

ACAP
11/30/17
Agenda Item 3b

Name of Institution
Clemson University

Name of Program (include concentrations, options, and tracks)
Master of Engineering (M. Engr.) in Biomedical 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
January 2018

CIP Code
14.0501

Delivery Site(s)
Clemson University (at MUSC, 68 Pres. St, BEB), 71023

Delivery Mode

- Traditional/face-to-face* Distance Education
*select if less than 50% online 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

Clemson University Board of Trustees, 3 February 2017

Background Information

Provide a detailed description of the proposed modification, including its nature and purpose and centrality to institutional mission. (1500 characters)

This program modification proposal requests approval to extend our approved Master of Engineering in Biomedical Engineering program, currently offered at both the Clemson University main campus and the Clemson University Biomedical Innovation Campus, to the MUSC main campus. In recent years, the relationship between Biomedical Engineering and clinical departments at MUSC has grown significantly as a robust applied engineering program with significant NIH funding providing opportunities for graduate applied training in biomedical engineering and close alignment with the biomedical industry in the Low Country.

The M.S. degree described in a separate accompanying proposal is a research-focused advanced degree intended to prepare students for a research career, foundational knowledge discovery, and/or doctoral study. The M.Engr. program, in contrast, provides an integrated education and internship experience preparing students for product and technology development as practicing engineers in the technical workforce. It is considered a professional terminal degree that furthers careers in the context of application of engineering knowledge.

Clemson University is committed to fostering innovation and education to support the economic development of South Carolina by providing applied knowledge leadership in fields of national importance. Expanding the reach of this master's level engineering program to benefit students in the LowCountry is consistent with these commitments and will continue to meet the education needs of South Carolinians.

List the objectives of the modified program. (1500 characters)

The purpose of offering Clemson's M.Engr. in Biomedical Engineering program at MUSC is to bolster the Clemson-MUSC partnership while providing a ready workforce for employers in the Lowcountry and beyond comprising students that have applied clinical experience through embedded education. The M.Engr. degree program is designed to better train an applied workforce to sustain a growing biomedical industry in South Carolina. The Biomedical Engineering program is based on core biomedical engineering and relevant clinical applications that provide the basis for strong applied technical contributions in industry.

This new location will provide students with unique opportunities for a superior education in biomedical engineering via access to MUSC clinicians and healthcare practitioners. Delivering certain courses in our curriculum in close proximity with clinicians and clinical facilities can add significant value to the students' applied clinical education and increase their competitiveness upon graduation for employment in the applied technical workforce.

Initiatives by the South Carolina Legislature, such as the SmartState Centers, have provided tremendous incentives for economic development in the biomedical technology sector. Over 900 biomedical companies are located in South Carolina and job growth is robust. These businesses need employees with applied clinical knowledge and leadership to ensure their competitiveness. The expansion of programs like these to the Lowcountry is an important aspect of meeting this need. This program will also provide leverage for recruiting to South Carolina other medical device companies seeking employees with advanced engineering skills.

Assessment of Need

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

Data from the Bureau of Labor Statistics predicts 62% job growth in the national biomedical engineering profession from 2012-2020. South Carolina is also becoming a center of bioengineering innovation. A 2012 Battelle Institute study reported that bioscience employment in South Carolina grew by more than 45% during the last decade. According to Battelle, 985 business establishments in the bioscience industry have been identified in South Carolina, with medical device manufacturing being the biggest subsector. Initiatives by the South Carolina Legislature, such as the SmartState Centers, have provided tremendous incentives for economic development in the biomedical technology sector. Accordingly, these businesses need employees with applied clinical knowledge and leadership skills to ensure their competitiveness. The expansion of programs like the M. Engr. in Biomedical Engineering to the Lowcountry is an important aspect of meeting this need.

Will the proposed modification impact any existing programs and services at the institution?

Yes

No

If yes, explain. (1000 characters)

List of Similar Programs in South Carolina

Program Name	Institution	Similarities	Differences
Master of Engineering in Biomedical Engineering	University of South Carolina	Same degree name	USC's degree mirrors the BS degree in Biomedical Engineering with Concentrations in Biochemical Engineering and Biomechanical Engineering. Clemson's degree focuses on two different concentrations: Bioelectrical Engineering and Biomaterials Engineering, as such both degrees complement each other and provide a full spectrum of talent meeting the workforce needs of the state biomedical industry.

Description of the Program

Projected New Enrollment – M.Engr. in Biomedical Engineering						
Year	Fall		Spring		Summer	
	Headcount	Credit Hours	Headcount	Credit Hours	Headcount	Credit Hours
2018	4	12	4	12	4	6
2019	8	12	8	12	8	6
2020	12	12	12	12	12	6
2021	16	12	16	12	16	6
2022	16	12	16	12	16	6

Curriculum

Attach a curriculum sheet identifying the courses required for the program.

Curriculum Changes

Note: Complete this table only if there are changes to the curriculum.

Courses Eliminated from Program	Courses Added to Program

Faculty

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

No major institutional change in faculty and/or administrative assignment will be needed to implement this program modification. Incremental personnel costs comprise modest supplements to support program administration via increased responsibilities of a Program Coordinator and Student Service Coordinator.

Resources

Identify any new library/learning resources, new instructional equipment, and new facilities or modifications to existing facilities needed to support the modified program. (2000 characters)

The Clemson-MUSC biomedical engineering collaboration has the required facilities and resources to support this program modification.

Financial Support (INCREMENTAL COST ACCOUNTING)

Estimated New Costs by Year						
Category	1 st	2 nd	3 rd	4 th	5 th	Total
Program Administration	14,590	15,197	16,185	17,149	17,710	80,831
Faculty and Staff Salaries						-
Graduate Assistants						-
Equipment	6,343	6,746	7,909	8,960	9,519	39,478
Facilities	14,136	42,150	63,012	88,167	94,339	301,804
Supplies and Materials	11,471	23,732	35,138	47,002	47,544	164,886
Library Resources						-
Other*	25,939	65,999	94,217	127,355	131,128	444,638
Total	72,479	153,824	216,462	288,633	300,239	1,031,637
Sources of Financing						
Category	1 st	2 nd	3 rd	4 th	5 th	Total
Tuition Funding	65,644	164,380	249,587	343,657	353,871	1,177,139
Program-Specific Fees						-
State Funding (i.e., Special State Appropriation)*						-
Reallocation of Existing Funds*						-
Federal Funding*						-
Other Funding*						-
Total	65,644	164,380	249,587	343,657	353,871	1,177,139
Net Total (i.e., Sources of Financing Minus Estimated New Costs)	(6,836)	10,557	33,126	55,024	53,631	145,502

*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.

Funding:

Graduate tuition is consistent with the pricing of the current M. Engr. program on the main campus. No graduate assistantships or tuition abatements will be offered, and only full-time students will be accepted. Total program costs range, based on residency, from \$13K to \$27K per M.Engr. student.

Costs:

The only new incremental personnel costs are modest supplements to support program administration via increased responsibilities of a Program Coordinator and Student Service Coordinator.

Modest equipment costs reflect hardware and maintenance to support replacement of design laboratory equipment and the replacement of videoconferencing equipment.

Materials costs reflect the programmatic materials required for use in the program's design laboratory.

Clemson will pay MUSC a per student fee to support MUSC's student services (health care, campus recreation, etc) based on an existing agreement with MUSC.

While the new program location will leverage existing space utilized by Clemson at MUSC and no additional space will be required at the proposed enrollment levels, the incremental accounting contains facilities costs that reflect debt service accounting to the State Treasurer.

Incremental "Other" costs include administrative overhead that is intended to represent general and administrative costs (estimated at 25% of base academic revenue) and marketing costs.

Evaluation and Assessment

Will any the proposed modification impact the way the program is evaluated and assessed?

- Yes
 No

If yes, explain. (1000 characters)

Will the proposed modification affect or result in program-specific accreditation?

- Yes
 No

If yes, explain; if the modification will result in the program seeking program-specific accreditation, provide the institution's plans to seek accreditation, including the expected timeline for accreditation. (500 characters)

Will the proposed modification affect or 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 modified program a teacher or school professional preparation program?

- Yes
 No

If yes, complete the following components.

Area of Certification

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