MERCER UNIVERSITY SCHOOL OF MEDICINE

PHD IN BIOMEDICAL SCIENCES

PROGRAM MANUAL

2024 - 2025

TABLE OF CONTENTS

Please refer to the Mercer University Student Handbook and the Mercer University School of Medicine (MUSM) Student Handbook for the Honor Code, standards of conduct, institutional policies, and resources for students. PhD in Biomedical Sciences (PhD-BMS) students must acknowledge their understanding of the contents of these handbooks as well as the PhD-BMS Program Manual prior to beginning classes at Mercer. The electronic versions of the documents are available on the following webpages.

Mercer University Student Handbook and MUSM Student Handbook
https://provost.mercer.edu/handbooks/studenthandbook.cfm

MSBMS Program Manual
https://medicine.mercer.edu/student-affairs-and-services/student-handbook-and-policies/

MUSM Administration and Community Directory

This is an abbreviated version of the directory found in the MUSM Student Handbook. All phone numbers are in the 478 area code.

Dean's Office
Jean Sumner, M.D., Dean.....301-4022
Tiffany Borel, Administrative Assistant to the Dean.....301-4022

Academic Affairs
Stephanie Beavers, MD, Associate Dean of Academic Affairs……..... 301-2350
Bridget McDowell, Lead Academic Records Associate and Proctor..……..... 301-4109
Misty Cline., Academic Success Counselor…….…….…..…..... 301-4108

Admissions
Richard McCann, Ph.D., Associate Dean of Admissions……..……..…..... 301-4066
Tracy Lancaster, Coordinator of Admissions……..……..301-5423
Bridget McDowell, Coordinator of Admissions ……..……..301-5425

Financial Planning
Susan Lumsden, Director of Financial Planning.....301-2539
Carole L. Porch, Administrative Coordinator…….. 301-2512

Registrar
Priscilla Hicks, Registrar 301-4053
Denise Fraser ……..……. 301-5137

Student Affairs
Candi Nobles-James, M.D., Associate Dean of Student Affairs……..... 301-2652
Sandra Bourdon, Student Affairs Specialist.....…301-2652

Mercer University Offices & Services
MUSM Library.....301-4056
Bear Card Office 301-2929
Bookstore.....301-2945
Counseling & Psychological Services 301-2862
Information Technology Help Desk 301-2922
Office of International Programs.....301-2573
Student Health 301-2696
Mercer Crisis Hotline..... (888) 291-5802

EMERGENCY NUMBERS
On-campus Emergency Number.....301-2911
Mercer Police (MERPO).....301-2970
Community Crisis Line (24 hours) 745-9292
Macon Police 751-7500
Mercer Medicine (24 hours) 301-4111
Navicent Health, Information.....633-1000

Mercer University Online Directory .....http://apps.mercer.edu/directory/

PhD in Biomedical Sciences Program Directory

Department of Biomedical Sciences Administration

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Interim Chair and Professor of Histology
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Pamela Noble
Administrative Assistant to the Chair
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Master of Science Program Administration and Faculty

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Associate Professor of Microbiology
Course Director, BMS 611
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LaTishia Fountain
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Assistant Professor, Community Medicine
Course Director, BMS 624
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Iuliia Zhuravlova, Ph.D.
Associate Professor of Anatomy
Course Director, BMS 621
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Associate Professor
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Program Description

The PhD in Biomedical Sciences (PhD-BMS) Program at Mercer University School of Medicine is a five-year, research-based graduate program. Students will work closely with research mentors in the Department of Biomedical Sciences. The program is offered on the Macon, Columbus, and Savannah campuses. The program is 200 credit hours in biomedical sciences, including both classroom instruction and bench research. The PhD-BMS program will prepare graduates for further postgraduate and professional studies in the biomedical sciences, employment in academic research and/or teaching, and research in the pharmaceutical and biotechnology industries.

Admissions Information

The current admissions requirements and instructions are available at:

https://medicine.mercer.edu/admissions/biomedical-sciences-phd/admissions-requirements/

Academic Information

Attendance

Although it is recognized that absences will sometimes be necessary, students are expected to attend classes. Course Directors will state specific attendance requirements in the syllabi for their courses. It is the responsibility of students to be cognizant of their own record of absences and to consult the Course Directors and instructors regarding work missed. The decision to permit students to make up work rests with the Course Director. Absences will negatively impact grades based on participation during in-class activities, such as group work and laboratory exercises, since this work cannot be performed, as designed, outside of the context of the classroom. The Course Director has the right to assign a grade of 'F' for any attendance and

participation portion of the course grade when a student habitually violates the attendance policy specified in the course syllabus.

Communication

Students will receive notifications, instructions, and assignments through their Mercer email accounts and the Canvas learning management system (LMS). Students are responsible for checking their Mercer email daily and immediately reporting problems with access to their Mercer account or to Canvas, unless Mercer Information Technology has previously notified all Mercer users of limited access to these systems. Students are expected to obtain information and to complete assignments posted on Canvas in a timely manner, as instructed by the Program faculty or staff. Problems with Canvas or email access should be reported by email to the Mercer IT Helpdesk at helpdesk@mercer.edu. Course directors and instructors will provide specific details regarding communication expectations for their courses in their course syllabi.

Course Numbering System

The numbering system for graduate courses in the PhD-BMS is the prefix BMS followed by three digits at the 600 and 700 level for core courses and at the 800 level for research courses.

Course Requirements

Students must purchase access to a version (print or electronic) of the textbook for each course. Additionally, the examination process for all courses in the program requires that students have access to a laptop computer. Students are required to provide their own laptop computer as part of the materials required for each course in the Program. The computer must meet the specifications needed to run ExamSoft Examplify software. The latest minimum system requirements may be found through links available on the Mercer ExamSoft login page. Students should refer to these requirements when considering an operating system upgrade or the purchase of a new computer. Students are required to download and install Examplify and to install upgrades of the Examplify software, as they are released by ExamSoft, and to contact ExamSoft support for problems with installing or running the software on their computers. Instructions for Examplify download and installation will be provided through an email from ExamSoft when student Examplify accounts are created. Tablets and iPads **cannot** be used for examinations. Mercer ExamSoft Login: https://ei.ExamSoft.com/GKWeb/login/mercermed

Curriculum

Year 1

Fall Semester (15 credit hours)

BMS 610 BiochemistryandMolecularGenetics (5 credit hours)
BMS 622 Microbial Pathogenesis (5 credit hours)
BMS 612 MolecularCellBiology (5 credit hours)

Spring Semester (12 credit hours)

BMS 620 HumanPhysiology (5 credit hours)
BMS 711 Research Seminar (1 credit hours)
BMS 611 Introdution to Faculty Research (1 credit hours)

Summer Semester (14 credit hours)

BMS 714 Responsible Conduct of Research (1 credit hours)
BMS 737 Pedagogical Methods in Health Sciences (3 credit hours)
BMS 738 Introduction to Research I (10 credit hours)

Year 2

Fall Semester (13 credit hours)

RRL 823 Interdisciplinary Research Methods (2 credit hours)
BMS 801 Research Seminar (1 credit hour)
BMS 800 Independent Research I (10 credit hours)

Spring Semester (16 credit hours)

BMS 802 Independent Research II (10 credit hours)
BMS 803 Thesis Preparation (1 credit hour)
Elective BMS 621, 611, 626, or 728 (5 credit hours)

Course descriptions can be found on pages 15-18.

Enrollment

Full-time enrollment in the Program is fifteen (12) semester hours. No part-time enrollment will be considered. Matriculating students are expected to enroll for the full-time academic load. Full-time enrollment is required for Financial Aid (see *Satisfactory Academic Progress for Financial Aid* on pg. 13). The BMS courses listed below are available only to degree-seeking students matriculating in the PhD-BMS and Master of Science in Preclinical Sciences programs.

Faculty Evaluations

Students are expected to provide feedback to the School of Medicine regarding their experience in the courses, including the evaluation of Course Directors and instructors, of textbooks, and of class assignments and activities. Anonymous feedback will be gathered from students in the form of surveys conducted through Canvas after the final examination for each course. Canvas will record whether a student has completed a survey, but it does not link the student's identity to survey answers. Students who complete the surveys may be able to view course grade information as soon as possible, whereas those not participating in a survey may be required to wait until grades are posted by the Registrar. Student responses to surveys are essential in improving and maintaining the quality of the program.

Honor Code and Graduate Honor System

Students are to uphold the Mercer University Honor Code and will be held accountable for violations of the Honor Code in accordance with the policies and procedures of the Graduate Honor System. The Honor Code and Graduate Honor System can be found in the MUSM Student Handbook. Honor Code violations (as defined in the MUSM Student Handbook) may result in immediate dismissal from the program.

Online Class Attendance

All lectures are delivered in-person on the Macon campus. Students on the Savannah and Columbus campuses are required to attend classes in the departmental conference room, which will be connected to the live lecture. Expectations for online learning interactions will be provided by faculty as needed. Students should contact the Mercer IT Helpdesk at helpdesk@mercer.edu for assistance with Zoom.

Policies

The Program Director will communicate all policies in the program manual during fall orientation and will notify students about changes in these policies through their Mercer email accounts. Students are expected to adhere to the policies in the program manual and any policy updates.

Registration

All students are required to register for courses at the time prescribed in the MUSM calendar or in compliance with official notices issued by the Office of the Registrar at the School of Medicine. Official course enrollment, which includes the completion of satisfactory arrangement for financial payments, is required for admission to classes. Student registration for courses in the PhD-BMS Program is completed by the Registrar after a student submits a deposit to secure enrollment. The deposit will be applied to the student's tuition. Registration commits a student to the courses for which he/she is registered and the corresponding fees and charges incurred. A registered student who is unable to attend classes must notify the Registrar of the School of Medicine in writing prior to the first day of class. If a student decides not to attend the Program, the deposit paid by the student to secure enrollment is forfeited. A student who registers after the official registration period is required to pay a $25.00 late fee.

Transfers

Students may transfer from the MSPCS program to the PhD-BMS program only after the end of the first semester. Students wishing to transfer must have a GPA of 3.0 and must meet with the Program Director. Student transfers are at the discretion of the Program Director and subject to space availability.

Tuition Scholarship and Stipend

PhD-BMS Program students in good standing are eligible for an tuition scholarship. Students will also be eligible for a Graduate Research Fellowship beginning Fall semester (August) of the first academic year of the program. This Fellowship comes with a stipend of $25,000 per year and is renewable for a total of five years. Students are responsible for paying any taxes associated with these stipends.

Academic Standards and Advising

Academic Performance Standards

The academic status of the student is determined by his or her academic performance. A student is in good academic standing as long as his or her examination scores within courses remain at a letter grade of “C“ or above, with a minimum cumulative GPA of 3.0. Course directors will report all students with exam scores below “C” on each exam to the Program Director. When a student receives an examination grade of below “C” in a course, he/she must meet with the course director to discuss his/her academic progress and a plan to improve his/her performance in the course. At this point, a student is under ‘academic caution’. A second examination score below “C” in the same course requires that the student meet with both the course director and the Program Director. At this point, a student is under ‘academic warning’. Notifications of academic status will be issued to the students by the Program Director. A minimum, cumulative grade point average of 3.0 is required for graduation from the PhD-BMS Program. *Final course grades below “C” do not count toward the PhD in Biomedical Science degree, and any student who receives a grade below a "C" will be dismissed from the PhD-BMS program.*

A student seeking the PhD degree should complete all Program requirements within the academic calendar of the Program as a full-time student. The maximum amount of time between initial enrollment in the Program and degree requirement completion is six academic years.

Academic Advising

The Program Director will serve as initial academic advisor for PhD-BMS students. After the student chooses a thesis research mentor, that faculty member will become the student's primary academic advisor and will direct the student's research along with two other members of the Biomedical Sciences faculty, who will become the student's Advisory Committee. The Advisory Committee, which includes the Research Mentor/Major Professor, will meet with the student regularly to monitor his/her academic progress. The Advisory Committee will report directly to the Program Director. The Advisory Committee will advise the student, monitor his or her progress through the curriculum, and provide academic guidance for the student throughout the PhD-BMS program.

Commencement Ceremonies

Only students who have completed all program requirements in good academic standing by the end of spring semester will be eligible to participate in commencement.

Degree Requirements

Completion of all required course work with a minimum, cumulative GPA of 3.0 and with all final course grades of “C” or above. Both academic performance requirements must be met for successful completion of the degree program. Clearance for graduation must be granted by the Office of the Registrar.

Degree Application

Applications for graduation are processed through the Office of the Registrar in the School of Medicine.

Degree Audit for May Graduation/Commencement

By March of the spring semester, each student in good academic standing must submit an application for graduation to the Office of the Registrar. This application will be available through MyMercer. The degree auditing process is initiated from these applications and is a joint responsibility of the Registrar's Office and the program administration to ensure that students stay on track for successful completion of the degree program.

Final Check/Recommendation for May Graduation

The Registrar's Office will check final grade point averages and spring semester final course grades and will clear for graduation those students who meet the degree requirements as defined below. The Registrar's Office will notify students who failed to meet the requirements that they are no longer eligible for the degree and cannot participate in commencement.

Diplomas

Diplomas are not distributed during commencement and will be available only in the Registrar's Office. Diplomas are ordered after all degree requirements are met. Graduates will be notified when their diploma is available.

Repeating Courses

Students who do not achieve a 3.0 final GPA but have a final cumulative GPA of 2.76 or above may file a request to repeat a maximum of two courses for the purpose of improving his/her/their cumulative GPA to 3.0 for degree eligibility (see the paragraph below for instructions). A student is eligible to repeat courses only if he/she/they/they has a final cumulative GPA of 2.76 or above, has completed the two-semester program as a full-time student, AND has a GPA of 3.0 or above in one of the two semesters. The PhD degree is conferred at the end of the semester in which a cumulative 3.0 GPA is achieved (either December or May). A graduate cannot enroll in additional program courses after receiving the PhD degree. The grade achieved when a course is repeated will replace the previous grade in the cumulative GPA calculation, but both grades received for the course will appear on the student's Mercer transcript.

Students, who meet the criteria described above and wish to repeat courses, must email a request to repeat courses to the Program Director within 14 days after the May commencement date for the academic year of his/her/their enrollment. The email must specify the courses and must include a study plan for achieving improved grades in these courses. The Program Director may request a meeting with the student to discuss the plan before approving the request.

Satisfactory Academic Performance

Academic performance will be monitored within courses during each semester for student academic advisement (see *Academic Advising*). For *satisfactory academic performance* in progress toward the degree, a student must maintain a cumulative GPA of 3.0. This is the

'minimum satisfactory academic performance', and a student at this level of performance will be placed on *academic warning* (see definition below).

Satisfactory Academic Progress for Financial Aid

Please refer to the *MUSM Satisfactory Academic Progress for Financial Aid Policy* and the *Financial Aid Maze* for the Program. The maximum time allowed for matriculation to graduation from the PhD-BMS program is 6 years. Students will be reviewed for their academic progress on a semi-annual basis and will be notified in writing of a change in their financial aid status. A student must maintain a GPA of 3.0 to make Satisfactory Academic Progress for Financial Aid. If a student obtains one "C" for a final course grade in the fall semester, the student will be placed on 'financial aid warning'. If a student obtains two final course grades of "C" in the fall semester, the student will become 'financial aid ineligible' and must appeal for reinstatement of financial aid eligibility.

Thesis Submission

Each student must prepare and submit a thesis describing his/her research project. The thesis should be formatted according to the guidelines provided on the Office of the Provost website. The deadline to submit theses is July 1. Any thesis that is not submitted by July 1 will be reviewed after the next submission deadline, which is November 1. Degrees will not be awarded until the thesis is approved by the Office of the Provost.

Withdrawal Procedure

To make an official withdrawal from a course, a student must obtain and submit a completed Course Withdrawal Form to the MUSM Registrar. If the student elects to discontinue class attendance and does not complete an official Course Withdrawal Form within the time limits described, a grade of F (failure) will be recorded on the student's official record. The grade of W (withdrawal) indicates that a student officially withdrew from a course on or before the last day for course withdrawals as designated in the current academic calendar. Withdrawals are not used when computing grade point averages. A grade of W may not be awarded if a student does not complete the official Course Withdrawal Form on or before the date designated for each semester in the current academic calendar.

Special Academic Circumstances

Leave of Absence

A student may be granted a Leave of Absence (LOA) for academic reasons. A student on LOA may use the library and other learning resources and will remain on the distribution list for any student updates, class newsletters, and other communications.

Note that these academic LOAs do not meet the conditions of the Title IV regulations for an "approved" leave of absence and therefore must be treated as a withdrawal for Title IV purposes.

The withdrawal date is the date the student begins the leave of absence. Students on LOA are not eligible for in-school deferment of student loans.

Student Appeals Process: Grievance Procedures

Students with grievances should follow the procedures for Academic or Nonacademic Grievances, as described in the respective sections of the MUSM Student Handbook.

Special Test Accommodation Policy

Testing accommodations are available for students who provide appropriate documentation of ADD, ADHD, LD or other relevant diagnoses. Providing such documentation is the responsibility of the student. Students seeking test accommodations may initiate the process by approaching the Senior Associate Dean of Student Affairs. Medical evaluation used as the basis of the diagnosis must have been completed within three years prior to the request for accommodation.

All requests for test accommodations are referred to the Senior Associate Dean of Student Affairs who in turn refers the request to the joint Law School/Medical School Test Accommodation Committee for evaluation. This committee is composed of members of the medical school and law school administration and faculty, uniquely approved by their respective Deans as having qualifications to serve in this capacity. Each request for accommodation is handled individually and confidentially. A senior member representing the medical school and the law school jointly chairs the Test Accommodation Committee. The committee reviews test data, other supporting data and evaluator's recommendations. An action plan is recommended to the Dean's representative for approval and implementation.

Student Affairs and Student Wellness

PhD-BMS students will serve as representatives on the MUSM Student Council, Wellness Program Committee, and Diversity and Inclusion Committee. These groups discuss issues within the MUSM learning environment and plan activities to promote student well-being and to bring together students from all of the degree programs. See the MUSM Student Handbook for more information.

Course Descriptions

YEAR 1

BMS 610 Biochemistry and Molecular Genetics (5 credit hours) The goal for the instruction in biochemistry and molecular genetics is for students to understand the chemical and biomolecular composition of the human body, the importance of buffering and solute concentrations in physiological function, the metabolic processes that provide energy to sustain tissue viability, the structure and dynamics of genetic material, the regulation of gene expression, and the principles of genetic inheritance. This learning goal will be achieved by students through problem-solving in the classroom, discussion of medical case scenarios, and analysis of the biochemistry and genetics research literature.

BMS 622 Microbial Pathogenesis (5 credit hours) The goal for the instruction in the human immune system is for students to understand the development and organization of the human immune system, the genetic and molecular mechanisms of immunity, the role of inflammation in immunity, the initiation and detection of immune responses, and the use of vaccines to support human immunity. This learning goal will be achieved by students through problem-solving in the classroom, discussion of medical case scenarios, and analysis of the immunology research literature.

BMS 612 Molecular Cell Biology (5 credit hours) The goal for the instruction in molecular cellular biology is for students to understand the fundamental structure of human cells, the function of intracellular organelles, the dynamics of organelles in different cell types, the cellular interactions within tissues to support tissue function, and the biomolecular interactions required for cellular function. This learning goal will be achieved by students through a combination of interactive lectures, problem-solving in the classroom, discussion of medical case scenarios, and analysis of the molecular biology and cell biology research literature.

BMS 620 Human Physiology (5 credit hours) The goal for the instruction in human physiology is for students to develop an understanding of the function of the human body, building upon their prior knowledge of human biology, physics, chemistry and mathematics. This course deals with body fluid compartments and body systems organization and function, with special emphasis on the nervous, cardiovascular, respiratory, and urinary systems. Students will examine the concepts of homeostasis and regulatory mechanisms as they are applied in the various body functions. The learning goal will be achieved through a combination of interactive lectures, group discussions, problem-solving exercises, and medical case-based activites. (prerequisites – BMS 610, 622 and 612)

BMS 621 Human Development (5 credit hours) The goal for the instruction in human development is for students to understand the process of human development, the determinants of embryonic development, the differentiation and organization of cells into functional tissues and organs, the maternal contribution to embryonic and fetal development, the environmental and physiological risks to human development, and the basic functional anatomy of the human body. This learning goal will be achieved by students through classroom discussion, interaction with animated programs depicting developmental processes, histological analysis of human tissues, and

observation of human cadavers and plastinated models of human tissues. (prerequisites – BMS 610 and 612)

BMS 622: Microbial Pathogenesis (5 credit hours) The goal for the instruction in microbial pathogenesis is for students to understand the structural and genetic differences between human cells, bacteria, fungi, parasites and viruses, the variations in structure among members of pathogenic species, the metabolic and genetic properties of microbes that facilitate their adaptation to different environments, the commensal relationship between humans and microbes, the mechanisms of microbial and viral pathogenesis, and the basic laboratory culture conditions and tests for human microbial pathogens. This learning goal will be achieved by students through problem-solving in the classroom and discussion of medical cases and research literature that illustrate clinical application of microbiology principles.

BMS 626 Biomolecular Engineering (5 credit hours) The goal for the instruction in bimolecular engineering is for students to understand the principles and techniques resulting in directed biological alteration at the molecular and cellular scale. This course introduces students to bioengineering methodology spanning advanced recombinant DNA technology and delivery methodology, protein engineering leading to altered structure and function (proteomics), genetic and genomic editing (genomics), bioimaging, biosensing, chip technology, and cell-based assay systems. Students will examine bimolecular engineering concepts as they relate to medical and commercial applications in health care, biomedical, pharmaceutical, biomaterials, and other biotechnology related industries. This learning will be achieved by students through classroom and group discussion of relevant research literature and student presentations that illustrate concepts in biomolecular engineering. Prerequisites: BMS 610, BMS 612, BMS 622

BMS 728 Neuroscience (5 credit hours) The goal for the instruction in neuroscience is to examine the anatomy, physiology, and pharmacology of the central and peripheral divisions of the nervous system. This course introduces students to neuronal function, synaptic transmission, sensory processing, movement, sleep and wakefulness, hunger, thirst, caloric and body fluid homeostasis, recovery of function after brain damage, and various neurological and psychiatric disorders. This learning goal will be achieved by students through problem-solving in the classroom and discussion of medical cases and research literature that illustrate clinical application of neuroscience principles. Prerequisites: BMS 610, BMS 612, BMS 622

BMS 711 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Also BMS 801, BMS 803, BMS 805, BMS 807, BMS 809, BMS 811, BMS 813, BMS 815, BMS 817, BMS 819, BMS 821

BMS 725 Introduction to Faculty Research (1 semester hours) The goal of this course is to introduce students to research methods and topics studied by faculty in the Department of Biomedical Sciences. Research faculty will give informational talks related to their specific research projects.

BMS 714 Responsible Conduct of Research (1 credit hour) The goal of this course is to examine ethical issues related to scientific research. Students will be introduced to ethical issues related to data management and analysis, collaborations, publications and authorship roles, conflicts of interest, and human and animal research.

BMS 737 Pedagogical Methods in Health Sciences (3 credit hours) The goal for this course is to educate members of the health professions in an interdisciplinary and interactive way to obtain, expand, and improve their teaching skills. The skills learned in this course can be applied within varied professional contexts and with a variety of learners.

BMS 738 Introduction to Research (10 credit hours) In this course, students will learn basic laboratory methods and explore laboratory research projects. This course will include a "Laboratory Boot Camp," which is a two-week session with hands-on, interactive laboratory exercises designed to teach basic laboratory methods. Following the Boot Camp, students will complete two, three-week laboratory rotations where they will work in a laboratory of their choice. Students will choose a research mentor and spend the final eight weeks of the semester in the laboratory as they begin their research project.

YEAR 2

BMS 801 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 711.

RRL 813 Interdisciplinary Research Methods (3 credit hours) This course begins a two-course series on the interdisciplinary research methods necessary to effectively conduct research and evaluation studies within rural communities. The course draws primarily from the fields of psychology, sociology, epidemiology, and biostatistics. Topics include research ethics, internal and external validity, confounding, hypotheses and research questions, and quantitative study design, including levels of measurement; conceptualization and operationalization; correlation and causation, p-values, error, and bias; moderation and mediation; parametric vs. non-parametric, descriptive and inferential statistics; data entry, coding, and cleaning; levels of prevention/intervention; measures of disease burden and risk; and diagnostic/screening characteristics.

BMS 803 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 801.

BMS 800 Independent Research I (10 credit hours) Dissertation research. Continuation of BMS 738.

BMS 840 Scientific Communications (1 credit hour) This course focuses on writing and presentation skills needed for a career in biomedical sciences. It provides basic instruction in writing abstracts, curriculum vitae, and grant applications. Students will also learn to organize and give scientific presentations. The basic aspects of teaching skills needed for education of undergraduate, graduate, and professional students will also be covered.

BMS 802 Independent Research II (10 credit hours) Dissertation research. Continuation of BMS 800.

BMS 805 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 831.

BMS 804 Doctoral Research I (12 credit hours) Dissertation research. Continuation of BMS 802.

YEAR 3

BMS 807 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 805.

BMS 806 Doctoral Research II (10 credit hours) Dissertation research. Continuation of BMS 804.

BMS 845 Teaching Practicum I (3 credit hours) The goal of this course is for students to gain teaching experience in a degree program. Students may choose to serve as a teaching assistant as part of the MS, MD, or undergraduate curriculum. Student responsibilities may include lecturing, managing team-based learning activities, setting up laboratory exercises, and/or facilitating small group discussions. Prerequisite: BMS 737

BMS 809 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 807.

BMS 808 Doctoral Research III (10 credit hours) Dissertation research. Continuation of BMS 806.

BMS 809 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 807.

BMS 846 Teaching Practicum II (3 credit hours) The goal of this course is for students to gain teaching experience in a degree program. Students may choose to serve as a teaching assistant as part of the MS, MD, or undergraduate curriculum. Student responsibilities may include lecturing, managing team-based learning activities, setting up laboratory exercises, and/or facilitating small group discussions. Prerequisite: BMS 737

BMS 810 Doctoral Research IV (12 credit hours) Dissertation research. Continuation of BMS 808.

BMS 811 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 809.

YEAR 4

BMS 847 MD Teaching Practicum (5 credit hours) The goal of this course is for students to gain teaching experience in the MD degree program. Student responsibilities may include lecturing, managing team-based learning activities, and/or facilitating small group discussions. Prerequisite: BMS 737

BMS 812 Doctoral Research V (10 credit hours) Dissertation research. Continuation of BMS 810.

BMS 813 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 811.

BMS 814 Doctoral Research VI (10 credit hours) Dissertation research. Continuation of BMS 812.

BMS 848 MS Teaching Practicum (5 credit hours) The goal of this course is for students to gain teaching experience in the MS degree program. Student responsibilities may include lecturing, managing team-based learning activities, and/or facilitating small group discussions. Prerequisite: BMS 737

BMS 815 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 813.

MS 816 Doctoral Research VII (12 credit hours) Dissertation research. Continuation of BMS 814.

BMS 817 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 815.

YEAR 5

BMS 849 Teaching Practicum III (optional) (3 credit hours) The goal of this course is for students to gain teaching experience in a degree program. Students may choose to serve as a teaching assistant as part of the MS, MD, or undergraduate curriculum. Student responsibilities may include lecturing, managing team-based learning activities, setting up laboratory exercises, and/or facilitating small group discussions. Prerequisite: BMS 737, BMS 845, BMS 846, BMS 847

BMS 818 Doctoral Research VIII (12 credit hours) Dissertation research. Continuation of BMS 816.

BMS 819 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 817.

BMS 820 Doctoral Research IX (12 credit hours) Dissertation research. Continuation of BMS 818.

BMS 821 Research Seminar (1 credit hour) In this course students will participate in a research seminar series, during which they will attend presentations by MUSM faculty and visiting speakers. This course includes required, regular attendance at the Department of Biomedical Sciences Seminar Program, delivered between the Macon, Savannah, and Columbus campuses by real-time video connection. Students will become broadly familiar with scientific approaches and various research topics. Students will also present their thesis research to an audience consisting of faculty and students. The objective of this course is to prepare students to become competent scientific communicators. Continuation of BMS 819.

BMS 822 Dissertation (1 credit hour) Preparation of dissertation and defense.

YEAR 6

If needed:

BMS 824 Doctoral Research X (12 credit hours) Dissertation research. Continuation of BMS 820.

BMS 826 Doctoral Research XI (12 credit hours) Dissertation research. Continuation of BMS 824.

BMS 828 Doctoral Research XII (12 credit hours) Dissertation research. Continuation of BMS 826.