

**New Program Proposal**  
**Master of Science, Technology Innovation and Entrepreneurial Engineering**  
**University of South Carolina Columbia**

**Summary**

The University of South Carolina Columbia requests approval to offer a program leading to the Master of Science, Technology Innovation and Entrepreneurial Engineering to be implemented in the Fall of 2017. The following chart outlines the stages of approval for the proposal. The Advisory Committee on Academic Programs (ACAP) voted to recommend approval of the proposal. The full program proposal and support documents are attached.

<b>Stages of Consideration</b>	<b>Date</b>	<b>Comments</b>
Program Proposal Received	12/16/16	Not Applicable
ACAP Consideration	1/26/17	<p>The USC representative introduced the proposal, stating the proposed program is one component of an initiative to connect with major stakeholders and to nurture technological innovation given the expressed interest of various industry partners. This M.S. program will be a one-year inter-departmental degree with the Moore School of Business that requires students to attend full-time and in traditional face-to-face format.</p> <p>Commission staffed asked about the success rate of the start-up companies referenced in the program proposal and for the proposal to elaborate upon the support services available for students. The USC Representative agreed to provide information regarding the sustainability of the aforementioned companies in addition to addressing the student support services.</p> <p>ACAP members asked about the breadth of academic preparation the institution may favorably consider for applicant admissions, and whether technically-trained or oriented students would be adequately prepared for graduate level business courses. The representative noted that curriculum delivery is designed for success for students from a breadth of training and backgrounds.</p> <p>After remaining discussion, ACAP voted to approve the program proposal. Staff transmitted remaining questions for additional clarity.</p>
Comments and suggestions from CHE staff sent to the institution	2/1/17	<p>Staff questions and requests for information included the following:</p> <ul style="list-style-type: none"> <li>• Explain how the proposed program relates to the industrial clusters noted in the Assessment of Need section and ensure the data is the most recent available;</li> <li>• For the admission requirements, provide examples of the types of compensatory industrial experience that would warrant an exception;</li> </ul>

Stages of Consideration	Date	Comments
		<ul style="list-style-type: none"> <li>• List the courses to be taught by adjuncts;</li> <li>• Provide program fee amount and specific purpose.</li> <li>• Identify the specific resources at the USC libraries (collections, databases, etc.) that will support the proposed program;</li> <li>• Update the Facilities section to describe adequate existing classroom and lab space, faculty offices, and more to support the program. Additionally, provide more explanation about the potential for reallocation of space including any estimated costs and anticipated impacts to other programs;</li> <li>• Provide more detail about the intended Assessment Measures and provide examples of the measures to be used; and</li> </ul> <p>As requested at ACAP:</p> <ul style="list-style-type: none"> <li>• Discuss the viability of the South Carolina start-ups mentioned in the program proposal. Include more employment data, particularly data for employment in SC;</li> <li>• As it relates to the enrollment chart, review and update the following: (a) explain no anticipated growth in projected enrollment; (b) verify the credit hours for accuracy; and (c) explicitly state that students will be enrolled full-time; and</li> <li>• Identify the academic support services available to students in addition to the Director and student services coordinator.</li> </ul>
Revised Program Proposal Received	2/13/17	The revised proposal satisfactorily addressed the requested revisions.

**Recommendation**

The staff recommends that the Committee on Academic Affairs and Licensing approve the program leading to the Master of Science, Technology Innovation and Entrepreneurial Engineering to be implemented in Fall 2017.

**Name of Institution**

University of South Carolina

**Name of Program (include concentrations, options, and tracks)**

MS in Technology Innovation and Entrepreneurial Engineering

**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.)

**Does the program qualify for supplemental Palmetto Fellows and LIFE Scholarship awards?**

- Yes
- No

**Proposed Date of Implementation**

Fall 2017

**CIP Code**

52.0701

**Delivery Site(s)**

University of South Carolina - Columbia

**Delivery Mode**

- Traditional/face-to-face\*  
\*select if less than 50% online
- Distance Education
  - 100% online
  - Blended (more than 50% online)
  - Other distance education

**Program Contact Information (name, title, telephone number, and email address)**

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**Institutional Approvals and Dates of Approval**

- |   |                   |
|---|-------------------|
| A. College of Engineering and Computing | April 19, 2016    |
| Chemical Engineering                    | April 8, 2016     |
| Civil and Environmental Engineering     | April 8, 2016     |
| Computer Science and Engineering        | April 8, 2016     |
| Electrical Engineering                  | April 8, 2016     |
| Mechanical Engineering                  | April 8, 2016     |
| B. Graduate Council                     | November 11, 2016 |
| C. University Provost                   | November 22, 2016 |
| D. USC President                        | November 22, 2016 |
| E. USC Board of Trustees                | December 13, 2016 |
| F. ACAF                                 | January 26, 2017  |

## **Background Information**

### **State the nature and purpose of the proposed program, including target audience and centrality to institutional mission. (1500 characters)**

There is a growing recognition of the need for technology innovation to sustain national economic revival. To address this need, the three major stakeholders, government, industry, and academia, have begun implementing major initiatives to nurture entrepreneurial mindset. Funding agencies have started to emphasize translational research. Private industry has developed partnership strategies to effectively access scientific discoveries. The academic institutions have taken steps to create entrepreneurial ecology, equip students with business skills, and promote research interactions between faculty and the private sector.

The University of South Carolina spearheads a number of initiatives to unleash the innovation potential of university research. Examples of successful efforts include, but are not limited to, establishing programs (e.g. Faber Center for Entrepreneurship), fostering ties with industry in strategic areas, and launching USC/Columbia incubator. Embedding an entrepreneurial mindset into the university culture, however, requires well trained students who can use emerging science as a basis for creation of economic value.

We propose that the ongoing efforts at the University of South Carolina can be complemented by the creation of a graduate program in Entrepreneurial Engineering. The goal of the program is to inspire and nurture the culture of innovation in students and faculty in the College of Engineering and Computing. The program will include an integrated curriculum, new venture creation projects and an innovation immersion module. The Moore School of Business will participate in the proposed program by providing overall design support and instruction via several courses. Several entrepreneurship/innovation courses are currently being offered at the master's level and undergraduate level.

### **List the program objectives. (2000 characters)**

In order to prepare engineering students with the skills needed to succeed in today's turbulent economy, engineering programs are increasingly offering some form of entrepreneurship training to their students. There is broad agreement of the need for a reform within the engineering community to develop graduates who meet the new standards for the next century. The reform movement encourages more entrepreneurial practices that move instruction from a traditional lecture to experiential learning. This transition necessitates higher education institutions to educate people in the fundamentals of entrepreneurship and encourage more entrepreneurial mindset.

According to a 2004 report published by the National Academy of Engineering (NAE), "The Engineer of 2020: Vision of Engineering in the New Century," "If the U.S. is to maintain its economic leadership position and be able to sustain its share of high-technology jobs, it must prepare for a new wave of change...it is agreed that innovation is the key and engineering is essential to this task."

The objectives of the program are to:

1. Train students with the tools, knowledge, and skills necessary to meet the challenges of working in today's corporate environment, which may include a startup or large corporation. This will be accomplished by giving students an overall insight of entrepreneurship and practices to assess technological and marketplace feasibility.
2. Contribute to economic development of South Carolina by supporting the development of scalable and commercially viable businesses generated by researchers and innovators.
3. Meet the educational goals of the University of South Carolina in its emphasis on innovation and technology.

4. Provide an alternate mechanism for engineering and science students to increase competitiveness in attaining technical, business development, consulting and leadership roles in early stage emerging ventures, and established organizations that emphasize innovation.

### **Assessment of Need**

Provide an assessment of the need for the program for the institution, the state, the region, and beyond, if applicable. (1500 characters)

Innovation has been recognized as an engine for economic growth. This has urged academic institutions to develop collegiate degree and certificate programs at the crossroads of engineering technologies and business, and invest in efforts that encourage innovation in all disciplines. For example, a recent study in 2010 by Shartland et al. highlighted that over half of the ASEE accredited universities offered a form of entrepreneurship content to engineers, with over 25% reporting more structured offerings like minors and certificates. The recent support by the NSF to launch a national STEP center to foster entrepreneurship, and the changes in ABET accreditation requirements for “professional skills” (Kuratko, 2005) further highlight the need for structured programs to instill an entrepreneurial mindset in engineering students. The effort permeates in the curriculum, research and industry endeavors, and in state economic engagement. The proposed program in Technology Innovation and Entrepreneurial Engineering is planned so that engineering and science students who wish to augment their technical skills with entrepreneurial skills can readily do so.

The University of South Carolina has been implementing a bold strategic plan to inspire creativity. The proposed program is directly related to the core USC mission, particularly the focus on education and the granting of terminal degrees, and is thus in-line with the overarching goals delineated in the mission statement.

At the state level, South Carolina is home to a number of industrial clusters in the transportation, recycling, biotechnology, medical/healthcare technology, manufacturing, automotive and aerospace sectors. The continued growth of these industries depend on the presence of a robust entrepreneurial ecosystem that meets the technological and workforce needs of companies. As noted in the 2017 South Carolina Innovation Plan, the SC Technology workforce has demonstrated a growth of 5.75% over the last year. However, there is a mismatch of skills leaving some industry sectors without available homegrown workforce. The growth in workforce has been mostly limited to two sectors of Advanced Manufacturing and Computer Software/Hardware. The existing workforce development programs are geared towards technical experts. Nevertheless, the jobs within the innovation economy requires workforce with a combination of expertise in product development as well as commercialization and feasibility assessment. Therefore, there is an immediate need to create a pipeline of talent with a combinatory education in business and entrepreneurship as well as technical skills.

The need for entrepreneurial education is also reflected in our survey of students on USC campus. Based on the results of a survey of students in the USC College of Engineering and Computing, approximately 27% of participants chose enthusiastic and 48% chose likely to consider a program in entrepreneurial engineering. Total number of participating students in this survey was 164 consisting of 66 sophomore, 47 junior and 51 senior students. The survey is an indicator of the demand for this program. The proposed program is a step-stone bridge the gap and will solidify the University of South Carolina’s position as the leading partner in advancing the State’s innovation economy.

### **Employment Opportunities**

Is specific employment/workforce data available to support the proposed program?

Yes

No

Provide supporting evidence of anticipated employment opportunities for graduates, including a statement that clearly articulates what the program prepares graduates to do, any documented citations that suggests a correlation between this program and future employment, and other relevant information. Please cite specific resources, as appropriate. (3000 characters)

**Note: Only complete this if the Employment Opportunities table and the section that follows the table on page 4 have not previously been completed.**

The need for creativity and innovation corresponds to the changing economy and the imperative to create sustainable 21st Century employment. The rapidly evolving nature of R&D and product development has created a significant demand for engineers with entrepreneurial and business mindset (National Science Board, Science and Engineering Indicators: 2010). It is no longer sufficient to graduate with a purely technical education; engineers need to understand how to bring research and technical skills to fruition by building commercially viable and scalable organizations and deliver new products and services tailored to the market demands. A recent Kauffman-funded Census report cites that “new firms and young businesses account for about 70 percent of gross job creation and disproportionately contribute to net job creation.” According to the Small Business Administration, Office of Advocacy, Small Business Profile: South Carolina, in 2009 there were 76,142 small businesses with less than 500 employees throughout the state. These small businesses accounted for 97.3% of the state’s total employers and 50.0% of private-sector employment (U.S. Dept. of Commerce: Bureau of the Census). These statistics highlight the great demand for students with entrepreneurial training who can join established or new businesses and become effective team leaders supporting employers as innovators.

As demonstrated in the 2016 Midlands Regional Competitiveness Report, the small business activity In Columbia metropolitan area saw a substantial increase of 10.48% indicating business environment conducive to small business growth. In addition, the share of employment in professional services and small businesses increased for the second straight year. According to this report, the number of SBIR/STTR awards per 100,000 residents and R&D expenditure per 1,000 residents increased substantially over last year. In another report published in 2012 by the Small Business and Entrepreneurship Council (SBEC), South Carolina was ranked the 4<sup>th</sup> state to do business in terms of tax incentives. The survey conducted by this study demonstrated 42.2% of participants selected the creation of strong climate as the best measurable goal for the region economic development.

These trends indicate that our region has begun to plant the seeds of innovation and entrepreneurship that need to be nurtured. Since 2007, the SC Small Business Development Center (SC SBDC) has assisted the startup of more than 500 new ventures and helped generate more than \$383 million in capital formation. In the past five years, SC SBDC consultants have helped create and save almost 6,000 jobs and have assisted in bringing more than \$27 billion in government contracts to small companies in South Carolina. A highlight of startup activity supported by the University of South Carolina further demonstrates this growth. University of South Carolina currently boasts 22 startups with licensed technology and 48 active licenses/options.

The purpose of the program is to train entrepreneurial minded talent to join startups and innovative companies Entrepreneurial engineers who seek leadership roles will have ample opportunities for in the private sector, consulting engineering firms and industry as well as in local, state and federal government agencies. This includes in-state organizations as well as outside the state and in foreign countries.

The program administrators will build strategic alliance with local industry through class projects, invited lecture series and recruit students as interns. In addition, the program will actively participate in national organizations (e.g. Keen Foundation, Tech Connect World, National Council of Entrepreneurs, VentureWell), and regional society meetings (e.g. SCBIO, Young Entrepreneurs of America). These interactions will contribute to enriching the opportunities that will be available to students in the program.

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

Yes

No

If yes, explain. (500 characters)

The proposed program will complement the existing graduate programs. The College of Engineering and Computing offers a Master of Engineering Management degree. The two programs significantly differ in terms of focus, professional degree, courses and target students. The planned program in Entrepreneurial Engineering will provide additional educational opportunities to the graduate students. This collaborative effort between the Moore School of Business and College of Engineering and Computing will be instrumental for multi-disciplinary research and instruction in the future.

**List of Similar Programs in South Carolina**

Program Name	Institution	Similarities	Differences
Technology Entrepreneurship	Clemson University	The program serve those graduate students in engineering and science disciplines who envision gaining an overall insight to entrepreneurship and commercialization feasibility.	<p>This is a certificate and not a graduate masters' degree.</p> <p>Clemson University's program focuses on classic entrepreneurship and new venture creation. The program a USC aims at instilling an entrepreneurial mindset in students and bringing a new dimension to education in science and engineering. The focus of our program is the cross-disciplinary skills that connects traditional with entrepreneurial engineering. The program includes concepts such as innovation, creativity, business plan development, and technology and commercialization feasibility analysis.</p>

### Description of the Program

Projected Enrollment						
Year	Fall		Spring		Summer	
	Headcount	Credit Hours	Headcount	Credit Hours	Headcount	Credit Hours
2017-2018	25	300	25	300	25	150
2018-2019	25	300	25	300	25	150
2019-2020	25	300	25	300	25	150
2020-2021	25	300	25	300	25	150
2021-2022	25	300	25	300	25	150

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

- Yes  
 No

If yes, explain. (1000 characters)

The admission criteria will generally conform to those currently required by the USC Graduate School. Individuals with the following qualifications will be admitted into the program:

- Must hold a B.S. degree from an accredited program (or equivalent if from an international university) in engineering, technology disciplines, or science, and must provide transcripts from the institution where the degree was obtained.
- A minimum undergraduate grade point average (GPA) of 3.0 is required for admission.
- International students are required to submit qualifying TOEFL or equivalent test score.
- Individuals may request a waiver of some of the above requirements (e.g., undergraduate GPA less than 3.0, or undergraduate degree not in engineering) and admission to the program if they provide sufficient evidence to the graduate program director that they have had compensatory industrial experience to warrant an exception. The determination is made on a case-by-case basis. The industrial experience that would warrant an exception is a minimum of 2 years in either a startup or a company that focuses on engineering and science fields. The experience should be detailed clearly in recommendation letters, as well as in the student's Statement of Purpose.

Are there any special articulation agreements for the proposed program?

- Yes  
 No

If yes, identify. (1000 characters)

### Curriculum

Select one of the following charts to complete: Curriculum by Year **or** Curriculum by Category

Curriculum by Year					
Course Name	Credit Hours	Course Name	Credit Hours	Course Name	Credit Hours
<b>Year 1</b>					
<b>Fall</b>		<b>Spring</b>		<b>Summer</b>	
ENCP 730 - Cases in Technology Feasibility Analysis	3	ECIV 707 - Management of Engineering Projects	3	ENCP 737 - Entrepreneurial Laboratory	6
ENCP 735 - Developing and Launching New Ventures	3	MGMT 777 - Innovation and New Venture Analysis	3		
EMCH 522 - Design for Manufacturing and Assembly	3	COSM 701 - Business and legal issues for Science Managers	3		
Business Elective	3	Business Elective	3		
<b>Total Semester Hours</b>	<b>12</b>	<b>Total Semester Hours</b>	<b>12</b>	<b>Total Semester Hours</b>	<b>6</b>
<b>Total Number of Credit Hours: 30</b>					

Business Electives (6 hours): Choose two approved business courses (500-level or above). Students should consult with the program director prior to enrolling in elective courses. Recommended Business Electives:

- (1) BADM 790 - Strategic Management of Technology and Innovation (3 Credit Hours)
- (2) BADM 790 - Entrepreneurial Finance and the Dynamics of Emerging Ventures (3 Credit Hours)

The program will include a comprehensive exam that serves as a culminating experience. The student works with an advisor, prepares a report that evaluates the student with respect to the breadth of knowledge and the ability to integrate and apply the knowledge in entrepreneurial engineering and technology innovation. The result of comprehensive examination will be signed by the advisor and members of the committee. The comprehensive exam will be at the end of second semester. Any student failing the comprehensive exam may petition to attempt it a second time. There is no guarantee that the petition will be accepted.

**Course Descriptions for New Courses**

Course Name	Description
Developing and Launching New Ventures	The objective of this course is to immerse students in (1) the frameworks that describe the process of new venture emergence and (2) the strategies and tools used to analyze and facilitate the emergence of new ventures, especially science and technology oriented ventures. The course will examine critical issues associated with key activities undertaken for the growth of a new initiative, whether in the form of a startup entity or within an established organization. The course will investigate how entrepreneurs address the challenges of creating viable business models and durable organizations. And, the course will engage with the entrepreneurial community and with founders of emerging ventures in projects that will provide value to their organizations.
Cases in Technology Feasibility Analysis	The courses focuses on determining whether to exploit a technological innovation idea. Students will acquire skills to evaluate the technical merits, operational logistics, consumer demands, team skills, and the financial viability of a technological innovation. In addition, students will apply entrepreneurial techniques to create a value proposition, conduct competitive analysis, and perform competitive analysis to assess whether an innovative technology is ready for commercialization.
Entrepreneurship Laboratory	The course will structure an intensive project experience for students to learn about challenges and opportunities facing entrepreneurs in startups. The course includes an experiential learning field visit. Student teams will work with technology-based startup companies incubated in government/university based innovation centers and conduct project-based research and analysis.

**Faculty**

<b>Faculty and Administrative Personnel</b>				
<b>Rank</b>	<b>Full- or Part-time</b>	<b>Courses Taught or To be Taught, Including Term, Course Number &amp; Title, Credit Hours</b>	<b>Academic Degrees and Coursework Relevant to Courses Taught, Including Institution and Major</b>	<b>Other Qualifications and Comments (i.e., explain role and/or changes in assignment)</b>
Program Director	Full-time	Cases in Technology Feasibility Analysis (3 credits); Entrepreneurship Laboratory (6 credits)	PhD/MBA	Faculty in the School of Engineering & Computing
Full Professor	Full-time	Strategic Management of Technology Innovation (3 credits)	PhD	Faculty in the Moore School of Business
Clinical Professor	Full-time	Innovation and New Venture Analysis (3 credits)	PhD/MBA	Clinical Faculty in the Moore School of Business
Clinical Professor	Full-time	Developing and Launching New Ventures (3 credits); Entrepreneurial Finance and the Dynamics of Emerging Ventures (3 credits)	PhD/MBA	Clinical Faculty in the Moore School of Business
Assistant Professor	Full-Time	Design for Manufacturing and Assembly (3 credits)	PhD	Faculty in the School of Engineering & Computing
Adjunct Professor	Part time	Management of Engineering Projects (3 credits)	PhD	Practicing – Experienced engineer/entrepreneur Adjunct Faculty in the School of Engineering & Computing
Adjunct Professor	Part-time	Business and legal issues for Science Managers (3 credits)	JD/MBA	Practicing – Experienced in intellectual property and technology development with a background in engineering – School of Engineering & Computing

Note: Individuals should be listed with program supervisor positions listed first. Identify any new faculty with an asterisk next to their rank.

Total FTE needed to support the proposed program (i.e., the total FTE devoted just to the new program for all faculty, staff, and program administrators):

Faculty	1	Staff	1	Administration	1
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### **Faculty /Administrative Personnel Changes**

Provide a brief explanation of any additional institutional changes in faculty and/or administrative assignment that may result from implementing the proposed program. (1000 characters)

All full-time faculty members in the program are presently in the College of Engineering and Computing and Moore School of Business. The program will be staffed with two adjunct faculty from private sector. The budget to cover the costs for the adjunct faculty is included in Financial Support Section.

An attribute of a strong entrepreneurial engineering program is that students to engage in academic theories as well as real-world examples. To accomplish this goal, the proposed program will be taught by a blend of academic faculty at USC and experienced entrepreneurs and industry veterans. Those two courses include EMCH 522 - Design for Manufacturing and Assembly, and ECIV 707 - Management of Engineering Projects.

The program fee will be sufficient to cover adjuncts or overload compensation for faculty and staff as well as other associated operating expenses.

### **Library and Learning Resources**

Identify current library/learning collections, resources, and services necessary to support the proposed program and any additional library resources needed. (1000 characters)

The library resources on entrepreneurship and innovation will be used to support the program. Overall, students have access to 1592 printed books, 1444 E-books, and 22 E-videos and 29 journals on the topics of innovation and entrepreneurship. The current library holdings are adequate for the proposed degree program.

Overall, The Thomas Cooper Library currently has 19,764 books and subscribes to 758 periodicals in management and related fields. Electronic subscriptions to many journals and other resources are available through inter-library loans. In addition, Moore School of Business maintains its own library (Elliott White Springs Business Library) which currently has 7, 507 books and 79 periodicals pertaining to management and other related fields. The library currently has an acquisition budget of \$270,637 for Business related subscriptions to journals and databases and \$9756 for Business related books. The university's total budget for the purchase of new books and periodicals totals \$6.02 million. The College of Engineering and Computing's allocated amount for periodical subscriptions is \$228,504 and \$10,800 for books. The School of Journalism and Mass Communications has a budget of \$35,732 for new periodical subscriptions and \$6785 for new books. The USC School of Law maintains their own library (Coleman Karesh Library) separate from the university system which has an acquisition budget of \$1,036,074 for the purchase of new books, journals and other periodicals.

### **Student Support Services**

Identify academic support services needed for the proposed program and any additional estimated costs associated with these services. (500 characters)

Present academic support services will suffice in the first two years. As enrollment increases, the need for academic services will be reassessed.

Administration of the program will be overseen in tandem by the Program Director and a faculty governance committee composed of four faculty members, two from Moore School of Business, and two from the College of Engineering and Computing. The core faculty who will deliver the proposed curriculum will consist of 5 members. A USC staff member will coordinate all administrative issues associated with the proposed program. A Graduate Committee of 3 faculty members is already in place, together with staff support, to administer the MS degree program. The Graduate Committee will assume the additional duties of administering the program including screening applications for admission and administering the comprehensive exam.

The Student Services Office at the College of Engineering and Computing will help students progress to graduation. Some of our general student affairs responsibilities include, but are not limited to new student orientation, registration issues, academic policies and procedures, graduation compliance and petitions. The Graduate Committee for the program will be responsible for academic of students and curricular issues. In addition, students will have access to the Career Center tools and events in the College of Engineering and Computing. In addition, the University provides services to all enrolled students including peer writing and communications, and workshops on academic decision skills and financial educations in small group sessions.

### **Physical Resources**

Identify any new instructional equipment needed for the proposed program. (500 characters)

No new equipment or resources are needed to support the proposed program.

Will any extraordinary physical facilities be needed to support the proposed program?

Yes

No

Identify the physical facilities needed to support the program and the institution's plan for meeting the requirements, including new facilities or modifications to existing facilities. (1000 characters)

The impact on space, equipment, technology and library holding is expected to be minimal. All resources required to deliver the proposed curriculum are already present at USC, and are available for the realization of this program. No additional physical plant requirements are foreseen specifically for the proposed program. No new laboratory space will be required to mount the new program.

If the number of students enrolled the program goes beyond the expected numbers, some reallocation of existing space may be performed to allow for the development and operation of the class-associated laboratories as needed. This includes holding the classes in larger class rooms (e.g. AMOCO Hall in the Swearingen Engineering Center). No additional cost is anticipated.

**Financial Support**

<b>Total Estimated Costs</b>						
<b>Year</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>Total</b>
Program Administration	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$50,000
Faculty and Staff Salaries	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$750,000
Graduate Assistants	-	-	-	-	-	-
Equipment	-	-	-	-	-	-
Facilities	-	-	-	-	-	-
Supplies and Materials	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
Library Resources	-	-	-	-	-	-
Other*	-	-	-	-	-	-
<b>Total</b>	<b>\$165,000</b>	<b>\$165,000</b>	<b>\$165,000</b>	<b>\$165,000</b>	<b>\$165,000</b>	<b>\$825,000</b>
<b>Sources of Financing</b>						
<b>Year</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>Total</b>
Tuition Funding	\$399,937.50	\$399,938	\$399,938	\$399,938	\$399,938	\$1,999,688
Program Specific Fees	\$165,000	\$165,000	\$165,000	\$165,000	\$165,000	\$825,000
State Funding (i.e., Special State Appropriation)*	-	-	-	-	-	-
Reallocation of Existing Funds*	-	-	-	-	-	-
Federal Funding*	-	-	-	-	-	-
Other Funding*	-	-	-	-	-	-
<b>Total</b>	<b>\$564,938</b>	<b>\$564,938</b>	<b>\$564,938</b>	<b>\$564,938</b>	<b>\$564,938</b>	<b>\$2,824,688</b>
<b>Net Total</b> (Sources of Financing Plus Minus Estimated New Costs)	\$399,938	\$399,938	\$399,938	\$399,938	\$399,938	\$1,999,688
<b>Net Total - College of Engineering</b> (Program Specific Fees Minus Estimated Costs)	\$0	\$0	\$0	\$0	\$0	\$0
<b>ROI</b> (Tuition Funding Plus Fees Minus Costs)	<b>242%</b>	<b>242%</b>	<b>242%</b>	<b>242%</b>	<b>242%</b>	<b>242%</b>

\*Provide an explanation for these costs and sources of financing in the budget justification.

### **Budget Justification**

Provide a brief explanation for the other new costs and any special sources of financing (state funding, reallocation of existing funds, federal funding, or other funding) identified in the Financial Support table. (1000 characters)

**Note: Institutions need to complete this budget justification *only* if any other new costs, state funding, reallocation of existing funds, federal funding, or other funding are included in the Financial Support table.**

The annual costs of implementation for the first 5 years is \$165,000/year. The costs include admin oversight and clerical support, marketing supply costs, and faculty salaries. The program will be partially taught by experienced investors, entrepreneurs and industry leaders as adjunct faculty. The proposed compensation cost for adjunct faculty is \$30,000 per year. The Moore School of Business will cover 4 courses, all of which are currently being offered. The Moore School will receive a total of \$60,000 from the fees generated from the program to cover the overload compensation. The remaining \$60,000 generated from the fees will cover the salary of full time faculty in the College of Engineering and Computing. The remainder of request is to cover the program administration and marketing costs.

Student tuition will cover the implementation costs. The revenue from the program is calculated based on the enrollment projections (page 6). The in-state tuition per graduate student per semester is \$6,399. The summer tuition per credit hour is \$533.25.

The College of Engineering and Computing fee for this program is \$220 per credit hour due to the executive nature of the proposed MS program. All tuition goes to the University's general fund; allocation back to the College of Engineering and Computing is determined by the annual strategic planning / budgeting process. The proposed fee will be used to cover the entire costs of program including administrative cost, additional sections added to currently taught classes, and networking costs. The administrative costs are associated with securing venture projects for the summer entrepreneurial laboratory as well as other course material. The Supplies and Materials costs are associated with organizing networking events and seminar series. The faculty and staff costs are associated with the adding sections to currently taught courses as well as the costs associated with adjunct faculty salaries.

## Evaluation and Assessment

**Programmatic Assessment:** Provide an outline of how the proposed program will be evaluated, including any plans to track employment. Identify Assessment tools or software used in the evaluation. Explain how assessment data will be used. (3000 characters)

We will put together a rigorous short-term and long-term evaluation plan to (1) assess the effectiveness of proposed program and (2) implement continuous refinement of curricular activities. We will use surveys to assess student growth and development. This will be accomplished by administering three surveys: (1) at the conclusion of program and (2) at the point when program alumni have entered workforce. The surveys will be prepared in consultation with USC Office of Program Evaluation.

A committee composed of faculty in the School of Engineering and Computing, the Moore School of Business, and adjunct faculty coming from industry will be formed to oversee the academic curriculum and coordinate the presentation of all curriculum changes to the faculty at-large for approval. The Director of the program will chair the Curriculum Committee. The committee will formalize the assessment plan, tactical metrics, and implementation plan.

The committee will document its assessment processes and program improvements. Program-level information will be linked to the student learning outcomes. The student learning outcomes (SOL) for the new degree program include:

1. Understand the fundamentals of technology prototyping, legal protection, market sizing, business plan development, and capital raise.
2. Communicate effectively across the entire enterprise and contribute in multidisciplinary teams.
3. Lead entrepreneurial process including ideation, feasibility analysis, and management of organizational resources.
4. Apply corporate innovation strategies including the assessment of commercial viability and transformation into business plans.
5. Analyze the impact of engineering solutions in global, economic, and entrepreneurial contexts.
6. Identify alternative career possibilities in the context of innovation and entrepreneurship.

There are six metrics (M) to be used to evaluate the Student Outcomes:

1. Student ePortfolios (M1)
2. Course Notebooks (M2)
3. Employer Survey (M3)
4. Internship evaluation (M4)
5. Exit survey (M5)

These measurement instruments encompass both direct and indirect measures, but with at least one direct measure per Student Outcome. Table 4 lists descriptions of the assessment instruments with the responsible party and schedule, as well as evaluation criteria.

**Student Learning Assessment**

<b>Assessment Instrument</b>	<b>Description of Assessment Instrument</b>	<b>Responsibility</b>	<b>Schedule</b>	<b>Evaluation Criteria</b>
M1 - ePortfolio	Digital collection of the student's work with artifacts demonstrating competency in engineering design, oral/written communication, industrial practices, and mentoring/ leadership addressing the program learning objectives.	Assessment Committee and program advisory board (consisting of practicing entrepreneurs in technology industry).	Every year	Assessment Committee and advisory board will conclude that the ePortfolio is complete and outcomes have been met.
M2 - Course Notebooks	A course notebook contains examples of all graded work collected from students (e.g., exams, homework, lab reports, etc), course syllabus, and textbook(s). Made for each course.	Course Instructors and Assessment Committee	Every third year in December and May	Assessment Committee will conclude that the Student Outcomes examined during a particular review have been achieved.
M3 - Employer Survey	Employers are queried for assessment of Student Outcomes of graduates employed at their institutions. Employment of students following attainment of the degree will be monitored through the CEC Career Office staffed with a student services coordinator.	Program Director and Assessment Committee	Every other year in March	Advisory Board member surveys will indicate that graduating students have achieved the outcomes.
M4 - Internship evaluation	A performance report following the completion of the internship by the assigned preceptor reviews business, professional, leadership, and communication skills of the intern.	Program Director and Assessment Committee	Every year	At least 80% of preceptors will concur that students have met outcomes.
M5 - Exit Survey	Program Director surveys graduating students using Exit Survey Form	Program Director	every three year thereafter	At least 80% of students will agree that the Student Outcomes are achieved.

### Summary of Program Evaluation Plan

Program Objectives	Student Learning Outcomes	Measures
<b>Enhancement of Knowledge and Understanding of fundamentals</b>	SLO1	M1, M2
	SLO2	M1, M2
	SLO5	M1, M2
<b>Career Opportunities</b>	SLO6	M3, M4, M5
<b>Workforce Performance</b>	SLO4	M3, M4
	SLO5	
	SLO6	

The student performance will be monitored by (1) gathering samples of homework and exams (weak, average, strong) in each course, and (2) asking students to assess the correlation between objectives and learning outcomes of on end of semester Student Evaluations. Employment of students following graduation will be monitored by the Office of Career Services in the College of Engineering and Computing. The employers will be queried for assessment of graduates employed who participated in the program versus those who did not. The surveys will emphasize the ability of students to solve problems, work across boundaries in multi-functional teams and understand fundamentals of technology development and commercialization.

The program faculty will hold an annual fall planning meeting to discuss the student learning outcomes, success metrics, and survey data. Assessment data will be used to monitor student learning, and refine curriculum and course contents.

Will the proposed program seek program-specific accreditation?

Yes

No

If yes, provide the institution's plans to seek accreditation, including the expected timeline for accreditation. (500 characters)

Will the proposed program lead to licensure or certification?

Yes

No

If yes, explain how the program will prepare students for licensure or certification. (500 characters)

**Teacher or School Professional Preparation Programs**

Is the proposed program a teacher or school professional preparation program?

Yes

No

If yes, complete the following components.

Area of Certification

Please attach a document addressing the South Carolina Department of Education Requirements and SPA or Other National Specialized and/or Professional Association Standards.