTING LIAISON or CEO NAME

EMAIL ADDRESS

Donald Miles

dmiles@mailbox.sc.edu

Revised 04/07/2023

[Check for current version](#)

University of South Carolina - Columbia

Substantive Change Prospectus

B.S. Industrial Engineering Program

December 14, 2023

Douglas Miles

Donald Miles
Executive Director OIRAA
SACSCOC Liaison

Contact:

Donald Miles, Executive Director, SACSCOC Accreditation Liaison
Office of Institutional Research, Assessment, and Analytics
University of South Carolina
1710 College Street
Columbia, SC 29208
803 777-2814
803 777-5415
E-mail: dmiles@mailbox.sc.edu

Common Content A - Background and Context

INDUSTRIAL ENGINEERING SACSCOC PROSPECTUS

ABSTRACT

The purpose of this prospectus is to acquire approval for a new program, a Bachelor of Science in Industrial Engineering, offered by the University of South Carolina Columbia College of Engineering and Computing. The B.S. in Industrial Engineering is a 120 credit-hour program and will be administered through in-person classes on the USC Columbia campus. The target start date is Fall 2024 with the first first-year cohort beginning in Fall 2025. The program will be ongoing with first-year students and transfer students accepted into the program each Fall session.

The target population is prospective students interested in an industrial engineering degree. These include first-year students who prefer to study at USC instead of another in- or out-of-state institution and transfer students with an associate degree from a SC Technical College. Enrollment projections are provided below:

Table 1 – B.S. In Industrial Engineering Enrollment Projections

Year	Fall New Enrollment	Spring New Enrollment	Summer New Enrollment	Total New Annual Enrollment	Projected Attrition	Projected Graduates
1	35	0	0	35	7	
2	35	0	0	35	7	
3	35	0	0	35	7	
4	35	0	0	35	7	28
5	35	0	0	35	7	28

The enrollment projections are conservative and assume 35 new students will enroll in the program each year, and we expect some attrition based on the enrollment of other engineering programs offered. These projections were calculated based on reviewing enrollment in our existing engineering programs and the enrollment in other industrial engineering programs in the state.

The College of Engineering and Computing comprises approximately 160 full time faculty and offers 10 ABET-accredited undergraduate degrees and 31 graduate degrees and certificates. Last year, faculty research exceeded \$32M with over 400 active sponsored projects. We are ranked in the top 100 patent producing universities, 9 years in a row. Strengths specific to the industrial engineering discipline include 10 faculty with manufacturing/industrial engineering backgrounds, the Ronald E. McNair Center for Aerospace Innovation and Research which was established to integrate research leadership and industry advancement, and strong existing partnerships with regional employers who seek industrial engineers in addition to our current graduates.

ASSESSMENT OF NEED

The proposed program is aligned with USC Columbia’s mission to educate the state’s citizens through teaching, research, creative activity, and community engagement. As stated in our mission statement, USC Columbia “leads the way in providing all students with the highest-quality education, including the

knowledge, skills, and values necessary for success and responsible citizenship in a complex and changing world through engagement in nationally and internationally ranked research, scholarship, community outreach, and artistic creation.” The proposed Industrial Engineering program will advance the university’s mission to educate the state’s citizens in an area of high employment need in the state.

A strategic priority of USC Columbia is to “enhance student access, affordability, and sense of belonging for all students including low income, first-generation, international, and underrepresented students.” The proposed program is intentionally designed to be transfer-friendly and facilitates AS-to-BS degree completion of students that start higher education at a South Carolina Technical College. Another strategic priority is to “address opportunity gaps” and industrial engineering has been identified as an undergraduate program to address this priority because nationally, women receive about 34% of industrial engineering bachelor’s degrees, more than the average of 24% of all engineering bachelor’s degrees (ASEE Engineering and Engineering Technology by the Numbers 2021). Over the past three years, 27% of engineering bachelor’s degrees at USC Columbia were awarded to women, so adding an industrial engineering program has the potential to increase the representation of women in engineering.

The proposed program is aligned with the Public Agenda’s goal to increase the proportion of South Carolinians with high-quality postsecondary credentials to 60 percent by 2030. The B.S. in Industrial Engineering has been designed to be aligned with workforce needs and requirements and for on-time degree completion with a clear, well-defined degree map that allows for graduation in four years without taking any summer coursework. Additionally, the program is aligned with the goal for equity in higher education because it has also been designed to ensure that academic credits earned at a two-year institution transfer to the program.

According to the American Society for Engineering Education (ASEE) (Engineering and Engineering Technology by the Numbers 2021), the engineering disciplines that produce the greatest number of bachelor’s degrees are mechanical, civil, electrical, chemical, computer, biomedical, and industrial/manufacturing/systems. The only one that USC Columbia is missing is industrial engineering.

During campus visits, prospective students ask about industrial engineering more frequently than any other engineering discipline not currently offered at USC. USC Career Center staff have also indicated that prospective employers ask whether we produce industrial engineers because there are more industrial engineering job openings in South Carolina than any other type of engineering. Therefore, USC Leadership has recognized that industrial engineering is a growth area for the university and adding an industrial engineering program will improve the institution’s academic reputation through increased number and capability of our undergraduate student body and graduates and improved relationships with employers.

In addition, curriculum planning efforts indicate that the new industrial engineering courses could contribute to future program development, including an accelerated professional master’s degree and an interdisciplinary studies undergraduate degree. Such programs would enhance the institution’s reputation through improved student enrollment and retention metrics.

Both the U.S. Employment and Training Administration’s Projections Central program estimates an average annual number of openings of 680 and the Economic Development and Employer Planning

System (EDEPS) estimates an average annual number of openings of 640 per year for South Carolina.^{1,2} In addition, Gray Associates found 666 job postings for industrial engineers in South Carolina in the past 12 months. The estimated average annual opening and job postings are more than three times the five-year annual average supply of graduates (164) noted above for the three other universities in South Carolina that offer ABET-accredited Industrial Engineering programs. Therefore, there is sufficient demand to support multiple programs in the state.

Table 2 displays the 10-year growth projections for Industrial Engineers and provides supporting evidence of anticipated employment opportunities for graduates with an Industrial Engineering degree.

Table 2 – South Carolina Labor Market / Career Placement Outlook and Salaries

Occupation	SOC Code	Source	Current Employment Totals	10 year % Growth Projections	Average Salary (O-Net data)
Industrial Engineers	17-2112	O*Net EDEPS	7,080 in 2020 for SC (EDEPS)	22,400 job openings; 8-10% growth from 2021-2031 (O*Net) projected to grow to 8,630 in 2030 for SC (21.9%) (EDEPS)	\$96,350 (O*Net) \$84,560 (EDEPS)
Industrial Production Managers	11-3051	O*Net EDEPS	2,720 in 2020 for SC (EDEPS)	15,400 job openings; 4-7% growth from 2021-2031 (O*Net) projected to grow to 2,990 in 2030 for SC (9.9%) (EDEPS)	\$107,560 (O*Net) \$107,170 (EDEPS)
Architectural and Engineering Managers	11-9041	O*Net EDEPS	2,910 in 2020 for SC (EDEPS)	14,000 job openings; 2-3% growth from 2021-2031 (O*Net) projected to grow to 3,210 in 2030 for SC (10.3%) (EDEPS)	\$159,920 (O*Net) \$132,960 (EDEPS)

The proposed program is intended to address the needs of industries in and moving to South Carolina. The Bureau of Labor Statistics reports that employment of industrial engineers is projected to grow 10 percent from 2021 to 2031, faster than the average for all occupations. And, as stated above, the employment of industrial engineers in South Carolina is expected to increase by 21.9% by 2030. As such, O*Net ranks this occupation as having a bright outlook, noting that it is expected to grow rapidly in the next several years with larger numbers of job openings. The data provided on SCWorks aligns with the information presented above as SCWorks’s projections for 2020-30 are 7,080 to 8,631 (21.9%) with

¹ “Short-Term Occupational Projections.” Projections Central.
https://projectionscentral.org/Projections/ShortTerm?AreaName=&AreaNameSelect%5B45%5D=45&Name=Industrial%20Engineer&items_per_page=10&page=2. Accessed 17 Aug. 2023.

² “Occupational Supply Demand.” *Economic Development and Employer Planning System*.
<https://www.edeps.org/DemandIndicators.aspx?UA=1422A&pn=0&st=SC>. Accessed 17 Aug. 2023.

estimated annual exits at 171, annual transfers at 314, and annual total openings estimated at 640.³ There are currently not enough graduates from SC institutions to meet this estimated demand.

A market analysis by EAB⁴ revealed a favorable labor market for this program. The report noted:

Statewide employers posted a high number of job postings in the past 12 months, while regional employers posted a moderate to high number of job postings (4,841 and 77,589, respectively).

From June 2020 to May 2023, relevant employer demand growth outpaced employer demand growth for all bachelor's level professionals in statewide and regional markets (4.46% vs 2.80% and 1.64% vs 1.25% respectively). Statewide employment is projected to increase faster than average in four of the top five most relevant occupations across the next decade, while regional employment is projected to increase in two of the top five most relevant occupations. Overall, these trends suggest graduates will continue to enter a labor market with many opportunities.

Student Demand

Enrollment in engineering programs at USC Columbia has increased from 1,801 in Fall 2013 to 1,869 in Fall 2022 (3.8%). However, bachelor's degrees awarded in engineering have increased from 263 in AY 2014 to 442 in AY 2023 (68%). The increases in both enrollment and degrees awarded in engineering programs show student demand for engineering programs. In addition, as stated earlier, prospective students ask about industrial engineering more frequently than any other engineering discipline not currently offered at USC Columbia. In addition, Gray Associates shared data showing there were 627 google searches for industrial engineering programs in South Carolina. EAB also provided a market analysis that noted:

Between the 2016-2017 and 2020-2021 academic years, the number of reported relevant completions increased 9.35% statewide and 2.18% regionally, signaling growing student demand in both regions. During the same period, the number of institutions reporting completions remained the same statewide and regionally, indicating no increase in competition. In the 2020 2021 academic year, Clemson University reported 83.77% of all statewide completions, indicating a strong market leader. In the same year, the top three regional competitors produced 46.35% of all regional completions, suggesting a concentrated regional market.

EAB concluded that increasing student demand paired with no change in competition suggests a favorable competitive market for USC Columbia to launch an industrial engineering program.

Institutional Approvals of Program Timeline

On June 29, 2023, the Dean of the College of Engineering and Computing appointed a Steering Committee for the new degree program Bachelor of Science in Industrial Engineering. The committee included eight tenured faculty with relevant expertise and was administratively chaired by the Senior Associate Dean for Academic Affairs. The committee met on July 5 to discuss goals and constraints for the program. A subcommittee was formed to draft course and curriculum proposals. The subcommittee analyzed the curricula of all ABET-accredited IE programs in SC, GA, NC, VA, and TN, the ABET requirements for IE, and the recommendations from the Institute for Industrial and Systems Engineering. First draft proposals were distributed to the full committee by email on August 11 for

³ Byrne, Gerald. "South Carolina Long-Term Industry and Employment Projections." *SCWorks*. July 17, 2023. <https://public.tableau.com/app/profile/gerald.f.byrne/viz/SouthCarolinaLongTermProjections-Occupations/SouthCarolinaLong-TermIndustryandEmploymentProjections>. Accessed 17 Aug. 2023.

⁴ In 2014, the company officially shortened its name from the Education Advisory Board to simply "EAB."

review and improvement. With committee member approval and no dissent, second draft proposals were distributed to department chairs on August 16 with a request for unit faculty approval by September 8.

Each department's faculty has reviewed and voted on the course and curriculum proposals using department-specific processes. The results include that the curriculum and course proposals were approved by a majority of faculty in the departments of Civil and Environmental Engineering, Computer Science and Engineering, Electrical Engineering, Integrated Information Technology, and Mechanical Engineering. A majority of faculty in Chemical Engineering did not approve of the proposals.

The course and curriculum proposals were subsequently submitted through university faculty governance processes, including formal concurrence from each academic unit that contributes courses to the program. The course and curriculum proposals were approved by the Faculty Senate Curricula and Courses Committee on October 11, 2023, and by the full Faculty Senate on November 1, 2023. The University Board of Trustees approved the program proposal on December 20, 2023.

Common Content B - Faculty Qualifications

The University of South Carolina Faculty Manual outlines the minimum qualifications required of teaching faculty by rank. For tenured/tenure-track appointments (e.g., Professor, Associate Professor, Assistant Professor) faculty are required to hold a terminal degree in the teaching, or in a closely related, discipline. For Instructors, a faculty member is expected to possess a master's degree in the teaching discipline or a master's degree with a concentration in the teaching discipline.

ACAF 1.20: Credentials Verification for Instructors of Record ([Appendix D](#)) requires that the credentials of all instructors of record follow accreditation requirements. For instructors of record at the undergraduate level, faculty must have earned a doctorate or master's degree in the teaching discipline (a minimum of 18 graduate semester hours in the teaching discipline). This program will be administered by the College of Engineering and Computing with a senior faculty member appointed as Undergraduate Director.

This program's instructional faculty comprises two existing tenured professors and three new professional track faculty to teach major courses. Existing university faculty will teach non-major courses. One of the tenure-track faculty members will serve as program director. Of the three professional track faculty hired to teach the new industrial engineering courses, two will be hired in the first year and one in the second year.

Please see ([Appendix C](#)) for the faculty roster containing information for those faculty teaching required coursework within the Bachelor of Science Industrial Engineering Program. The faculty roster includes courses taught during Spring 2023 and Fall 2023. The faculty listed in the roster are the same faculty that are expected to teach when the program starts in Fall 2024.

The curriculum includes 12 new engineering courses. These will be taught by two existing faculty and three new full-time instructors. Each course will be offered twice annually, as shown Table 4.

Table 4. Projected Course Offerings by FT Industrial Engineering Faculty.

FALL	SPRING	SUMMER
Instructor A		
INDE 190	INDE 190	INDE 392
INDE 593	INDE 392	INDE 593
INDE 595	INDE 595	
Instructor B		
INDE 391	INDE 391	INDE 490
INDE 496	INDE 490	INDE 496
Instructor C		
INDE 292	INDE 292	INDE 397
INDE497	INDE 397	INDE 497
Professors		
INDE 591	INDE 591	
INDE 291	INDE 291	

The impact on faculty workload is minimal since the university has committed to hiring new faculty specifically for this program.

The curriculum lead is Professor Ramy Harik. Dr. Harik, a Fulbright Scholar, is a faculty member in the Department of Mechanical Engineering at the University of South Carolina and a resident researcher at the McNAIR Center for Aerospace Innovation and Research. He is currently a visiting Research Scientist at NASA Langley, conducting research in Automated Fiber Placement. His education includes Mechanical Engineering (Master's of Science), Automated Manufacturing Engineering Technology (Master's of Science) and Industrial/Mechanical Engineering (Doctor of Philosophy). He teaches courses in Computer Aided Design (CAD), Manufacturing and Computer Aided Manufacturing (CAM). Dr Harik is an Associate Editor of the Computer Aided Design & Applications international journal. He has worked with Boeing, NASA, SC Department of Commerce, Fokker Aerostructures, Dassault Aviation and several other agencies. He received the 2016 Outstanding Young Educator Award from Pi Tau Sigma Honor Society at the University of South Carolina. Dr. Harik is the chair of ACE'15, ACE'16 and ACE'17 Technical Symposiums (South Carolina Aerospace Conference and Exhibition) and was the chair of the PLM'16 International Conference held in Columbia, South Carolina.

The administrative lead is Professor Jed Lyons. Dr. Lyons is the Senior Associate Dean for Academic Affairs for the College of Engineering and Computing and a Professor in Mechanical Engineering. As Associate Dean, he directs the college's undergraduate recruitment, retention, peer mentoring, student services and graduation. He also provides college-level support for undergraduate and graduate courses and curricula and program assessment including ABET and SACS accreditation. His office manages the college's classrooms, computer labs, and other academic resources and services. Lyons earned a Ph.D. in Mechanical Engineering from the Georgia Institute of Technology. At USC, he served as the Mechanical Engineering Undergraduate Director from 1996-2001, Faculty Director of the university's Center for Teaching Excellence from 2006-2012, and in his current position since 2012. He teaches introduction to engineering, engineering materials, and engineering laboratory courses. His research interests include engineering education and engineering materials. He has held several leadership positions in the American Society for Engineering Education, including serving as Chair of both the Mechanical Engineering and Pre-College Engineering Education divisions. Awards include USC's Outstanding Faculty

Service award, Joseph M. Biedenbach Distinguished Service award, Samuel Litman Distinguished Professor award and Michael J. Mungo Outstanding Teacher award, Georgia Tech's Outstanding Young Engineering Alumni award, and election to the grade of Fellow of the American Society for Engineering Education.

Dr. Harik's research expertise in the areas of industrial and manufacturing engineering has led to over \$17M in funded research and implementation projects. His scholarship includes 136 peer reviewed articles and 100+ technical presentations. He has supervised 46 graduate students/researchers and over 100 undergraduate researchers. He has over 3000 hours of classroom teaching hours over three different continents spanning all different topics of Industrial and Manufacturing Engineering.

Dr. Lyons' research expertise in mechanical engineering and engineering education has led to over \$8M in funded research and implementation projects. He has mentored over 200 research assistants, teaching assistants, teaching fellows and K-12 teacher/researchers. His scholarship includes 89 peer reviewed articles and 91 technical presentations.

Description of oversight to ensure quality of the new program

The University of South Carolina has policies and procedures for determining the amount and level of credit awarded for its courses. ACAF 2.03 Creation and Revision of Academic Courses ([Appendix E](#)) governs the process. This policy and the procedures outlined therein apply to all programs and courses regardless of location (Columbia, regional Palmetto College campus, or off-campus site), format, or mode of delivery.

For this program, course development begins with the unit faculty and decisions about the number of credit hours and level of the proposed course are made at the unit level according to the course's nature and the program's requirement. As specified in ACAF 2.03 Creation and Revision of Academic Courses, course actions for undergraduate courses (courses numbered 499 and below) are reviewed by the Faculty Senate's Curriculum and Courses Committee and then the Faculty Senate. Course actions for advanced undergraduate/graduate courses (courses numbered 500-699) are reviewed by the Committee on Curriculum and Courses with a representative of the Graduate Council participating in the review to report the outcome to the Graduate Council; upon approval by this committee, such courses are considered by the Faculty Senate (minutes are published in the meeting archives page of the Faculty Senate website ([Appendix F](#))). If course actions involve the inclusion or addition of pedagogy such that 50% or more of the course may be delivered by distributed learning methods, then the proposal is also reviewed by the Office of Distributed Learning; such courses numbered 100 to 699 are also reviewed by the Faculty Senate's Committee on Instructional Development.

Common Content C - Resources **Library and Learning/Information Resource**

The Thomas Cooper Library acquires material in a variety of formats that support current and projected curricular offerings, the needs of students, and faculty teaching and research within the engineering disciplines. The Thomas Cooper Library already provides access to several premiere industrial engineering journals, including IISE Transactions, ISE Transactions on Occupational Ergonomics and Human Factors, and IISE Transactions on Healthcare Systems Engineering, conference proceedings and books on industrial engineering.

The Thomas Cooper Library's Research & Instruction Department offers a range of instructional services. Class-tailored sessions are offered to provide general library introductions and hands-on instruction focusing on the information needs of a particular class. Personal instruction is available at the reference desk, via email, Ask a Librarian online chat, via the telephone, and by appointment via the Library's Book a Librarian service. Reference and literature search requests are accepted in-person, by telephone, or online. Assistance is offered in locating materials, computerized bibliographic searches, identifying authoritative web sites with quality content, using local databases, interlibrary loan requests, class presentations, and advice on library services and policies.

Interlibrary loan services are also provided to obtain materials not available from University Libraries. The University Libraries provides interlibrary loan services to current students, faculty, and staff of the University of South Carolina Columbia campus free of charge. Faculty may have up to 100 active requests, staff may have up to 25 active requests, graduate students may have up to 50 active requests, and undergraduates may have up to 15 active requests. Electronic desktop delivery of book chapters and periodical articles can be requested through the Scan and Deliver link located in the library catalog or via the Scan and Deliver option in ILL Express.

Students also have access to additional library collections, databases, and resources provided by the Partnership Among South Carolina Academic Libraries (PASCAL). In addition to shared licensing of electronic resources, PASCAL Delivers enables students, faculty, and staff to request and receive print books from participating academic libraries in South Carolina. A full list of engineering databases available to students can be found in ([Appendix G](#)). Students are made aware of library and learning information resources available to them during orientation sessions, course syllabi, and individual course orientation.

The current library and learning resources at the University of South Carolina will continue to be sufficient for the proposed program.

Student Support Services

Advising Industrial Engineering students will follow a high-quality model deployed across the College of Engineering and Computing. Academic and career advising will be provided through Undergraduate Academic Advisors and Faculty Advising Fellows. Undergraduate Academic Advisors are full-time staff who help students select classes, connect to university resources, and gain basic knowledge of career and professional development. Students are required to meet with their assigned advisor at least once each semester. Faculty Advising Fellows are faculty in each program who help students on demand with career information that goes beyond the expertise of an Undergraduate Academic Advisor.

USC Columbia is committed to providing reasonable accommodations for students with disabilities. Students with disabilities must contact the Student Disability Resource Center prior to beginning or early in their academic program to determine if they are eligible for reasonable accommodations.

The Office of Student Affairs and Academic Support provides students with a variety of programs and resources in the areas of academic success, career preparation, involvement and leadership, and well-being. USC Columbia has a writing center to help students at any stage of the writing process. USC Columbia also has a Student Success Center that facilitates student learning and degree completion by providing a comprehensive array of programs, resources and services that advance academic goal setting, skill development, personal transition to and within the university setting and effective decision

making. The Student Success Center's services include study and writing support, financial consultations, population specific support, academic engagement resources, and various workshops in the areas of support provided. In addition, the USC Columbia Career Center is dedicated to supporting students' needs at all stages of the process, by providing students with several resources including career exploration, resume and cover letter consultations, assistance with job search strategies, career coaching appointments, professional headshots, and professional clothing. From the basics of exploring major and career options and writing a resume, to connecting with employers for internships and interviews, USC students have access to career coaches and a premiere collection of online tools. Student Health Services provides students with a variety of resources to support their mental and emotional health and well-being in a variety of areas including COVID-19, emotional wellness, environmental wellness, financial wellness, intellectual wellness, occupational wellness, physical wellness, social wellness, and spiritual wellness. USC also provides many mental health resources including assistance with mental health emergencies and after-hour counseling and psychiatry, information for the 24-hour National Suicide Prevention Hotline, the Crisis Text Line, the Trevor Lifeline, and online mental health services. The Division of Information Technology provides students with assistance in a variety of resources and platforms such as Blackboard, Carolina Tech Zone, Password Help, Self-Service Portal, and the Service Desk.

Physical Resources

The College of Engineering occupies nine buildings on the USC campus. The Swearingen Engineering Center has been the college's hub since 1987 and includes more than 500,000 square feet of teaching, research, and laboratory space. A 1,200 square foot room within Swearingen has been identified for this program's instructional laboratory space. This room previously housed computer servers which have become consolidated since the building was erected and is currently underutilized. Therefore, the impact on physical facilities is positive. The budget for the program includes funds to outfit this space with resources for the courses Computer Control of Manufacturing Systems and Industrial Engineering Capstone Project, including anthropometric measurements, programmable logic controllers, articulated robots, and flexible manufacturing cells.

Financial Resources

Start-up expenses for this program is planned from reallocation of existing resources, but the program is expected to show a positive return on investment in year 3. In year one there will be new recurring expenses associated with faculty/instructional staff and equipment. In year 2 there will be ongoing recurring expenses associated with non-instructional staff. Additional recurring expenses for library resources are planned beginning at year 3. Positive revenue is anticipated in year 4. All figures in the budget are in 2023 costs unadjusted for inflation. The budget's tuition funding follows the enrollment projections in the enrollment projection table provided at the beginning of this prospectus and assumes that 45 of the 120 credit hours will be instructed by the College of Engineering and Computing as USC uses an RCM model where 70% of tuition revenue goes to the college of instruction and 30% to the college of record for the student (college associated with the student's major). The 17% of projected tuition revenue included as an "other" cost is for the USC Participation Tax, which is the funding provided to administration to support service units. The faculty and instructional staff costs include the costs of the three new professional track faculty, program coordinator, and program director. The non-instructional staff costs are for the new advisor to support the program. The equipment costs include office and instructional technology (\$12,000 in Year 1 and \$18,000 in subsequent years) and laboratory equipment costs (\$50,000 per year). Please see table 5 below for a detailed description of expenses and revenue.

There are no resources used for contractual or support services.

If the expected revenue does not materialize or if costs exceed estimates, then the actions that may be taken would depend on magnitude. Reallocation of existing resources is feasible if a revenue-cost deficit is less than 40% of costs during the start-up phase of the program. In the unlikely event that the deficit is significant, then teaching-out admitted students could be considered. Students may be advised to switch to another of the 10 existing engineering and computing undergraduate programs.

Table 5 – Expense and Revenue Projections

Projected One-Time Start-Up Expenses						
Category	Planning	Year 1	Year 2	Year 3	Year 4	Year 5
Faculty & Instructional Staff						
Non-Instructional Staff						
Graduate Assistants						
Accreditation						
Consultants						
Equipment						
Information Technology						
Library resources						
Marketing						
Facilities						
Travel						
Other						
<i>Total Start-Up Expenditures</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>
Projected New Recurring Expenses						
Category	Planning	Year 1	Year 2	Year 3	Year 4	Year 5
Faculty & Instructional Staff		\$370,906	\$662,212	\$672,212	\$682,212	\$682,212
Non-Instructional Staff			\$75,853	\$75,853	\$75,853	\$75,853
Graduate Assistants						
Accreditation					\$7400	\$800
Consultants						
Equipment		\$62,000	\$68,000	\$68,000	\$68,000	\$68,000
Information Technology						
Library resources				\$2,000	\$2,000	\$2,000
Marketing						
Facilities						
Travel						
Other – USC Participation Tax (17% of tuition revenue)		\$41,126	\$74,028	\$106,929	\$139,830	\$139,830

Other						
<i>Total Recurring Expenditures</i>						
Grand Total (Start-Up and New Recurring)		\$474,032	\$880,093	\$924,994	\$975,295	\$968,695
Projected Revenue						
Category	Planning	Year 1	Year 2	Year 3	Year 4	Year 5
Tuition and Fees		\$346,920	\$624,456	\$901,992	\$1,179,528	\$1,179,528
Grants						
Institutional Reallocations		\$127,112	\$255,637	\$23,002		
Other (e.g., Federal or state appropriations, etc.)						
Total Revenues		\$474,032	\$88,0093	\$924,994	\$1,179,528	\$1,179,528
Net Totals (Revenue-Expenses)		\$0	\$0	\$0	\$204,233	\$210,833

Common Content D- Institutional Evaluation and Assessment Processes

Program objectives and learning outcomes will be assessed through bi-annual reporting to the Office of Institutional Research, Assessment, and Analytics (OIRAA) whereby student learning outcomes are evaluated based on defined measures and success criteria. Data is collected and analyzed to determine whether program objectives are being met and to determine if curricular changes are necessary to improve student outcomes. According to the Degree Program Assessment Business Process document maintained by OIRAA ([Appendix H](#)), USC’s degree program assessment approach employs a coordinated and carefully designed set of processes and tools used by those responsible for assessment to submit, review, store, and access academic program assessment plans and reports. Quality assurance procedures are built into the process at the institutional level to ensure data integrity and appropriate responses to student performance on learning outcomes by program administrators. The University’s Office of Institutional Research, Assessment, and Analytics (OIRAA) serves in a quality assurance capacity by reviewing and providing feedback on all degree program assessment plans in accordance with SACSCOC standards.⁵

The College of Engineering and Computing will work with OIRAA to ensure that the B.S. in Industrial Engineering assessment is incorporated into the institution-wide assessment infrastructure and processes and that assessment deadlines are met. Table 6 below outlines the student learning outcomes and assessment methodology for the B.S. in Industrial Engineering.

Table 6 – Student Learning Outcomes and Assessment/Evaluation Methodology

⁵ “Degree Program Assessment Business Process Document.” https://www.sc.edu/about/offices_and_divisions/institutional_research_assessment_and_analytics/documents/assessment/academic_program_assessment/2022_business_process_document.pdf. Accessed 23 Aug. 2023.

Program Objectives	Student Learning Outcomes Aligned to Program Objectives	Courses where SLOs are Intended to be Fulfilled	Methods of Assessment/Evaluation Methodology
Graduates of the Industrial Engineering program will advance professionally, collaborate effectively, practice lifelong learning, and adapt to change	1. Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	INDE 497- Industrial Engineering Capstone Project	Final Report
	2. 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.	INDE 595 - Systems Simulation	Test and exam questions
	3. Ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgement to draw conclusions.	INDE 397- Computer Control of Manufacturing Systems	Laboratory Report
	4. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	INDE 595 - Systems Simulation	Test and exam questions
	5. Ability to communicate effectively with a range of audiences.	INDE 497- Industrial Engineering Capstone Project	Presentations
	6. 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.	INDE 595 - Systems Simulation	Test and exam questions

USC Columbia’s engineering and computing programs are also accredited by ABET, a nonprofit, ISO 9001 certified organization. With ABET accreditation, students, employers, and the society we serve can be confident that our programs meet the quality standards that produce graduates prepared to enter a global workforce. The program of study is designed for ABET accreditation and guided by current recommendations of the Institute of Industrial and Systems Engineers (ISEE). The ISEE publication Industrial and Systems Engineering Body of Knowledge provides an outline for specific knowledge areas to achieve mastery in the field and is updated on an evolving basis. We plan to pursue ABET accreditation for this program.

The College of Engineering and Computing will submit a Request for Evaluation (RFE) within 18 months of conferring the first Bachelor of Science in Industrial Engineering degree. After requesting the evaluation, a self-study report will be submitted to ABET by July 1 following the RFE submission. The self-study report will include a quantitative and qualitative assessment of the program's strengths and weaknesses. The on-site visit typically occurs in September-December following the submission of the self-study report. The on-site review includes a review of materials, a tour of facilities and interviews with faculty, staff, students, and university administrators. Accreditation status is communicated by ABET by August 31 of the following year. Once ABET accreditation is obtained, the program will be reviewed every six years thereafter.

REQUIRED INFORMATION FOR THE SPECIFIC SUBSTANTIVE CHANGE (NEW PROGRAM)

Entrance Requirements

Admission requirements for first-year students are established by the Office of Undergraduate Admissions ([Appendix I](#)). Admissions requirements for transfer, major change and readmitted students are established by the College of Engineering and Computing. For the B.S. Industrial Engineering program, transfer applicants from regionally accredited colleges and universities must have a cumulative 2.75 GPA on a 4.00 scale and have completed a four-semester Calculus course equivalent to MATH 141 with a grade of C or better. Current University of South Carolina students who wish to enter the College of Engineering and Computing, and former students seeking readmission, must have an institutional GPA of 2.50 or better on at least 15 hours earned at USC, and have completed a four-semester Calculus course equivalent to MATH 141 with a grade of C or better.

Degree Conferral and Graduation Policies

To be eligible for graduation, students must meet all course requirements, be in good academic standing, meet any departmental or program requirements, and have a cumulative GPA of at least 2.00 on all work attempted at USC. The last 25% of a student's degree must be completed in residence at the University, and at least half of the hours in the student's major courses and in the student's minor courses (if applicable) must be taken at the University.

Bachelor of Science Industrial Engineering Program of Study (120 hours)

Program of Study	Credit Hours
1. Carolina Core	34-43
2. College Requirements	0
3. Program Requirements	44-53
4. Major Requirements	33

MAJOR REQUIREMENTS (33 hours)

Take all of:

Course	Title	Credits
INDE 291	Materials & Manufacturing	3
INDE 292	Work Design & Ergonomics	3
INDE 391	Production Engineering & Management	3
INDE 392	Operations Research in Engineering	3

INDE 397	Computer Control of Manufacturing Systems	3
INDE 490	Quality Engineering	3
INDE 496	Facilities Planning & Material Handling	3
INDE 497	Industrial Engineering Capstone Project	3
INDE 591	Smart Manufacturing	3
INDE 593	Supply Chain Engineering	3
INDE 595	Systems Simulation	3

New Courses and Course Descriptions

INDE 190 Introduction to Industrial Engineering (3 credits). Introduction to the profession and core topics of industrial engineering. Introduction to problem solving, ethics and industrial engineering design and analysis techniques.

INDE 291 Materials & Manufacturing (3 credits). Engineering materials, deformative manufacturing, subtractive manufacturing, additive manufacturing, assembly processes, quality control and productivity; computer aided manufacturing.

INDE 292 Work Design & Ergonomics (3 credits). Manual components and cognitive aspects of work. Ergonomics and work design methods for increased productivity and improved worker health and safety. Integration of motion and time study with human factors and ergonomics and safety engineering.

INDE 391 Production Engineering & Management (3 credits). Planning and control of operations in both manufacturing and service industries. Effective management and utilization of resources and the production of cost-effective products and services. Principles, models, and techniques used for production planning and inventory control.

INDE 392 Operations Research in Engineering (3 credits). Application of operations research to industrial engineering. Algorithmic and practical implementation of mathematical models to describe and/or improve systems and to gain real-time efficiency.

INDE 397 Computer Control of Manufacturing Systems (3 credits). Programmable automation applied to manufacturing. Computer architecture, sensors, and automatic data acquisition. Experiments interfacing microcomputers and industrial controllers in manufacturing applications.

INDE 490 Quality Engineering (3 credits). Quality tools and techniques employed to help prevent defects in engineered products, and to avoid problems when delivering solutions or services to customers.

INDE 496 Facilities Planning & Material Handling (3 credits). Methods to analyze and optimize facilities layout and the arrangement and movement of physical resources to support the production and distribution of goods and services.

INDE 497 Industrial Engineering Capstone Project (3 credits). Open-ended team design experiences that develop the ability to develop, implement, and improve integrated systems that include people, materials, information, equipment, and energy. Real-world experiences and business perspectives.

INDE 591 Smart Manufacturing (3 credits). Advanced concepts of smart manufacturing: hardware infrastructure, cyber infrastructure, data infrastructure, industrial Internet of things, machine to machine network, machine vision, manufacturing event understanding.

INDE 593 Supply Chain Engineering (3 credits). Engineering analysis of the movement, production, and storage of raw materials, work-in-process inventory, finished goods, and services from point of origin to point of consumption or use.

INDE 595 Systems Simulation (3 credits). Discrete event simulation methodology emphasizing the statistical basis for simulation modeling and analysis. Overview of computer languages and simulation design applied to various industrial situations.

The projected schedule for offering the industrial engineering courses listed above is provided in Table 4, above. Each course included in the major requirements will be offered twice annually, either fall-spring, spring-summer, or summer-fall. All general education and lower division courses in the program are currently offered every fall and spring, and most requirements can be completed in the summer as well.

Compliance with SACSCOC Standard 10.7

The College of Engineering and Computing follows University policies for determining the amount and level of credit awarded for its courses. Course development begins with an assigned faculty member with content expertise, with the help of the Director of Distributed Learning as applicable. Decisions regarding the number of credit hours and level of the proposed course are proposed to the Curriculum committee and voted on within the appropriate Academic Council.

The University adheres to the IPEDS [Integrated Postsecondary Education Data System] definition of a credit hour as 'a unit of measure representing the equivalent of an hour (50 minutes) of instruction per week over the entire term.' Therefore, each single course credit requires a minimum of 700 minutes of continuous and ongoing instructional time. A minimum of one calendar week of instruction with a cumulative total of at least 700 minutes is required for each credit offered. This time excludes breaks and final exams." All courses offered at the University of South Carolina Columbia are recorded in terms of semester hours.