

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 Science in Bioengineering program, currently offered at both the Clemson University main campus and the Clemson University Biomedical Innovation Campus, to the Bioengineering Building at MUSC. In recent years, the relationship between Clemson bioengineering and clinical departments at MUSC has grown significantly as a robust fundamental research program with significant NIH funding that provides opportunities for graduate research training in bioengineering and close alignment with the biomedical industry in the Low Country.

The M.S. degree is a research-focused advanced degree intended to prepare students, who typically are not or do not aspire to be practicing engineers in the technical workforce, for a research career that could include subsequent doctoral studies and foundational knowledge discovery. Clemson University is committed to fostering innovation and education to support the economic development of South Carolina by providing knowledge discovery 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 MS Bioengineering program at the MUSC location is to bolster the Clemson-MUSC partnership while providing: a) a talented and prepared pool of South Carolinians for doctoral study in bioengineering, and/or b) a ready workforce for employers in the Lowcountry and beyond via students that have fundamental research experience through embedded clinical education. The M.S. degree is a research-focused program of study designed to prepare graduates to join academic research efforts creating knowledge that underlies new biomedical technologies. The bioengineering profession works in close partnership with clinical practice. This new location will provide students with unique opportunities for a superior education in bioengineering via access to MUSC clinicians and healthcare practitioners. Delivering certain courses in our curriculum in close proximity with clinical collaborators and facilities can add significant value to students' educational experience, and increase their competitiveness upon graduation for employment and doctoral degree enrollment.

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

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 foundational knowledge and knowledge discovery leadership skills to ensure their competitiveness. The expansion of programs like the MS in Bioengineering 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 Science in Biomedical Engineering	University of South Carolina	Graduate level research degree program focused on biomedical engineering fundamentals.	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 – MS in Bioengineering						
Year	Fall		Spring		Summer	
	Headcount	Credit Hours	Headcount	Credit Hours	Headcount	Credit Hours
2018	8	12	8	12	8	6
2019	15	12	15	12	15	6
2020	18	12	18	12	18	6
2021	20	12	20	12	20	6
2022	20	12	20	12	20	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. A 10% supplement will be provided to the MS program's graduate student service coordinator for the increased workload associated with the program delivery and management.

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 bioengineering 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	5,915	5,978	5,682	5,436	5,616	28,626
Faculty and Staff Salaries						-
Graduate Assistants						-
Equipment	12,686	12,649	11,864	11,200	11,899	60,298
Facilities	28,273	79,031	94,518	110,209	117,923	429,955
Supplies and Materials	19,741	38,497	45,507	50,753	51,430	205,928
Library Resources						-
Other*	51,078	122,248	139,526	157,194	161,909	631,955
Total	117,694	258,403	297,096	334,791	348,778	1,356,762
Sources of Financing						
Category	1 st	2 nd	3 rd	4 th	5 th	Total
Tuition Funding	173,798	434,579	497,106	570,143	587,247	2,262,872
Program-Specific Fees						-
State Funding (i.e., Special State Appropriation)*						-
Reallocation of Existing Funds*						-
Federal Funding*						-
Other Funding*						-
Total	173,798	434,579	497,106	570,143	587,247	2,262,872
Net Total (i.e., Sources of Financing Minus Estimated New Costs)	56,105	176,175	200,010	235,352	238,469	906,110

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

Financial Support (FULL COST ACCOUNTING)

Estimated New Costs by Year						
Category	1st	2nd	3rd	4th	5th	Total
Program Administration	5,915	5,978	5,682	5,436	5,616	28,626
Faculty and Staff Salaries	132,639	133,096	125,601	119,293	122,367	632,995
Graduate Assistants						-
Equipment	18,353	13,935	13,046	12,295	12,994	70,623
Facilities	28,273	79,031	94,518	110,209	117,923	429,955
Supplies and Materials	181,238	200,348	198,610	196,495	201,462	978,152
Library Resources						-
Other*	46,310	104,935	118,325	132,059	134,905	536,533
Total	412,728	537,322	555,781	575,786	595,267	2,676,884
Sources of Financing						
Category	1st	2nd	3rd	4th	5th	Total
Tuition Funding	173,798	434,579	497,106	570,143	587,247	2,262,872
Program-Specific Fees						-
State Funding (i.e., Special State Appropriation)*						-
Reallocation of Existing Funds*						-
Federal Funding*						-
Other Funding*						-
Total	173,798	434,579	497,106	570,143	587,247	2,262,872
Net Total (i.e., Sources of Financing Minus Estimated New Costs)	(238,930)	(102,743)	(58,675)	(5,644)	(8,020)	(414,012)

*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 MS 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 \$17K to \$37K per MS student.

Costs:

The only new incremental personnel costs are modest supplements to support program administration via increased responsibilities of an extant 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.