MUSC College of Graduate Studies

Master of Science in Medical Sciences Program

2016-17

Student Handbook of Curriculum and Policies
Introduction and Policies

The Master of Science in Medical Sciences (symbol: BSC) Program at MUSC is a three semester, multidisciplinary graduate program designed to improve the competitiveness and readiness of post-baccalaureate students for medical school or dental school. Success in professional school depends on cognitive and non-cognitive skills, and therefore, it is the goal of the faculty of this program to mentor and evaluate participants in the program both academically and professionally. In no way is completion of the program a guarantee of admission to the MUSC College of Medicine, any of the MUSC affiliated colleges or any other medical or professional school. The program provides the students with an opportunity to assess whether their cognitive and non-cognitive skill set is commensurate with the rigors of medical school.

1) Curriculum The curriculum for the Master of Science in Medical Sciences requires a minimum of 31 credit hours over three consecutive semesters and does not require a thesis. The curriculum is outlined in the following table:

<table>
<thead>
<tr>
<th>Summer Session (10 weeks)</th>
<th>Total cr hrs</th>
<th>9-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Number</td>
<td>Title</td>
<td>Method of Instruction</td>
</tr>
<tr>
<td>BSC-700</td>
<td>Histology/BIOL J530</td>
<td>Online</td>
</tr>
<tr>
<td>BSC-704</td>
<td>Standardized Test Prep (opt out possible)</td>
<td>Face-to-face</td>
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<tr>
<td>BSC-706</td>
<td>Professional Development</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>BSC-708</td>
<td>Grand Rounds</td>
<td>Seminar</td>
</tr>
<tr>
<td>BSC-710</td>
<td>Clinical Exposures (ED)</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>BSC-718</td>
<td>Special Topics in Health Care (alternative to BSC 704)</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>MCR 789-08</td>
<td>Core Clinical Research Training</td>
<td>Online</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Fall session (15 weeks)</th>
<th>Total cr hrs</th>
<th>11-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Number</td>
<td>Title</td>
<td>Method of Instruction</td>
</tr>
<tr>
<td>BSC-702</td>
<td>Anatomy</td>
<td>Face-to-face, virtual labs</td>
</tr>
<tr>
<td>BSC-712</td>
<td>Biochemistry</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>CGS-700</td>
<td>Biostatistics</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>Example Optional Electives</td>
<td>MCR-731 Intro to Clinical Lit Rev</td>
<td>Face-to-face</td>
</tr>
<tr>
<td></td>
<td>PCOL-625 Human Physiology</td>
<td>Face-to-face</td>
</tr>
<tr>
<td></td>
<td>HAP-635 Language of Medicine</td>
<td>Online</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Spring Session (15 weeks)</th>
<th>Total cr hrs</th>
<th>11-13</th>
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</thead>
<tbody>
<tr>
<td>Course Number</td>
<td>Title</td>
<td>Method of Instruction</td>
</tr>
<tr>
<td>BSC-710</td>
<td>Clinical Exposures (Autopsy)</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>BSC-714</td>
<td>Oral Immunobiology</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>BSC-716</td>
<td>Medical Microbiology</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>MCR-724</td>
<td>Introduction to Clinical Trials</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>Optional Electives</td>
<td>IP 710 Transforming Health Care</td>
<td>Seminar</td>
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<td></td>
<td>BSC-708 Grand Rounds</td>
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2) **Academic Requirements:** To receive the MS in Medical Sciences degree, the student must be enrolled as a full-time graduate student (minimum of nine credits per session), submit a portfolio at the end of fall semester (consisting of their CV, personal statement, and two Grand Rounds reports), pass all honors-pass-fail courses, and finish with a cumulative minimum grade point average of 3.0 in the required merit graded courses.

- There are 6 required honors-pass-fail courses:
  - Grand Rounds (summer)
  - Clinical Exposures (summer/spring)
  - Professional Development (summer)
  - Standardized Test Prep or Special Topics in Health Care (summer)
  - Core Clinical Research Training (summer)

- There are 7 required merit graded courses:
  - Histology (summer)
  - Anatomy (fall)
  - Biochemistry (fall)
  - Biostatistics (fall)
  - Medical Microbiology (spring)
  - Oral Immunology (spring)
  - Intro to Clinical Trials (spring)

3) **Grading scale:** Requirements for honors-pass-fail grades are specific for each course. For all other courses, the merit grade scale is the University Grading System published in the MUSC Bulletin: [http://academicdepartments.musc.edu/esl/bulletin/acad_policies/grading.html/](http://academicdepartments.musc.edu/esl/bulletin/acad_policies/grading.html/)

4) **Optional courses:** MS in Medical Science students have the option of enrolling in additional courses offered at MUSC at no additional charge, with the course instructor’s permission, and notification of the MS in Medical Science program directors. Grades from optional courses will be reported on the student’s MUSC transcript, but they will not be included in the calculation of the final grade point average with regard to eligibility for the MS in Medical Science degree. Only grades in the required elements will count for the purposes of determining eligibility. Under unusual circumstances a student may be allowed to substitute an alternative MUSC course for one of the required elements. Suggested optional courses are listed in the curriculum table.

5) **Interim Progress Assessments:** At the end of each semester, the progress of each student will be assessed by the Program Committee. **If a student’s performance in the summer or fall semester is such that future application for admission to a professional school is unlikely to be successful, the student may be advised to withdraw from the program or be dismissed** if the program directors feel that it is in the student’s best interest. The student may appeal this decision. Reinstatement, if granted, will be contingent on written acceptance of an individualized academic enhancement plan agreed upon by the program directors and the student.

6) **Professionalism:** To prepare students for the behavioral expectations of a professional school, the MS in Medical Science program employs the feedback system in use for behavioral issues in the MUSC College of Medicine. To inform a student that his or her behavior has been unprofessional, a Physicianship Evaluation Form is completed by the student and program directors/faculty in a private meeting. This provides a formal opportunity for both parties to discuss perceived transgressions of professional behavior on the part of the student. The form is not intended to be punitive, but rather to encourage self-assessment and improvement where needed to ensure positive professional growth. You may view the form at this link: [www.musc.edu/com1/current/resources/Physicianship EvalForm_Yr1_Yr2.pdf](http://www.musc.edu/com1/current/resources/PhysicianshipEvalForm_Yr1_Yr2.pdf)
7) Honor Code: The MUSC Honor Code applies to MS in Medical Science students and can be found at [http://academicdepartments.musc.edu/esl/studentprograms/honorcode/](http://academicdepartments.musc.edu/esl/studentprograms/honorcode/)

8) Early Decision and timing of application to medical school or dental school: The MUSC College of Medicine Admissions Committee will give credit for participation in the MS in Medical Science program in their ranking of applicants after the end of the fall semester. Therefore, in general, MS in Medical Science students are advised against applying to MUSC for Early Decision. Timing of applications to other professional schools should be guided by each school’s recommendations. Students are encouraged to apply to multiple professional schools and to request letters of recommendation from faculty in the MS in Medical Science program. A letter from the MS in Medical Science program directors describing the MS in Medical Science curriculum, with or without an assessment of the requesting student’s performance, is available to be included in all applications or to be sent to MUSC only at a student’s request.

10) Diplomas/Commencement: The MS in Medical Science Program is a degree granting program. Upon successful completion of the program, students will be awarded a diploma and a transcript stating that they have been awarded the Master of Science in Medical Sciences. MS in Medical Sciences graduates may participate in MUSC Commencement exercises. Information about graduation and commencement can be found on the College of Graduate Studies website or [http://academicdepartments.musc.edu/esl/em/records/commencement/](http://academicdepartments.musc.edu/esl/em/records/commencement/)

11) Tuition and Fees: Tuition for the MS in Medical Science program is the same as charges for any master’s degree student in the College of Graduate Studies for the current academic year. Full-time enrollment is required. Please note that the summer histology course has additional fees. See: [http://academicdepartments.musc.edu/em/records/fees.html/](http://academicdepartments.musc.edu/em/records/fees.html/)

12) Financial Aid: Students are eligible for federal financial aid. Contact the Medical University of South Carolina Financial Aid Services Office for information on how to apply. Private loans may also be available, but please be aware that unfavorable loan terms are likely. The choice of a private lender for your alternative student loans is yours. The Medical University of South Carolina Financial Aid Services Office will process alternative loans from any eligible lender you decide to use but are prohibited by federal law from providing advice regarding individual lenders. [http://academicdepartments.musc.edu/em/fin_aid/](http://academicdepartments.musc.edu/em/fin_aid/)

13) Housing: MUSC does not own or administer any on-campus housing. Off-campus housing information can be found on the Student Life section of the MUSC web site: [http://academicdepartments.musc.edu/esl/studentprograms/housing/](http://academicdepartments.musc.edu/esl/studentprograms/housing/)
Descriptions of Required Courses

BSC 700 Histology
(summer; Dr. Oglivie) This is an online human histology course accessed via cross-registration with the University of South Carolina-Columbia. It combines multiple resources to facilitate learning of the microscopic architecture and function of the cells, tissues and organs that make up the human body including: an online virtual microscope used with the course textbook (WebMic Study Guide: Learning Histology Step by Step) and online lectures, labs, quizzes and exams. The course is an image intensive four credit hour course that requires a minimum of 12.5 hours of focused time each week. Students have flexibility as to when to view lectures and complete the lab assignments using virtual lab resources within the framework of five modules, so long as all quizzes and exams are completed according to the posted schedule. This course is merit graded.

BSC 702 Anatomy
(fall; Dr. Bacro) This intensive gross anatomy course is designed to prepare students for entry in the field of health professions in general, with a focus and emphasis on medical and dental curricula in particular. The course provides students with a detailed examination of all structural aspects of the human body with a special emphasis on the anatomy and anatomical relationships significant to common clinical medicine topics and surgical procedures. It is presented by anatomic regions through lectures and matching online laboratories. The material is organized in units and presented in a logical fashion, i.e. Superficial Back and Upper Limb, Thorax, Abdomen and Pelvis, Lower Limb and finally Head and Neck. Throughout the course, imaging techniques including CT scans and x-ray radiography are used to introduce the student to the clinician's perspective. The course content is also designed to correlate with important clinical problems that students may encounter as practitioners, and additional reading assignments are included. The students also have the opportunity to further their knowledge of anatomy by using online resources that will be made available to them through a course management system. This course is merit graded.

BSC 704 Standardized Test Preparation
(summer; Drs. Wright and Kasman) Students develop their own individualized study plan will meet with topic-specialist tutors. Materials including practice books are provided. Students with an incoming MCAT or DAT score at the 80th percentile or above prior to enrollment in the program may substitute BSC 718 for this course with the permission of the program directors. They must however, retake the MCAT or DAT to apply to MUSC College of Medicine or Dental Medicine respectively unless this is waived by the respective admissions office. This course is Pass/Fail/Honors.

BSC 718 Special Topics in Health Care
(summer; Dr. Wright) This course will introduce pre-professional students to the analytical methods, resources, and approaches to quality improvement analyses in health care using a realistic case-based study. Students will work in teams to develop and present a health care improvement plan based on a fictional but realistic medical case from the Annual Clarion National Case Competition founded by the Institute for Healthcare Improvement. The majority of this course will consist of independent study, but specific milestones (i.e. root-cause analysis and fish bone diagram, proposal outline, bibliography, and draft powerpoint presentations) will be due at regular intervals when students will also meet with the instructor for guidance and
feedback. At the end of the term, each team’s written proposal and presentation will be judged to determine the grade of Pass/Fail/Honors based on the national Clarion judging rubric by a panel of experienced MUSC faculty judges.

**BSC 706 Professional Development**
(summer; multiple faculty) Faculty with clinical experience, administrative experience on admissions committees for MUSC Colleges, and from the MUSC Center for Academic Excellence, present weekly seminars on topics such as interview skills, writing personal statements for applications, time management, study skills, interprofessionalism, stress management, strategies for getting strong letters of recommendation, and current topics in health care laws. Each student is required to submit a portfolio of his or her personal statement and CV by the end of the term. This course is Pass/Fail/Honors.

**BSC 708 Grand Rounds**
(summer and fall or spring elective; Dr. Halushka) Students are required to attend a set amount of grand rounds or basic science seminars during the semester. They may choose from any of the seminar series on campus, but during the semester they must attend at least one grand rounds seminar in each of the following: Medicine, Surgery and Pediatrics. After attending each seminar, they have one week to turn in a one page paper describing what they learned. Two grand rounds write-ups will be chosen by each student to complete their MS in Medical Science portfolio. This course is Pass/Fail/Honors.

**BSC 710 Clinical Exposures**
(summer, spring; Dr. Halushka) Students will have the opportunity to shadow a physician working in the MUSC Emergency Department and/or to observe an autopsy. They will be required to write up the history of an observed patient, the diagnosis and treatment plan. The write-up will be graded Pass/Fail/Honors.

**BSC 712 Comprehensive Biochemistry**
(fall; Dr. Palanisamy, director) An in-depth course emphasizing the basic metabolic reactions of living systems. Topics which are emphasized include: structure-function relationships of hemoglobin, myoglobin and enzymes, pH considerations, enzymatic activity and factors such as allosteric effectors and conversion of proenzymes to active enzymes, biosynthesis (anabolism) and degradation (catabolism) of amino acids, proteins, carbohydrates, lipids, polysaccharides and nucleic acids. Topics which are covered in depth include pH and buffers, glycolysis, the citric acid cycle, the pentose phosphate pathway, glycogen metabolism, regulation of metabolism, the nature of genetic material and the relationship of the genetic code to protein synthesis. An introduction to genetic engineering, genetic diseases and chemotherapy is also presented. This course is taken with current dental students and is merit graded.

**BSC 714 Oral Immunobiology**
(spring; Dr. Westwater) This course is the comprehensive immunology course for students in the MUSC College of Dental Medicine. MS in Medical Science students will attend lectures with dental students, and will have access to recorded lectures as well. The course grade will be based on four multiple choice question exams, which will be identical to the exams taken by the dental students, and evidence-based medicine/dentistry literature reports. This course is taken with current dental students and is merit graded.
BSC 716 Medical Microbiology  
(spring, Drs. Kasman and Schmidt) This course will foster a knowledge base and understanding of the fundamentals of bacterial physiology and genetics; clinical bacteriology, virology, parasitology and mycology; antimicrobial therapy; asepsis in health care; and infection control. The primary goals of the course are to explore the relationship between the physiology of medically important microbes to the pathobiological sequelae of human-microbial interactions, with particular reference to the role of microbes in human disease. In addition to lecture, instruction includes problem based, small group exercises in microbiology with clinical case scenarios. This course is taken with current dental students and is merit graded.

CGS 700 Biostatistics  
(fall) This course provides a survey of descriptive and inferential statistics commonly used in biomedical research. Topics include elementary probability theory, an introduction to statistical distributions, point and interval estimation, hypothesis testing, regression and correlation. The course is intended for graduate students in the basic and clinical sciences, clinical residents/fellows, and medical and dental students who seek a working knowledge of biostatistical methods and their applications. 4 s.h. merit graded.

MCR 789-08 Core Clinical Research Training  
The purpose of the Core Clinical Research Training course is to prepare research team members to coordinate cost effective healthcare research while at the same time, promote the rights and safety of human subjects, achieve recruitment and retention outcomes and contribute to the science of health care in compliance with the Good Clinical Practice Guidelines and federal regulations. The training prepares participants to successfully manage many phases of health care research from study initiation to close out. Web-based curriculum. 1 s.h. pass-fail

MCR 724 Introduction to Clinical Trials (spring)  
This is a comprehensive course in the design and conduct of clinical trials. The course covers the types of clinical trials; study design (including sample size estimation); randomization methods and implementation; project and data management; ethics; and issues in data analysis (e.g. intent-to-treat; missing data analysis). Both clinical and basic science investigators can benefit from this course provided they have the required background in statistics. 3 s.h. merit graded.

Example elective courses:

PCOL 625 Physiology  
(fall; Dr. Soltis, 4 cr. hrs) This course in human physiology is designed to utilize basic physiologic concepts towards understanding the integrative nature of organ and whole body function. It presents integrated concepts of 1) Cell membrane structure and function including transport processes, receptors/signaling and electrophysiology; 2) Muscle types emphasizing excitation and contractile processes; 3) Autonomic nervous system organization and function; 4) Regulation and maintenance of cardiovascular and respiratory function; 5) Laboratory exercises on the electrocardiogram (ECG) and pulmonary function testing. This course is merit graded.

HAP 704 Health Policy  
(Fall, Dr. Jones, 3 cr hr) This course is designed to provide students with a conceptual and analytical understanding of health policymaking and politics. Political and policymaking institutions and processes that affect the structure and functioning of the U. S. health care system will be examined. Fundamental concepts and issues associated with political decision
making and the delivery of health services will be explored, including the impact of constitutional and other legal provisions, the activities of political parties and interest groups, the involvement of health professional associations and client organizations, and the relationships between economic factors and evolving health policymaking patterns. Available face-to-face and web-based.

**MCR-731 Intro to Clinical Lit Review (fall) Dr. Lackland**
This course is required for the Master of Science in Clinical Research. It is assumed that students in this class have a solid foundation in research design and both parametric and nonparametric statistics. An emphasis will be placed on the competencies and processes necessary to review the scientific literature. In particular, the students will review the published and unpublished literature associated with clinical research results. The focus of the class will be the review of the types of scientific and clinical research manuscripts, papers, and reports produced from different study approaches. The course will identify resources for the critical review of the scientific literature. The considerations and criteria for critical review of the literature will be addressed in the course. Students will prepare written critiques of selected literature and manuscripts. Prerequisites: MCR 700, 736, or permission. 2 s.h.

**IP 710 Transforming Health Care (fall, spring)**
The course goal is to lay the foundations for beginning (first year) professions students to understand the complexities of the health care system and the role of interprofessional collaboration to improve the system. Through an interprofessional context, students will explore the art and science of teamwork and communication skills, cultural competency, ethical issues, healthcare disparities and social determinants of health. This course addresses the university's Quality Enhancement Plan (QEP) goals #2 (e.g., students learn more about the other professions) and #3 (e.g., students apply interprofessional teamwork competencies in a learning setting) and will provide a mechanism to evaluate student learning outcomes associated with each goal. This is a 2 credit hour course.
MS in Medical Science Program Co-Directors

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Requirements to Apply
Prerequisites for the program include obtaining at least a baccalaureate degree with coursework appropriate for admission to the desired professional school. Applicants must have a Medical College Admission Test (MCAT) or Dental Admission Test (DAT) score dated no more than two years before the date of matriculation into the MS in Medical Science program to apply. Successful applicants will have test scores at or above the 50th percentile.

How to Apply
All applications to the College of Graduate Studies must be submitted online. The link is available at http://academicdepartments.musc.edu/grad/MS Medical Sciences/ Applications for the program are open from Dec 1 – April 15. A filing fee of $95 applies.

Option 1 (For applicants who have previously applied to the MUSC College of Medicine or Dental Medicine) If you have previously applied, you may use the same CollegeNet ID and password to apply for the certificate program as you used previously to apply to medical school. Much of your information should pre-populate from your previous medical school application. Make sure to update your contact information if it has changed. In this option, you DO NOT need to fill out the essay, CV, or reference letters sections, as these will be obtained from your AMCAS or AADSAS. You only need to have official transcripts sent for any coursework completed since the AMCAS or AADSAS was submitted to MUSC.

Option 2 (all other applicants): You need to fill in the application completely and arrange to have three letters of reference, official transcripts from all prior institutions, and unofficial MCAT or DAT scores sent to MUSC Enrollment Management before an application will be considered complete.

Please note that successful completion of this program is in no way a guarantee of an interview or acceptance into a professional school at MUSC or any other institution. If you have any questions about the program or application process, please contact either of the program directors above.