Mercer University School of Medicine

Master of Science in Biomedical Sciences
Program Manual

2018-2019
Master of Science in Biomedical Sciences: Program Manual

The Master of Science in Biomedical Sciences (MSBMS) Program at Mercer University School of Medicine is a two-year, research-based graduate program. Students will work closely with research mentors in either the Division of Biomedical Sciences on the Macon Campus or in the Department of Biomedical Sciences on the Savannah Campus. 75 credit hours in biomedical sciences, including both classroom instruction and research comprise the MSBMS Program. The MSBMS 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.

Following successful completion of a research thesis, students will be awarded the degree of Master of Science in Biomedical Sciences with a concentration in one of the disciplines represented by the Basic Sciences faculty on the Macon and Savannah campuses.

ADMISSIONS INFORMATION

The current admissions requirements and instructions are available at:
http://medicine.mercer.edu/admissions/biomed/admissions/

Academic Information

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 MSBMS 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.

Course Numbering System

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

Mercer University 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 at: https://provost.mercer.edu/handbooks/studenthandbook.cfm.

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 SofTest software. The specific system requirements may be found on the following Examsoft webpages. Students should refer to these requirements when considering the purchase of a new computer. Students are required to download and install SofTest and to install upgrades of the SofTest software, as they are released by Examsoft, and to contact Examsoft support for problems with installing or running the software on their computers; current (May 2017) links are below:

Examsoft Support:
http://support.examsoft.com/h/
Windows System Requirements:
http://support.examsoft.com/h/c/259101-windows
Mac System Requirements:
http://support.examsoft.com/h/c/259104-mac
SofTest Download and Installation Instructions:
http://support.examsoft.com/h/ (Under Topic menu)

Enrollment
Full-time enrollment is 15 semester hours in the fall and 16 semester hours in the spring. Summer enrollment is 12 hours. In the second year full-time enrollment is 16 hours for each semester. 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 eligibility.

MSBMS Program students in good standing are eligible for an MSBMS Tuition Scholarship for 55 of the 75 credit hours required for completion of the Program. This begins in the second semester (Spring) of the MSBMS Program and covers all credit hours other than the four formal courses taken in the first and second semesters of the Program (Fall Semester: BMS 610, 612, 622; and one course in Spring Semester chosen from among BMS 611, 620, 621, and 626; see Curriculum outline below). MSBMS Students will also be eligible for a Graduate Research Fellowship beginning Spring Semester (January) of the first academic year of the program. This Fellowship comes with a stipend of $18,000 per year, payable at $1,500 per month, and continues through May of the second and final academic year of the MSBMS Program.

Satisfactory Academic Performance

Academic performance will be assessed 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).

Academic Advising

The Program Director will serve as initial academic advisor for MSBMS students. An Advisory Committee consisting of the student’s research mentor (major professor) and two other program faculty members will be established during the second semester of the first year. This Committee will advise the student, monitor his or her progress through the curriculum, and provide academic guidance for the student throughout the MSBMS Program.

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. 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 his/her faculty advisor. At this point, a student is under ‘academic warning’. Course directors will report all students with exam scores below “C” on each exam to the Program Director. 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 MSBMS Program. Final course grades below “C” do not count toward the Master of Science in Biomedical Science degree, and any student who receives a grade below a “C” will be dismissed from the MSBMS Program.

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, the Program Director submits to the Office of the Registrar an application for graduation for each student in good academic standing and potentially eligible to participate in commencement. 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.

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.

Participation in 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.

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.

Curriculum

Year 1

Fall Semester (15 credit hours)

- BMS 610  Biochemistry and Molecular Genetics (5)
- BMS 622  Microbial Pathogenesis (5)
- BMS 612  Molecular Cell Biology (5)

Spring Semester (16 credit hours)

- BMS 620*  Human Physiology (5)
- BMS 621*  Human Development (5)
- BMS 611*  Human Immunity (5)
- BMS 626*  Biomolecular Engineering (5)
- BMS 711  Research Seminar (1)
- BMS 625  Introduction to Research I (10)

Summer Semester (12 credit hours)

- BMS 630  Introduction to Research II (11)
- BMS 712  Research Seminar (1)

*Students will choose one of these courses based on their particular research interests; MSBMS Program students completing their thesis research on the MUSM-Savannah campus will take BMS 626.

Year 2

Fall Semester (16 credit hours)

- BMS 710  Independent Research I (15)
- BMS 713  Research Seminar (1)

Spring Semester (16 credit hours)

- BMS 720  Independent Research II (15)
- BMS 721  Thesis Preparation (1)

Course Descriptions

**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. The learning goal will be achieved by students through problem-solving in the classroom, discussion of medical cases and research literature, and laboratory experiments that illustrate principles in biochemistry and genetics.

**BMS 611: Human Immunity (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. The learning goal will be achieved by students through problem-solving in the classroom, discussion of medical cases and research literature, and laboratory experiments that illustrate principles in immunology.

**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 problem-solving in the classroom, discussion of medical cases and research literature, and laboratory experiments that illustrate principles in cellular and molecular biology.

**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, including the nervous, muscular, cardiovascular, respiratory, urinary, digestive, and endocrine 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 activities. (prerequisites – BMS 610, 611, 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 interaction with animated programs and with plastinated models of human anatomy. (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. (prerequisites – BMS 610, 611 and 612)

**BMS 626: Biomolecular Engineering (5 credit hours)**

The goal for the instruction in biomolecular 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 biomolecular 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. This course is offered only on the MUSM-Savannah Campus. Prerequisites: BMS 610 (Biochemistry & Molecular Genetics) and BMS612 (Molecular Cell Biology).

**BMS 625: Introduction to Research I (10 credit hours)**

Students will be introduced to their thesis research in this class, which will consist primarily of directed study by their individual research mentors as they begin the develop the individual competencies required for their discipline. Students will be evaluated on the basis of their acquired knowledge of these research techniques. Students also will be introduced to the scientific literature, data-handling and analysis (e.g., statistical evaluation of research data), and the responsible conduct of scientific research, including scientific authorship. Participation in this course will be essential for students to develop these core competencies as a scientist. These goals will be complemented by participation in BMS 711: Research Seminar.

**BMS 630: Introduction to Research II (11 credit hours)**

Prerequisite: BMS 625

Continuation of BMS 625.

**BMS 710: Independent Research I (15 credit hours)**

Thesis research.

**BMS 711, 712, 713: Research Seminar (1 credit hour)**

One of the most important skills for a scientist is public speaking. In this course students will participate in research seminar, 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 and Savannah campuses by real-time video connection, during which students will become broadly familiar with scientific approaches and projects of MUSM faculty and visiting speakers. Students will also present papers from the classical and current primary literature that supports their thesis research.
to an audience consisting of MSBMS faculty and their fellow students. The objective of this course is to prepare students to become competent scientific communicators.

**BMS 720: Independent Research II (15 credit hours)**

Thesis research.

**BMS 721: Thesis Preparation (1 credit hour)**

Class descriptions and requirements may be modified from time to time based on changing program requirements. *Curriculum revision approved by Graduate Council, effective 13 March 2018.*

**Class 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 the 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.*

**Program Communication**

Students will receive notifications, instructions, and assignments through their Mercer email accounts and the Canvas learning management system. 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 Blackboard in a timely manner, as instructed by the Program faculty or staff. Problems with Blackboard should be addressed to Michelle Bliss at bliss_mv@mercer.edu and Mercer email problems should be reported to Kevin Hatfield at hatfield_kp@mercer.edu or 478-301-4132. Course directors and instructors will provide details regarding communication for their courses in their course syllabi.

**Program Course Examination Policies**

The Program Director will communicate all policies regarding examination procedures during the fall program orientation and will notify students about changes in these policies through their Mercer email accounts. Students are expected to adhere to these policies for all examinations administered in the program.

**Grading System**

Grades within a course will be assigned on a 100-point scale and the final grade will be converted to a letter grade. The final course letter grades will then be converted to a 4-point scale for determining the overall GPA for the Program.

<table>
<thead>
<tr>
<th>Grading Scales</th>
<th>0 - 100</th>
<th>0 - 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>90-100</td>
<td>4.0</td>
</tr>
<tr>
<td>B+</td>
<td>86-89</td>
<td>3.5</td>
</tr>
<tr>
<td>B</td>
<td>80-85</td>
<td>3.0</td>
</tr>
<tr>
<td>C+</td>
<td>76-79</td>
<td>2.5</td>
</tr>
<tr>
<td>C</td>
<td>70-75</td>
<td>2.0</td>
</tr>
<tr>
<td>F</td>
<td>Below 65</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Degree-seeking students enrolled in graduate courses will receive letter grades for all graduate work.

The following grading marks may be used when students do not complete courses within the curriculum, do not perform required activities in courses, or do not take courses for a letter grade.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABX</td>
<td>Excused absence from exam</td>
</tr>
<tr>
<td>AU</td>
<td>Audit</td>
</tr>
</tbody>
</table>
A grade of IP is awarded only in a graduate practicum or in research project courses, which may extend beyond the end of a semester. A student is expected to finish "in progress" work based on the timetable established by the professor issuing the IP grade, and, at the latest, by the course withdrawal deadline of the semester after the IP was earned. If the student does not complete the required work within the time specified, the grade automatically converts to an F.

The grade of ABX denotes that a student was absent from an examination because of illness or another valid and compelling reason deemed satisfactory by the professor. A makeup exam must be completed by the course withdrawal deadline of the semester after the ABX was earned. If the student does not complete the required work within the time specified, the grade automatically converts to an F.

The grade of IC Indicates that a relatively small part of the semester's course work remains incomplete because of a student's sickness or reasons satisfactory to the professor. The work must be completed by the course withdrawal deadline of the semester after the IC was earned. If the student does not complete the required work within the time specified, the grade automatically converts to an F.

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.

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. 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.

Course Grades and Faculty Evaluations

Students are expected to provide feedback to the School of Medicine regarding their experience in MSBMS 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 Blackboard after the final examination for each course. Blackboard 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 MSBMS education.

Academic standards and Advising

The Program Director will serve as preliminary faculty advisor to each student upon enrollment in the MSBMS Program. 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 faculty advisor will have access to advisee academic records, will provide academic guidance for the student throughout the Program, and will consult with course directors and the Program Director, as needed, to address the academic status of the student and counsel the student regarding academic performance. The academic status of the student is based on the academic performance standards as outlined below. Academic advisors are to keep the academic information of the student in confidence.

Academic Performance Standards

A student seeking the MS 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 three academic years. This maximum time to degree may be needed in the case of a leave of absence.

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. 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
his/her faculty advisor. At this point, a student is under ‘academic warning’. Course directors will report all students with exam scores below “C” on each exam to the Program Director. 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 MSBMS Program. **Final course grades below “C” do not count toward the Master of Science in Biomedical Science degree, and any student who receives a grade below a “C” will be dismissed from the MSBMS Program.** Academic dismissal precludes re-application to the MSBMS Program and generally to all other graduate programs within Mercer University.

**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 MSBMS program is 3 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.

**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, the Program Director submits to the Office of the Registrar an application for graduation for each student in good academic standing and potentially eligible to participate in commencement. The degree auditing process is initiated from these applications and is a joint responsibility of the Registrar’s Office and the program administration to insure 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.

**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.

**Participation in 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.

**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.

**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.