

Approved November 2013

The logo of the University of Jordan is a circular emblem with a red and white color scheme. It features a central shield with Arabic calligraphy, surrounded by a wreath and topped with a crown. The text 'UNIVERSITY OF JORDAN' is written around the perimeter.

**Biomedical
Science MS
Graduate
Program**

**- Policies and Procedures -
MANUAL**

Introduction

The University of South Carolina School of Medicine Biomedical Science MS Program is a cooperative effort between the School of Medicine basic science departments:

- Cell Biology and Anatomy
- Pathology, Microbiology and Immunology
- Pharmacology, Physiology, and Neuroscience

The course of study and thesis in this program leads to the MS in Biomedical Science degree. The student receives extensive theoretical and practical training in the biomedical sciences. The purpose of the MS program is to provide broadly-based interdisciplinary training in Biomedical Science to individuals who wish to expand or change their educational background and training to fulfill personal, pre-professional, or other career advancement goals.

The program is composed of extensive coursework in fundamental biomedical sciences and research that will generate an MS thesis. The MS thesis can be generated from hands-on laboratory research or from library-based research. The thesis research is conducted under the supervision of a Major Professor and the guidance of a Thesis Committee. Generally the Major Professor is a member of the Basic Science faculty at the School of Medicine; however, under unique circumstances Biomedical Science MS students may perform their MS Thesis research under the supervision of a university faculty member outside the School of Medicine. In these instances, students must still meet the requirements of the Biomedical Science MS Program.

The Director of the Biomedical Science Graduate Program and staff of the School of Medicine Graduate Office will monitor and aid the progress of students through the MS Program. The rules and regulations that apply to each student shall be those in force at the time of admission. If the rules and regulations are altered after the student is admitted, the student shall have the choice of complying with the new rules and regulations or those in force at the time of admission.

Administration

The Biomedical Science Graduate Program at the School of Medicine follows the general academic regulations of the Graduate School as described in the University of South Carolina Graduate Studies Bulletin. Particular requirements of the Biomedical Science MS Program are described in this manual and can be located in the Biomedical Science MS portion of the University of South Carolina Graduate Bulletin (<http://bulletin.sc.edu/index.php?catoid=35>).

1. Program Administration

Within the School of Medicine, the Biomedical Science Graduate program is administered by the Director of the Biomedical Sciences Graduate Program who is responsible for coordinating, developing and maintaining the curriculum and managing admission. The Biomedical Science Graduate Advisory Committee consists of one faculty representative from each department and the Director for the Biomedical Sciences Graduate Program. The Graduate Advisory Committee may also include student members who assist with graduate program decisions where student input is needed. This committee is responsible for establishing policies and procedures consistent with University and School of Medicine guidelines and for ensuring that program requirements are met. The Office of Graduate Studies maintains student files and required graduate forms and is located in room 229 of Building 3 on the School of Medicine campus.

Director, Biomedical Sciences Graduate Program	Dr. Edie Goldsmith	216-3809
Graduate Program Coordinator	Ms. Ansley Roberts	216-3321
Graduate Program Assistant	Ms. Gloria Price	216-3321
Assistant Director for Student Services	Mr. Jerel Arceneaux	216-3629

2. Departmental Administration

The Chairman of each participating department selects one or more faculty members to serve as its departmental representative to handle graduate affairs and to serve on the Biomedical Science Graduate Advisory Committee.

Current faculty members of the Graduate Advisory Committee are:

Cell Biology and Anatomy	Dr. Holly LaVoie
Pathology, Microbiology and Immunology	Dr. Angela Murphy
Pharmacology, Physiology, and Neuroscience	Dr. Lawrence Reagan

3. Academic Responsibility, *Carolina Community* and The Office of the Ombudsperson

The USC Student Handbook and Policy Guide, *Carolina Community*, is located on the Graduate School's web site. In addition to describing aspects of student life, this publication also contains the *Carolinian Creed* and associated policy on Academic Responsibility to which all students must

adhere. Students in the Biomedical Science Graduate Program are expected to adhere to the University Rules of Academic Responsibility. These rules are concerned with infractions of academic discipline or ethical conduct and prohibit plagiarism, cheating, and falsification of data.

The educational program in the School of Medicine has been developed to support and encourage the collegiality and professionalism essential to an effective learning environment. Students who believe that they have been punitively assessed or mistreated because of religion, race, ethnicity, gender, sexual orientation, age or other factors have access to the School of Medicine Ombudspersons who are empowered to receive and investigate reports of mistreatment in a completely confidential manner, to mediate between the parties involved and, in the event that mediation is not successful, to make recommendations directly to the Dean of the School of Medicine regarding appropriate resolution of any complaints. The use of the Ombudspersons' services to resolve a complaint represents a form of alternate dispute resolution. For this reason the services of the Ombudsperson will no longer be available to a student once that student engages an attorney to initiate legal action against the School of Medicine, the University of South Carolina, or the employees of those institutions. The current Ombudspersons is Dr. Lawrence Reagan, 216-3515; Lawrence.Reagan@uscmed.sc.edu.

Program Logistics

1. Admissions

Applicants can apply to the Biomedical Sciences PhD program using the USC ApplyWeb system (see “FUTURE STUDENTS” at <http://biomedical.med.sc.edu/ms.asp>). An applicant must have a baccalaureate degree or its equivalent from an accredited college or university. Undergraduate courses should include at least two semesters each of biology, physics, inorganic chemistry, and organic chemistry as well as math through calculus.

Admission to the Biomedical Sciences MS program is determined by the Dean of The Graduate School after recommendation by the Biomedical Sciences Graduate Director and the Biomedical Sciences Graduate Advisory Committee. Criteria examined include an appraisal of the applicant’s transcript, letters of recommendation, research experience, scores on the Graduate Records Examination (GRE), and the student’s statement of purpose for graduate study. MCAT or DAT scores can be used in lieu of the GRE. A BS degree in a subject related to biomedical science, although not required, makes an application more competitive. Highly ranked domestic applicants are often invited to interview and visit the university. Selected overseas applicants may receive a telephone interview.

Generally, an overall Grade Point Average (GPA) of 3.00 or better is required. GRE scores on the Verbal and Quantitative sections above the 50th percentile are typically required. A minimum TOEFL score of 100 is also required for students whose native language is not English.

2. Interim Advisor

The Director of the Biomedical Sciences Graduate Program will serve as Interim Advisor to Biomedical Science MS students until they have selected a major professor for either laboratory or library research. The interim advisor will assist the student in the selection of a beginning course of study and in the selection of laboratory rotations and a thesis advisor where applicable. The interim advisor will also ensure that all early requirements are met. At all stages in the student’s participation in the graduate program, the Graduate Director will try to ensure the smooth progress of the student through the program. A permanent graduate faculty advisor should be appointed as soon as an area of laboratory or library research is identified.

3. Transfer Credits and Course Substitution

Relevant courses taken as a non-degree student at the University of South Carolina can be applied to the Biomedical Science MS program. Courses taken in the Biomedical Science Certificate program can also be applied to the MS program with the permission of the student’s advisory committee and the Graduate Curriculum Committee. **Note that no more than six credits obtained in one completed degree or certificate program can be applied to a subsequent degree at the University of South Carolina.**

Students should note that the University of South Carolina has detailed restrictions on transfer of

credit into MS programs (see the USC Graduate Bulletin). In general, no more than twelve hours of graduate credit can be transferred into the Biomedical Science MS program. Credit to be transferred must be in courses relevant to those in the Biomedical Science program and be of equivalent rigor. Transferred courses cannot substitute for the Core Courses of the Biomedical Science MS program. Only courses with grades of a B or better can be transferred from another institution.

4. Academic Regulations

a. *Grades and Academic Progress*

Graduate courses may be passed for degree credit with a grade of C or better, but the student's average GPA on all courses attempted for graduate credit **must be** at least a B (3.0 on a 4 point scale). Graduate students whose cumulative grade point average drops below **B** (3.00) will be placed on academic probation and allowed one calendar year in which to raise the grade point average to at least 3.00. Students who do not reach a cumulative 3.00 grade point average during the probationary period will not be permitted to enroll for further graduate course work in that degree program. Appeals for reinstatement to degree candidacy may be made first to the Biomedical Science Graduate Program and then forwarded to the Dean of the Graduate School.

b. *Graduate Assistantships*

Biomedical Science MS students are not typically provided stipend support. Moreover, it should be noted that tuition is charged by the Graduate School and is the responsibility of the student. Since foreign students must have evidence of support throughout their time in the United States, such students cannot be admitted to the Biomedical Science MS program unless they are able to demonstrate access to enough funds to maintain themselves throughout their studies. Normally, foreign students are supported by scholarships from their home country or personal funds.

Once an advisor is chosen, mentors **may** elect to provide stipend support to Biomedical Science MS students doing research in their laboratories, in which case the student may be considered to be a Graduate Assistant. In addition to receiving a stipend, non-South Carolina residents who are Graduate Assistants are assessed the in-state rate for tuition purposes. To be eligible for employment as a Graduate Assistant, students must be in good standing in the Biomedical Medical Science MS program and be registered for at least six credit hours during a major semester. The minimum stipend that must be provided to qualify the student for a Graduate Assistantship is \$1,200 for fall or spring semester for no more than ten hours per week of service or \$600 per summer session for no more than ten hours per week of service. Appointments for more hours per week should result in proportionately higher stipend amounts.

Biomedical Science MS students are not normally expected to work during examination periods and school holidays. It is the responsibility of the major professor to discuss the period of appointment, work schedule, specific duties, manner, method, and schedule of evaluation with the student. Regular reviews should give feedback to the student about areas of excellent performance and substandard performance, which are detailed enough to make clear what results are desired.

c. *Pass-Fail Courses*

This option is available for courses whose content is related to the Program of Study, but in an area requiring a different training or background. The past-fail option permits enrichment of a student's experience without affecting the grade point average.

5. Biomedical Science MS Curriculum

a. *Required and Elective Courses*

The MS degree in Biomedical Sciences requires the completion of a series of Core Courses in basic biomedical topics as well as elective courses in focused areas. The MS degree in Biomedical Science requires **at least 32 graduate credit hours**, not more than 6 of which may be taken as research (BMSC 780, MCBA 780, MBIM 780 or PHPH 780) or thesis preparation (799 courses). Of the 32 credit hours, at least 50 percent must be in courses numbered 700 or above, exclusive of dissertation credit. Not more than 6 hours of independent study, special topics, or directed research other than dissertation research are permitted, unless justified by the program of study and approved by the Dean of the Graduate School. The remainder of the requirements may include courses numbered from 500 to 699 taken for graduate credit. As many as 12 hours of study may be taken in USC schools and colleges other than the School of Medicine; this option provides great flexibility to individually tailor programs and draw on the wider resources of a comprehensive university. At least 10 credit hours of graduate study must be taken from basic medical science graduate courses.

The Graduate Studies Bulletin website lists, with a brief description, all graduate courses offered by the University of South Carolina, arranged by graduate program and department. The Master Schedule accessed from the Registrar's website <http://registrar.sc.edu/> lists which courses are offered in a given semester, as well as meeting time, place, and instructor.

The curriculum consists of **required Core Courses** in the biomedical sciences and additional elective courses that depend upon the interest and career goals of the student.

The **Core Courses** include:

An advanced biochemistry course including either Biomedical Biochemistry (BMSC 754), Biological Chemistry (BIOL 717) or *Biochemistry for Biomedical Science (BMSC 707)

Interdisciplinary Laboratory (BMSC 700)

Ethics in Biomedical Research (BMSC 706)

Seminar in Biomedical Sciences (BMSC 801)

An advanced cell biology course either Medical Cell Biology I (BMSC 702), Advanced Cell Biology (BIOL 714) or *Human Cell and Molecular Biology I (BMSC 708)

#Special Topics in Microscopic Anatomy (MCBA 720)

*denotes courses from Biomedical Sciences Certificate program which would fulfill biochemistry and cell biology MS degree requirements

#required of all students substituting BMSC 707 or BIOL 717 for BMSC 754

Additional electives will be required to meet the needed hours of didactic courses for the Biomedical Science MS degree. These should be selected in advisement with the student's major professor and Thesis Committee (discussed below). Note that while 500 and 600 level courses can be taken for graduate credit, at least 50 percent of the courses taken for MS credit must be 700 level or higher. **It is imperative that the student take into consideration specific courses that may be required by particular departments.**

Biomedical Science MS students are required to attend the Biomedical Science seminars and are required to enroll in BMSC 801 for at least one semester (a student can enroll in BMSC 801 each semester in the program if so desired). While not required, Biomedical Science MS students are encouraged to present in the Biomedical Science Student Seminar series.

b. *Program of Study*

Every student must submit a Master's Program of Study Form to the Graduate School that specifies all courses taken as part of the degree. The courses to be taken or Program of Study includes the Core Courses and electives and is determined with the student's Major Professor and Thesis Committee. The Master's Program of Study should be submitted by the end of the second semester or early in the third semester of study. A copy of the form should also be submitted to the School of Medicine Graduate Office. The Master's Program of Study Form can be located at the University of South Carolina Graduate School Forms Library (<http://gradschool.sc.edu/forms/>).

6. Selection of a Major Professor (Mentor)

Selection of a Major Professor or Mentor is an important decision in the student's successful progression through the MS program. The Major Professor will be responsible for assisting the student in selecting elective courses, choosing a thesis topic and performing research related to the thesis. Selection of a Major Professor should be done after careful deliberation and by mutual agreement between the student and faculty member.

a. *Discussing the Research Interests of the Faculty*

In the first semester, students are expected to meet with faculty to familiarize themselves with the ongoing research in the Biomedical Science Graduate Program. To facilitate this process and help students identify faculty members whose area of research expertise aligns with their research interests, symposia with potential mentors will be scheduled at the beginning of the fall semester. Students are also encouraged to meet with potential mentors individually.

b. *Laboratory Rotations (students doing laboratory research)*

For students planning to perform hands-on research for their MS thesis, it is important to spend time in the potential Major Professor's laboratory to gain firsthand experience with the research in the faculty member's laboratory. A lab rotation will usually consist of six to eight weeks of research experience with a faculty member. This may consist of a small independent project or of a component of a larger ongoing project. A student who undertakes a laboratory rotation with

a faculty member is under no obligation whatsoever to continue thesis research with that professor. Similarly, the faculty member is under no obligation to retain the student in their lab for the MS research. A student will usually start rotations in his/her first semester and may participate in one or more rotations.

The student is required to inform the Graduate Director about planned research rotations. The mentor for the rotation(s) should be reported to the graduate office on Biomedical Science MS Form 1 (see Appendix). Biomedical Science MS students should have designated a Major Professor by the end of the second semester in the program or shortly thereafter.

c. Students in the library-based thesis option

Students who wish to write a thesis using library research must also select a major professor who will advise on the topic of research. The topic will be decided jointly by the student and the professor. The student and the professor will hold monthly meetings to assess the progress of the research. It is expected that the thesis will consist of a major review of the literature on a topic of interest to both the student and the professor. It is expected that the thesis project will be pursued concurrently with courses in year 1 and as a major project in year 2.

d. Selection of Major Professor

The selection of major professor by students in the laboratory or library research options is by mutual agreement and is formalized by submission to the Office of Graduate Studies of a completed "Selection of Major Professor" form (Biomedical Science MS Form 2, see Appendix).

It is important that the selection of a major professor be an informed decision by student and advisor. The symposia in the first semester by potential advisors to showcase their research interests will give students the opportunity to select faculty with whom they share an interest. Rotations, in the case of laboratory research students, allow the student and faculty member to determine on a trial basis whether they can act productively in a student/mentor relationship and whether the student can commit to a specific area of research.

The choice of a major professor by a graduate student and the acceptance of the role of major professor by a faculty member, are important decisions which imply a certain sense of obligation on both sides. The choice of a major professor is normally made with every intention of that being a final decision. However, it is appreciated that a student may decide that the choice was inappropriate for that student; therefore, a mechanism exists for changing the major professor. It is pointed out to the student that this is not a decision to be taken lightly. It will almost certainly delay completion of his/her degree program as it will be necessary to develop a new thesis research program and have it approved.

In the event that a graduate student deems a change of major professor necessary, the following procedures will apply:

- 1) The student and the advisor should attempt to reconcile their misunderstandings and differences, or, if they mutually agree that a change is advisable, they should arrange for a mutually satisfactory transition.

- 2) If initial attempts at reconciling differences are unsuccessful, the student and faculty member should confer with the Director of the Biomedical Sciences Graduate Program who will serve as an intermediary to arrange for a mutually satisfactory transition.

7. Thesis Committee

The Thesis Committee is designed to offer guidance to the student as he or she progresses through the MS program and to provide critical evaluation of the student's thesis research. The Biomedical Science MS Thesis Committee must consist of at least three graduate faculty members, all from the USC Columbia campus. One of these members is the student's Major Professor. At least one other member should be from the School of Medicine.

The MS Thesis Committee shall be responsible for approval of the student's Program of Study and the approval of a thesis research project and thesis. The Thesis Committee should discourage research by students on projects with no assurances of the free exchange of ideas and scientific information. In addition, the Thesis Committee is responsible for monitoring the student's research progress through conferences (approximately two times a year). The Committee Chair will be responsible for notifying the Director of the Biomedical Sciences Graduate Program, in writing (with a copy to the School of Medicine Office of Graduate Studies), of all official actions of the Committee.

It is anticipated that the composition of the Thesis Committee will change only if there is a change in direction of research by the student, in which case an additional member with expertise in that area may be requested to join the committee, and a member who was appointed because of an area of expertise which is no longer relevant may volunteer to resign. If a student changes his major advisor, a new Thesis Committee will be appointed.

8. Thesis Proposal

By the end of the second semester or early in the third semester, the student, in consultation with their Major Professor, should have formulated specific goals for their thesis research. The student, with the Major Professor's advisement, should develop a written thesis proposal. The proposal should include: 1) a brief review of the relevant literature that provides the rationale for the thesis research (laboratory or library), 2) an outline of the problem to be addressed or reviewed and 3) an indication of the specific experimental aims (in the case of a laboratory thesis) or topics to be covered (in the case of a library thesis). While this may vary, it is anticipated that the thesis proposal will be four to five double-spaced pages. The written thesis proposal should be submitted to the student's Thesis Committee. A meeting should then be convened to discuss the thesis proposal. The thesis proposal should be submitted to the committee at least one week prior to the scheduled meeting. After approval by the committee, the student should submit the thesis proposal to the School of Medicine Graduate Office.

9. MS Thesis

The culmination of the student's research is the MS Thesis. To allow some flexibility, the

specific structure of the thesis is left up to the discretion of the student, Major Professor and Thesis Committee. The goal of the Major Professor and student should be to generate a document that can be published as a scientific manuscript. The thesis will ultimately be submitted electronically to the USC Graduate School. Careful attention should be paid to specific formatting requirements of the Graduate School. Failure to adhere to these requirements can result in a delay in graduation. Current requirements can be found at the USC Graduate School website (<http://gradschool.sc.edu/students/thesisdiss.asp?page=td>).

10. MS Thesis Defense

The student will be required to present to the Thesis Committee an oral defense of the thesis. The structure of this defense is flexible and should be dictated by the student's Thesis Committee. The student may hold a defense that is open to School of Medicine faculty and students or the defense may be restricted to the student's Thesis Committee. Following the defense, the Thesis Committee will determine if the performance is satisfactory. Following successful defense of the thesis, the student and Thesis Committee members should complete the Thesis Approval Form (G-TSF) found in the USC Graduate School Form Library (<http://gradschool.sc.edu/forms/>). A copy of the completed form should be delivered to the School of Medicine Graduate Office and the original delivered to the USC Graduate School.

11. MS Comprehensive Assessment

The University of South Carolina Graduate School requires that all MS students successfully complete a Comprehensive Assessment. Completion of the thesis defense meets the requirements of a comprehensive assessment in the Biomedical Science MS program. Upon completion of the defense, students should complete the Master's Exam Verification Form from the USC Graduate School Forms Library.

W. Morgan Newton Graduate Student Symposium

This symposium has been established in honor of Dr. W. Morgan Newton, the retired Director of the Animal Resource Facility. Biomedical Science MS students are encouraged to participate in the Morgan Newton Symposium but it is not mandatory. Participants submit an abstract based on some aspect of their current research and make an oral presentation before the faculty and students. An award committee selects a winner and recognizes several highly ranked presentations worthy of 'honorable mention'. Selection criteria include: clarity and organization of the presentation; quality of research; analysis and interpretation of data and understanding of the research demonstrated by responses to questions. Participation in the Newton Symposium by MBS students is welcome but not mandatory.

APPENDICES



**UNIVERSITY OF SOUTH CAROLINA
BIOMEDICAL SCIENCE GRADUATE PROGRAMS**

FORM 1 – LABORATORY ROTATION

Date _____

After discussion with the laboratory mentor, I will be performing a rotation in the undersigned faculty member's laboratory.

I understand that this does not obligate the faculty mentor to accepting me into their laboratory for my MS research. Similarly, I am not obligated to join the mentor's laboratory at the end of the rotation.

Name of Student

Signature of Student

Name of Faculty Member

Signature of Faculty Member

Dates of the Planned Rotation: _____
Beginning Date

End Date

***Please submit this form to Ansley Roberts in the School of Medicine Graduate Office. Complete a new form for each rotation that you do.*



**UNIVERSITY OF SOUTH CAROLINA
BIOMEDICAL SCIENCE GRADUATE PROGRAMS**

FORM 2 – SELECTION OF MAJOR PROFESSOR

Selection of a Major Professor is an important step in the progression towards the MS degree. This is an agreement that should be entered into only after considerable discussion and consideration.

This form should be filled out by the student, signed by all involved parties and delivered to the School of Medicine Graduate Office.

The undersigned individuals agree that _____ will carry out their
Student's Name

MS thesis under the mentorship of _____.
Mentor's Name

Signatures:

Student: _____

Major Professor: _____

Department Chair: _____

Graduate Program Director: _____



UNIVERSITY OF SOUTH CAROLINA BIOMEDICAL SCIENCE MS PROGRAM

Master's Degree Checklist

Degree Requirements (32 graduate credit hours; 26 must be “didactic” or non-research course work)

Course Requirements

Fall Semester First Year

Interdisciplinary Laboratory (BMSC 700); 1 credit hour

Ethics in Biomedical Research (BMSC 706); 2 credit hours

Biochemistry – Biomedical Biochemistry (BMSC 754); 4 credit hours or Biological Chemistry (BIOL 717) 3 credit hours or *Biochemistry for Biomedical Sciences (BMSC 707); 3 credit hours

Cell Biology – Human Cell and Molecular Biology (BMSC 702); 4 credit hours or Advanced Cell Biology (BIOL 714); 3 credit hours or *Human Cell and Molecular Biology I (BMSC 708); 3 credit hours

Special Topics in Microscopic Anatomy (MCBA 720); 1 credit hour (required for students substituting BMSC 707 for BMSC 754)

11 credit hours completed

Spring Semester First Year

Seminar in Biomedical Sciences (BMSC 801); 2 credit hours

Electives (up to three 500 level or higher courses to be determined in conjunction with Thesis Advisor – note that while 500 and 600 level courses can be applied to the MS degree, at least 50 percent of the courses taken must be 700 level or higher)

Max 12 hours

Fall Semester Second Year

Electives (one or two 500 level or higher to be determined in conjunction with Thesis Advisor)

Research Credits (BMSC 780, MCBA 780, MBIM 780 or PHPH 780); variable

Max 12 hours

Spring Semester Second Year

Research Credits (BMSC 780, MCBA 780, MBIM 780 or PHPH 780); variable

Thesis Preparation (BMSC 799); variable

Max 12 hours

NOTE: Only 6 hours of Research Credit (BMSC 780, MCBA 780, MBIM 780 or PHPH 780) and Thesis Preparation (BMSC 799) may be applied to the 32 hours required for degree completion.

Degree Progression Milestones

To facilitate graduation in a timely manner, the items listed below should be completed in the noted academic term.

Fall Semester First Year

Begin Laboratory Rotations (submit Laboratory Rotation form to SOM Graduate Office)
Complete Core Curriculum Requirements

Spring Semester First Year

Complete Elective Courses
Continue Laboratory Rotations (submit Laboratory Rotation form to SOM Graduate Office)
Identify Major Professor/Thesis Advisor (submit Selection of Major Professor form to SOM Graduate Office)
Form Thesis Committee
Submit Master's Program of Study Form (send to Graduate School and SOM Graduate Office)

Fall Semester Second Year

Submit copy of approved Thesis Proposal to SOM Graduate Office
Research

Spring Semester Second Year

Check Graduate School website for thesis submission and defense deadlines for Spring Graduation
Thesis defense (complete Thesis Approval Form (G-TSF) and Master's Exam Verification Form)