PROGRAM MODIFICATION PROPOSAL

Name of Institution
Medical University of South Carolina

Name of Program (include concentrations, options, and tracks)
Change MS Biomedical Sciences concentration in Biometry and Epidemiology to two separate concentrations for the MS Biomedical Sciences
Concentration in Biostatistics
Concentration in Epidemiology

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
March 1, 2018

CIP Code
26.0102

Delivery Site(s)
Medical University of South Carolina

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)
Dr. John Vena
Professor and Founding Chair, Department of Public Health Sciences
843-876-8687
vena@musc.edu

Institutional Approvals and Dates of Approval
Department of Public Health Sciences Biostatistics Curriculum Committee: 06 September 2016
College of Graduate Studies Curriculum Committee: Oct 24, 2017
Education Advisory Committee: Dec 5, 2017
MUSC Provost Council: Dec 18, 2017

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Background Information

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

MUSC has been offering a concentration of its MS Biomedical Sciences degree (CIP 26.0102) called Biometry and Epidemiology (CIP 26.0102) for over three decades. Upon matriculation, students in this concentration gravitate towards a focus in either biostatistics or epidemiology, with subsequent coursework and research training appropriately tailored. Since its initial approval, curricular offerings have been updated as needed, and trainees have continued to secure competitive employment upon graduation. The early didactic training in the concentration is identical, and students typically focus either on biostatistics or epidemiology focused courses and research experiences. The lack of specificity in the name of this concentration does not convey to prospective students that the program offers a depth in biostatistics or epidemiology. Additionally, 'biometry' is a dated term replaced some decades ago by the term 'biostatistics' to describe the field of statistics applied to biomedical research.

We request CHE approval to modify our existing single concentration in Biometry and Epidemiology to two separate concentrations—one in Biostatistics; another in Epidemiology. None of the other concentrations in our MS in Biomedical Sciences degree is affected by this proposed modification. Because Biostatistics and Epidemiology are concentrations within a single degree, no change in CIP code is needed. The proposed modified concentrations are fundamentally unchanged with respect to curriculum and research training since we have evolved the curriculum incrementally over the years to prepare graduates to have a breadth of knowledge in both disciplines with a special depth of knowledge in one or the other—whichever they expressed was the discipline that best aligned with their career interests. As such, students enrolled in the current MS program will not be disadvantaged. The transition will occur seamlessly and without disruption to students in the existing program.

The well-respected MSPH program at the Arnold School of Public Health at the University of South Carolina has been operating in parallel to our MS concentration in Biometry and Epidemiology for decades with minimal competition, and all our graduates either receive employment in academia, research and government immediately after graduation or pursue PhD studies, further supporting that the requested program modification will not adversely affect the existing program at USC nor will it create an imbalance in supply to demand for MS trained Biostatisticians and Epidemiologists.

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

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The following lists **core competencies of the Biostatistics concentration of the** MS degree:

- Describe the role of biostatistics in the discipline of public health.
- Describe the basics of probability, random variation and common probability distributions.
- Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met.
- Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
- Apply descriptive techniques commonly used to summarize public health data.
- Apply common statistical methods for inference.
- Develop sample size and power calculations for different study designs including those from clinical trials and observational studies
- Perform a variety of basic and advanced statistical analyses
- Apply quantitative and reasoning skills, as well as content-area knowledge, to analyze data from epidemiologic, clinical, observational and experimental studies
- Interpret results from explanatory and descriptive data analysis and advanced statistical analyses to draw relevant conclusions from data
- Develop a high level of competency in statistical programming both with R and SAS for both managing and analyzing data
- Communicate effectively by producing summary reports, statistical analysis sections of papers, graphical summaries and tabular summaries of the data
- Interact with different public health, health care and medical professionals to address statistical aspects of their research studies as a part of statistical consultation
- Recognize potential ethical issues and implement the concepts of ethical conduct of research.

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The following lists **core competencies of the Epidemiology concentration of the** MS degree:

- Identify key data sources for epidemiologic investigations
- Identify the principles and limitations of public health screening programs
- Describe a public health problem in terms of magnitude, person, time and place
- Explain the importance of epidemiology for informing scientific, ethical, economic and political discussions of health issues
- Calculate, apply and critically evaluate basic and advanced epidemiologic measures of association and disease frequency
- Understand prediction, confounding, mediation and effect modification
- Communicate epidemiologic information to lay and professional audiences
- Design, analyze and evaluate epidemiologic studies
- Assess study internal and external validity
- Demonstrate skills in data collection and management
- Characterize issues associated with missing data
- Understand sampling design for common observational studies, complex sample surveys, clinical trials
- Understand the global, cultural and social context of health and disease

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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)

The individual Biostatistics and Epidemiology concentrations in the MS Biomedical Sciences degree program align with MUSC's missions in disease prevention, patient and community wellness, and population health. The concentration in Biostatistics will continue to equip students with expertise in biostatistics and research methodology fulfilling the workforce needs of the state, the region and the nation with regard to professionals with advanced training in biostatistics.

The program will provide graduates marketable skills for careers in public health agencies, health departments, hospitals and other health care organizations, government regulatory agencies, not-for-profit agencies, academic institutions, and industry. Graduates with MS training are equipped to enter careers in current and projected growth areas, as shown on the following table.

Area	Title	Base	Projected	Change	% Change	Avg. Anl Openings
South Carolina	Statisticians	410	560	150	37.9	20
United States	Statisticians	30,000	40,100	10,100	33.8	1,540
Area	Title	Base	Projected	Change	% Change	Avg. Anl Openings
South Carolina	Epidemiologists	20	20	0	6.3	00
United States	Epidemiologists	5,800	6,100	400	6.3	220
Area	Title	Base	Projected	Change	% Change	Avg. Anl Openings
South Carolina	Survey Researchers	130	140	10	13.6	00
United States	Survey Researchers	16,700	18,700	1,900	11.6	390
Area	Title	Base	Projected	Change	% Change	Avg. Anl Openings
South Carolina	Health Educators	880	1,000	120	13.3	30
United States	Health Educators	61,400	68,900	7,500	12.2	1,950

Source: www.projectionscentral.com (US Bureau of Labor Statistics database)

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

☒ Yes

☐ No

If yes, explain. (1000 characters)

Eliminating the existing concentration and replacing it with separate concentrations in Biostatistics and Epidemiology will provide students training to be appropriately skilled in the discipline that best matches their career goals and to be most marketable in industry and academia and health care today.

This change is not expected to affect number of students enrolled in either concentration—only to accurately divide the current concentration students into one concentration or the other.

List of Similar Programs in South Carolina

Program Name	Institution	Similarities	Differences
MSPH in Biostatistics	Arnold School of Public Health, USC	Core course work	• Emphasis on clinical trials, medical informatics, oncology research, spatial biostatistics, and bioinformatics • Emphasis on collaborative biomedical research • Different student pool • Different elective coursework
MSPH Epidemiology	Arnold School of Public Health, USC	Core course work	• Emphasis on quantitative methodology, use of large databases, spatial epidemiology, environmental epidemiology, and cancer epidemiology • Emphasis on collaborative biomedical research • Different student pool • Different elective coursework

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Description of the Program

Projected New Enrollment in Biostatistics concentration						
Year	Fall		Spring		Summer	
	Headcount	Credit Hours	Headcount	Credit Hours	Headcount	Credit Hours
2017	3	45	3	45	3	45
2018	6	90	6	90	6	90
2019	6	90	6	90	6	90
2020	6	90	6	90	6	90
2021	6	90	6	90	6	90

Projected New Enrollment in Epidemiology concentration						
Year	Fall		Spring		Summer	
	Headcount	Credit Hours	Headcount	Credit Hours	Headcount	Credit Hours
2017	3	45	3	45	3	45
2018	6	90	6	90	6	90
2019	6	90	6	90	6	90
2020	6	90	6	90	6	90
2021	6	90	6	90	6	90

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 to be eliminated from each concentration	Courses Added to Program
from Epidemiology (These Electives only)	
Biostatistics Methods IV (BMTRY 702)	No new courses will be added. All required and elective courses currently exist and are available to students
Bayesian Biostatistics (BMTRY 719)	
Linear Models in Biology and Medicine (BMTRY 714)	
Advanced Inference (BMTRY 779)	
Infectious Disease Epidemiology (BMTRY 713)	
Cancer Epidemiology (BMTRY 734)	
Chronic Disease Epidemiology (BMTRY 789-13)	
Molecular Epidemiology (BMTRY 789-10)	
Health Disparities-Social Epidemiology Course (BMTRY 789-XX)	

Epidemiology of Cardiovascular Disease (BMTRY 737)	
from Biostatistics (Electives only)	**Courses added**
Biostatistics Methods IV (BMTRY 702)	No new courses will be added. All required and elective courses currently exist and are available to students
Analysis of Categorical Data (BMTRY 711)	
Analysis of Survival Data (BMTRY 722)	
Bayesian Biostatistics (BMTRY 719)	
Linear Models in Biology and Medicine (BMTRY 714)	
Advanced Inference (BMTRY 779)	

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)

Administrative responsibilities will be shared between the two concentrations and existing faculty and personnel will implement the programs. The graduate program student services coordinator will commit 50% time to the Epidemiology concentration and 50% to the Biostatistics concentration. Program oversight will be conducted by the graduate coordinator for Biostatistics and the Vice Chair for Academic Programs. In short, MUSC can provide the expertise needed for this concentration in Biostatistics and Epidemiology in the MS Biomedical Sciences degree with existing faculty and staff.

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)

We have had a longstanding history of providing both masters level and doctoral level education in this field and hence we have sufficient educational resources to support this program modification.

It is not anticipated that additional equipment will be necessary. The current computing and data storage equipment will be updated and replaced using the normal acquisition process. DPHS has Full time Information Technology (IT) Support personnel for support staff, faculty and student systems and software. DPHS provides Network access to internet resources, shared department network storage and services as well as access to High Performance Compute Clustering. DPHS IT staff provide software.

Given the projected annual enrollment in this program (~15 students enrolled), the current physical plant will be adequate to meet the educational needs of the students. The core classes taught to students in this program will be conducted in existing classrooms in Cannon Place, the Bioengineering building, and the Drug Discovery building as needed. These classrooms are all equipped with SmartBoard technology, high definition cameras, high-fidelity projection systems, and all necessary audiovisual equipment.

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Financial Support

Estimated New Costs by Year (**SEE BUDGET JUSTIFICATION)						
Category	**1st**	**2nd**	**3rd**	**4th**	**5th**	**Total**
Program Administration	33,797	34,810	35,855	36,930	38,037	179,429
Faculty and Staff Salaries	528,799	544,663	561,003	577,833	595,168	2,807,466
Graduate Assistants	-	-	-	-	-	-
Equipment	-	-	-	-	-	-
Facilities	-	-	-	-	-	-
Supplies and Materials	750	773	796	820	844	3,983
Library Resources	-	-	-	-	-	-
Other*	-	-	-	-	-	-
Total	563,346	580,246	597,654	615,583	634,049	2,990,878
Sources of Financing						
Category	**1st**	**2nd**	**3rd**	**4th**	**5th**	**Total**
Tuition Funding	56,805	113,610	170,415	227,220	284,025	852,075
Program-Specific Fees	1,485	1,485	2,970	4,445	5,940	16,335
State Funding (i.e., Special State Appropriation)*	-	-	-	-	-	-
Reallocation of Existing Funds*	505,056	465,151	424,269	383,918	344,084	2,122,468
Federal Funding*	-	-	-	-	-	-
Other Funding*	-	-	-	-	-	-
Total	563,346	580,246	597,654	615,583	634,049	2,990,878
Net Total (i.e., Sources of Financing Minus Estimated New Costs)	0	0	0	0	0	0

*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.

** Although the table requests new costs, often the review of the proposal is assisted when all costs are disclosed, which is what is provided here. There are no new costs associated with this program modification—the table shows the division of existing costs for each discipline separately (essentially dividing current degree program costs by two).

Thus, implementation of this program modification will not incur any unique costs or special state appropriations. Tuition and research grants to the faculty will be the primary source of funding. Most of the necessary infrastructure exists now, so there will be no new costs directly associated with the program administration.

Evaluation and Assessment

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

☐ Yes

☒ No

If yes, explain. (1000 characters)

Per university policy, each academic degree program engages in continuous quality improvement through annual self-assessment of performance on program outcomes (PO) and student learning outcomes (SLO). At least every third year in a four year assessment cycle, these data drive comprehensive plans for improvement.

Program Outcome 1: The program performs well on dashboard indices of quality
Assessed by: Percentage of students who graduate within 150% of program length (3 years); Percentage of students employed in a related career or pursing further education within 6 months of graduating.

Student Learning Outcome 1: Evidence of ability to think independently at a level appropriate for a master's level scientist
Assessed by: Faculty evaluations of the student in the second year; performance on his/her oral defense for cognitive skills (as determined by a standardized rubric)

Student Learning Outcome 2: Design, complete, and defend a rigorous scientific research project
Assessed by: Faculty evaluations of the student in the second year related to his/her progress on thesis research; percentage of students achieving candidacy by November 1 of the second year in the program (~14 months after matriculation); performance on his/her oral defense as an overall assessment (as

determined by a standardized rubric)

Student Learning Outcome 3: Demonstrate appropriate technical skills
Assessed by: Faculty evaluations of the student in the second year; completion of an individual development plan within one year of matriculation;

Student Learning Outcome 4: Demonstrate strong communication skills (orally and written)
Assessed by: Performance on his/her oral defense for quality of presentation (as determined by a standardized rubric); performance on his/her oral defense for responses to questions (as determined by a standardized rubric); percentage of students who have presented their work at a scientific conference prior to graduation

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)

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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.

UNIVERSITY OF SOUTH CAROLINA

Department of Epidemiology and Biostatistics
Arnold School of Public Health

November 6, 2017

John Vena, Ph.D.
Professor and Founding Chair
Department of Public Health Sciences
Medical University of South Carolina

Dear Dr. Vena,

I appreciate you sharing the program modification applications that the Medical University of South Carolina will submit to the Commission on Higher Education. There is a strong rationale to separate the current Ph.D. in Biometry and Epidemiology degree program into two distinct degree programs, a Ph.D. in Epidemiology and a Ph.D. in Biostatistics. There is a similarly strong rationale to take a parallel step with the Masters of Science degree in Biomedical Sciences with a concentration in Biometry and Epidemiology and separate it into two separate concentrations, an M.S. in Epidemiology and an M.S. in Biostatistics.

The characterization in your program modifications of the differences between the Medical University of South Carolina's and the University of South Carolina's degree programs in these areas are accurate, and I agree that these changes will not result in unnecessary competition or duplication between the programs at the two institutions. Similarly, your summary is accurate that the programs at our two universities have been operating in parallel for decades with minimal competition. Your requested separation of the program into separate Ph.D. programs and M.S. concentrations will not adversely affect the existing program in the Department of Epidemiology and Biostatistics at the University of South Carolina's Arnold School of Public Health, nor will it create a greater supply than demand for well-trained epidemiologists or biostatisticians in South Carolina.

Sincerely,

Anthony J. Alberg

Anthony J. Alberg, Ph.D., M.P.H.
Professor and Chair
Department of Epidemiology and Biostatistics
Arnold School of Public Health
Medical University of South Carolina