

Masters of Medical Science Program



STUDENT HANDBOOK

2011 - 2012

GRADUATE SCHOOL
OF
BIOMEDICAL SCIENCES

PROGRAM DESCRIPTION

The Masters of Medical Science (MMS) Program is a flexible and cost-effective academic opportunity to validate, recognize, and enhance the research experience of clinicians wishing to perform biomedical research. The category of clinicians encompasses dentists, veterinarians, and physicians, including residents, fellows, and faculty of UTMB clinical departments. **The program is only open to applicants from within the UTMB community.**

PURPOSE:

The Masters of Medical Science Graduate Program provides individualized guidance, training, and support to educate clinicians in critical aspects of biomedical research. The program may also be viewed as part of a path to become a biomedical scientist. These goals are achieved through the following five (5) MMS Program Objectives:

1. Promote the development of in-depth knowledge of research methodology, data analysis, and critical thinking.
2. Generate opportunities to interact and collaborate with basic scientists and physician-scientists involved in cutting edge technologies.
3. Provide a formal research experience with medical applications.
4. Provide opportunities to develop an awareness of positive social, ethical, and scientific perspectives.
5. Prepare students for a career in Academic Medicine.

To achieve its objectives, the Masters of Medical Science Graduate Program requires students to:

1. Pursue an intensive **full-time** research experience in one area of biomedical research under the guidance of a mentor and a thesis committee.
2. Obtain a solid theoretical foundation in a broad subject area encompassing their focus of research. Students will demonstrate knowledge of a defined medical research project by presenting an oral defense examination to the student's thesis committee.
3. Develop required technical skills, including bench work, informatics, and statistics, and attain mastery of independent problem solving.
4. Register for and complete a **minimum of thirty semester credit hours** of graduate credit (minimum of one year of **full-time** studies).
5. Register and complete Ethics of Scientific Research Course MEHU 6101.
6. Demonstrate effective oral and written communications skills that can be successfully applied to the pursuit of external funding and the publication of research findings.

APPLICATION PROCESS:

MMS Applicants must hold one of the following clinical degrees: M.D., D.V.M., D.D.S., or D.O (or their equivalents for international students).

*Your application should be **completed** at least 2 months before the beginning of the first semester* (check the Academic Calendar on the GSBS website:

<http://gsbs.utmb.edu/calendars/default.asp#gsbscal>). The following is the normal procedure:

1. Contact the Program Director (gvalbuen@utmb.edu) for a personal interview and to obtain guidance in the application process.
2. Follow general admission procedures found on the GSBS website (<http://gsbs.utmb.edu/admissions/>). In most cases, their respective departments will reimburse students for the application fee. Submit the online application and inform program director by email when you do so. The following must be considered:
 - a. *Submit Official Certified transcripts* from schools attended that granted M.D., D.V.M., D.D.S., or D.O. degree. An ECFMG certificate, if available, is sufficient.

For students who have completed their education at foreign schools and do not have an ECFMG certificate: If the documents are not in English, a certified English translation must be submitted in addition to official original transcripts. Because of delays in receiving transcripts from foreign schools, it is suggested to request these months prior to the anticipated date of enrollment.
 - b. *Satisfy the Language Requirement: If your native language is not English*, you are required to take and score satisfactorily on the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS). *If your native language is not English and you are proficient in the English language and have not taken the TOEFL exam*, you should obtain a letter from your supervisory professor requesting a waiver of the TOEFL/IELTS exam certifying that you are proficient in the English language and that your communication skills are effective both verbally and in writing.
 - c. *Application Fees*. Applications are not processed until the application fee is paid.
3. Letter of Intention to Sponsor from the Proposed Supervisor. This letter should state that the person agrees to be Supervisory Chair. The letter should also indicate, in one paragraph, what the student's project would be. Send to the MMS Program Director by campus mail or e-mail.
4. Letter from the Chairman of the student's clinical department or an appropriate Departmental representative. The letter should state that the department endorses the application and guarantees relief from routine patient-care duties for a one-year, full-time equivalent. If you are not practicing routine patient-care duties, please provide a letter stating that you are not practicing in routine patient-care.

MMS PROGRAM REQUIREMENTS AND PROCESSES

The following diagram depicts the general timeline:

Master in Medical Sciences Program Timeline		
Event	Time	Instructions
Application and admission	2 months before beginning of the program	<ul style="list-style-type: none"> Your application should be completed at least 2 months before the beginning of the first semester. Follow instructions above.
First Registration	4 weeks before beginning of the program	<ul style="list-style-type: none"> Register for MMSC 6097 (Research) and Ethics of Scientific Research (MEHU 6101, only offered in May)◆. You can also register for other courses offered by the GSBS according to your needs and after discussing with supervisor and Program Director. Register online via MyStar at: http://www.utmb.edu/enrollmentservices/. You need to register for at least 9 hours. If you are only taking MMSC 6097 (Research), register for 9 hours. If you are taking other courses, register fewer hours of Research, but no less than 3 hours. If you plan to complete the program in one academic year, you will need to register for an average of 10 semester credit hours per term.
Orientation	One week before beginning of the program	<ul style="list-style-type: none"> You will receive an announcement. Make sure you attend the relevant sessions.
First semester	First month	<ul style="list-style-type: none"> Select Supervisory Committee.
	First three months	<ul style="list-style-type: none"> Obtain preliminary data.
	No later than 5 weeks before end of semester	<ul style="list-style-type: none"> Submit full written proposal to Supervisory Committee for approval.
	No later than 4 weeks before end of semester	<ul style="list-style-type: none"> Oral defense of approved written proposal and qualifying examination.
	No later than 3 weeks before end of semester	<ul style="list-style-type: none"> Request admission to candidacy.
	No later than 1 week before end of semester	<ul style="list-style-type: none"> Register for MMSC 6098 (Thesis)■ and any other elective course. You need to register for at least 9 hours. If you are only taking MMSC 6098 (Thesis), register for 9-10 hours (10 if you are planning to finish within one year). If you are taking other courses, register for fewer hours of Thesis, but no less than 3 hours.

Semester 2 (and up to 3 other semesters)	Entire semester	<ul style="list-style-type: none"> Pursue research activities related to the approved project.
	No later than 3 weeks before end of semester	<ul style="list-style-type: none"> Present progress report to Supervisory Committee for approval and recommendations.
	No later than 2 weeks before end of semester	<ul style="list-style-type: none"> Supervisor to submit evaluation form to Program Director (obtain from Program Coordinator).
	No later than 1 week before end of semester	<ul style="list-style-type: none"> Register for MMSC 6098 (thesis) and any other elective course.
Last semester	First half of the semester	<ul style="list-style-type: none"> Finish research activities related to the approved project. Schedule oral defense of results with the student's committee.
	No later than 5 weeks before end of semester	<ul style="list-style-type: none"> Consider committee's input and then write and submit research findings as a manuscript to a peer-reviewed journal. Notify program director of the submission.
	No later than 4 weeks before end of semester	<ul style="list-style-type: none"> Complete graduation packet if manuscript is already accepted for publication.
	No later than 3 weeks before end of semester	<ul style="list-style-type: none"> If the submitted paper has not been accepted by the end of the semester, a requirement for graduation, you will have to request a leave of absence and re-enroll for the semester that follows immediately after the acceptance of the article.
Graduation semester (if needed because of timing of acceptance of article).	4 weeks before anticipated re-enrollment	<ul style="list-style-type: none"> Request re-admission to the program by filling out the Request for Re-enrollment form, which you can obtain from the GSBS office. Make sure that you indicate that this is for enrollment <i>in absentia</i> (for the purpose of graduation only). You will not have to register for any course and will only have to pay a small fee.
	No later than 4 weeks before end of semester	<ul style="list-style-type: none"> Complete graduation packet.

◆ Students planning to begin the MMS program in the summer or fall semesters are encouraged to complete the following three-day course which is offered only in May: Ethics of Scientific Research (MEHU 6101). For this purpose, the prospective student will request an appointment as a special student to the Dean of the GSBS. Please contact the MMS Program Director to direct your request to the Dean of the GSBS.

■ If the student does not pass the defense and oral examination or for any other reason cannot defend on term 1, he or she can register for MMSC 6097 (Research) for term 2.

After formal acceptance into the MMS Program, the student, with the support of his or her supervisory professor, must prepare for the following milestones.

1. Selection of a Supervisory Committee

Within the first semester of acceptance into the program, the student, under his or her mentor advice, will name a supervisory committee to oversee the proposed research. It is the student's responsibility to contact all prospective members and determine that they are willing to be members. The supervisory committee is made up of three (3) members:

- Supervisory professor, who will chair the committee.
- A basic scientist from the student's department.
- A clinician scientist from the student's department.

The members of your committee must be faculty of the GSBS. If any committee member is not a faculty of the GSBS, his or her CV must be submitted to the MMS Program Director; he will then recommend this person to the Dean of the GSBS for either a special appointment or a permanent appointment.

Important note: It is the responsibility of the student to produce a letter signed by the committee members in which they agree to serve in that role and state that they have read and understood the Student Handbook (the student will provide a current version of the MMS Student Handbook). This letter will be submitted to the MMS Program Director for pre-approval. The MMS Program Director will then forward the request to the Dean of the GSBS for final approval.

2. Writing, Submission, and Approval of Full Proposal

During the course of the first semester of enrollment, the student will write, under the supervision of his or her mentor, a full proposal describing the planned research. **The proposal will follow the most recent NIH format instructions for an R21 application (7 pages).** The following are important resources that you should read and follow:

- <http://grants.nih.gov/grants/oer.htm>.
- We strongly recommend the following book for assistance in preparing your grant proposal: <http://www.grantcentral.com/workbooks.html>. This workbook is a very practical, step by step guide to the philosophy and proven techniques for the writing of successful grant proposals.

The text should be divided into the following sections (page recommendations are approximate):

- a) Abstract (1/2 page; does not count towards page limit): a concise synopsis of the proposal.
- b) Specific Aims (1 page): include objective of the application, central hypothesis, rationale, specific aims, and, briefly, expected outcomes.

- c) Research Strategy (6 pages). Divide in the following subsections:
- i) Significance (1/2 page).
 - ii) Innovation (1/2 page).
 - iii) Approach (5 pages): divide by specific aims and include the following in each one:
 - (a) Introduction: state objective of the aim, working hypothesis, approach (very briefly), and rationale.
 - (b) Justification and feasibility: include relevant background for the aim as well as relevant preliminary data (if available).
 - (c) Research design: a logical experimental plan with details of how you will address the specific aim, rationale for use of specific techniques, and plans for interpreting anticipated results. Remember to include controls (negative and positive if appropriate) and the appropriate statistical analyses that are required.
 - (d) Expected outcomes.
 - (e) Potential problems and alternatives: provide an analysis of the limitations and potential pitfalls of each and every approach. Also, provide the alternatives available if an approach or technique does not work out.
- d) Timeline (1/4 page).
- e) Literature Cited (does not count toward page limit). You should read original papers and keep citations of review articles to a minimum. If you cite a paper it is assumed that you have actually read it.

The student should understand every word, experimental approach, and technique that is part of the proposal. There should be a rationale for everything that is proposed.

Important note: student-generated preliminary data is desirable but not absolutely required. However, it is expected that students will generate at least part of the preliminary data during the first semester. Due to the short duration of the program, it is critical that students be admitted to candidacy at the end of the first semester. Students that are not admitted to candidacy by the end of the second semester will be dismissed from the MMS Program.

The written proposal will be submitted to the members of the student's supervisory committee who will review it following the most recent NIH guidelines. The following resources are available:

- <http://enhancing-peer-review.nih.gov>
- http://grants.nih.gov/grants/peer_review_process.htm

An evaluation form will be provided by the Program Coordinator once the Program Director is informed of the intention to defend the proposal. A grade of Pass or Fail will be assigned to the written proposal by each member of the supervisory committee. If any member of this committee assigns a Fail grade,

the student will have one more chance to rewrite the proposal. The student must obtain a unanimous Pass grade on a second round of review in order to continue in the MMS program.

The Chair of the student's Supervisory Committee will inform the student and the MMS Program Director of the consensus of the committee. Students that do not successfully complete this part of their training cannot enter candidacy and are therefore subject to dismissal from graduate school.

3. The Oral Examination

When the student obtains a Pass grade on the written proposal, he or she will schedule an oral qualifying examination with the Supervisory Committee. Students are responsible for contacting all members of their committee and coordinating the time and location of their examination. Please note proposed timeline in the table above.

The oral qualifying examination is designed to: 1) test the student's general knowledge of biomedical research in his or her area of concentration and the general field that frames the research proposal; 2) assess creative, critical, and rational thought; 3) test the candidate's understanding of the basis of research methods; and 4) evaluate the student's aptitude for research.

The student will prepare an oral presentation of the approved written proposal. The total presentation/examination should last no more than three hours. The format is variable and should be discussed with the Chairman of the Supervisory Committee. It can, for example, be a 45-minute presentation followed by questions, or can be a longer presentation with Committee members asking questions during the presentation. Questions that will be asked will focus on your proposal/presentation but can take many forms. Be prepared to explain methodologies (formulae, what specific reagents do, etc.), experimental plans (use of controls, etc.), data analysis (statistics), etc. Remember that questions are not limited to the proposal but can also include knowledge that can reasonably be expected based upon the student's research interest and academic background.

After the presentation and examination, the student's Supervisory Committee will assign a Pass or Fail grade. If any member of this committee assigns a Fail grade, the student will have one more chance to orally defend the proposal and pass the examination. The student must obtain a unanimous Pass grade on a second round of examination in order to continue in the MMS program.

The Chair of the student's Supervisory Committee will inform the MMS Program Director about the performance of the student by submitting a specific evaluation form provided by the Program. Students that do not successfully complete the examination cannot enter candidacy and are therefore subject to dismissal from graduate school.

If the student cannot complete all the requirements for candidacy within the first

semester (the only reason should be that exams had to be repeated), the student can register one more time for Research (MMSC 6097). Students must be admitted to candidacy within the first two semesters. Failure to do so constitutes grounds for dismissal from graduate school.

4. Admission to Candidacy

Upon receipt of a passing evaluation form, the MMS Program Director will recommend admission to candidacy to the Dean of the GSBS. **It is the responsibility of the student** to make sure that the Chair of the Supervisory Committee submits the evaluation form to the MMS Program Director before applying to candidacy. This should happen at the end of the first semester so she or he can register for MMSC 6098 (Thesis) in the following semester (see specific timeline in the table above). The student should allow at least one week for processing of the request. Students may register for Thesis up to four subsequent terms until graduation.

5. Conduct of Research

During the research component of the work toward the MMS degree, the student must be enrolled in the MMSC 6098 Thesis course offered each term by the graduate school. As part of the requirements of this course, the student must present an oral progress report to the members of the Supervisory Committee (every semester that the student is enrolled in Thesis). The student's supervisor will forward an evaluation with a grade to the MMS Program Director.

6. Oral Defense of thesis

After completion of the proposed research, the student will prepare an oral presentation to discuss his or her research results with the members of the Supervisory Committee. Students are responsible for contacting all members of their committee and coordinating the time and location of their defense. Students will receive feedback for approaching the following and final step of the MMS program. It is recommended that the oral defense be scheduled in such a way that there will be enough time to write the article (next step) and process the graduation package by the end of the semester.

7. Writing a Scholarly Report

After satisfactory defense of the student's research results and conclusions, the student will write a manuscript with the results of his or her research for submission to a peer-reviewed PubMed-indexed journal. The following criteria pertain:

- The student must write the article and be first author.
- The student must submit evidence of the submission to the program director.
- A single paper cannot serve to meet the MMS publication requirement for more than one MMS student.

- The article must be accepted for publication in order to be eligible for graduation. Please submit evidence of acceptance to MMS Program Director.

Once all requirements are completed, the MMS Program Director will recommend to the Dean of the GSBS that the MMS degree be granted to the graduating student. At this point, the Program Coordinator will help the student with processing the graduation package.

MMS COURSE REQUIREMENTS:

- MMSC 6097 Research course. This course initiates the formal research training directed toward a Masters of Medical Science degree. During this course, the student will select a supervisory committee, submit full written proposal for approval, orally defend the approved written proposal, and request admission to candidacy. Grading is based on the student's level of performance as reported by the student's supervisory professor assigned as satisfactory, needs improvement, or unsatisfactory.

Credits: 3-10

Course grades: S/N/U

Term offered: I, II, III.

Year offered: Annually.

- MMSC 6098 Thesis course. Once admitted to candidacy, the student will pursue the proposed research and present a progress report to the supervisory committee for approval and recommendations. In the last semester, the student will finish research activities related to the approved project, prepare an oral defense of his or her thesis, and write and submit his or her research findings as a manuscript to a PubMed-indexed peer-reviewed journal. Grading is based upon the student's level of performance as reported by the chairperson of the student's supervisory committee.

Credits: 3-10

Prerequisite: Admission to candidacy for the master's degree.

Course grades: S/N/U

Term offered: I, II, III.

Year offered: Annually.

These courses are not designed in a classroom setting. The student selects a laboratory sponsor and a supervisory professor that will enable the student to conduct their proposed research.

- MEHU 6101 Ethics of Scientific Research course. This required course is a small-group discussion that explores ethical issues in the conduct of scientific research. Students meet with course faculty to discuss readings and cases dealing with the philosophy of science, the ordinary practice of scientific research, conflicts of

interest, and the value conflicts that arise between scientists and society at large. Course grades (S/U) will be determined by attendance, which is required at all sessions (60%), and adequate class participation based on an understanding of the basic concepts of the course (40%).

It is mandatory for all GSBS students to enroll in this classroom-based course offered once a year in May. A student cannot graduate until this course is completed.

Students planning to begin the MMS Program in the summer or fall semesters are encouraged to complete this course even before the beginning of the Masters training. For this purpose, the prospective student will request an appointment as a special student before admission to the program. Please contact the MMS Program Director to direct your request to the Dean of the GSBS.

- Elective courses: Most courses of the GSBS are also available to MMS students. In consultation with your supervisor, students will decide if they need to take elective courses.

GSBS REQUIREMENTS

GSBS Requirements for Full-Time Registration. UTMB Graduate School for Biomedical Sciences (GSBS) Policy requires that all degree-seeking students must be enrolled full time, registering for at least nine hours a semester.

It is possible to request a waiver on a semester-by-semester basis. A request for such a waiver should be made in writing to the MMS Program Director, who will then forward the request to the Dean of the GSBS for approval if it has appropriate justification. At the dean's discretion, waivers may be granted for full-time UTMB employees, for those with significant clinical responsibilities, and for others in special circumstances.

Each master's degree student must spend at least one year enrolled as a student in residence in the Graduate School of Biomedical Sciences. Exceptions to the residence requirement must be obtained in writing from the candidate's Supervisory Committee and the Dean of the graduate school.

The Graduate School also requires that each degree-seeking student must spend one year in residence as a full-time student or seek a special waiver as spelled out in Sections 4.6111 and 4.6211 of the Graduate School's Bylaws and Academic Policies (available on the GSBS web site: <http://www.gsbs.utmb.edu/>).

Note: The minimum time to complete MMS degree is one year - three terms.

Resources for our MMS program graduates

Clinician-scientists interested in pursuing an academic career in the United States should explore the possibility of applying to a KO8 award from NIH. For more information, visit <http://grants.nih.gov/training/careerdevelopmentawards.htm>.

MMS PROGRAM CONTACTS

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**FACTS ABOUT UTMB STUDENTS,
RESEARCH AND OUR COMMUNITY**<http://www.utmb.edu/><http://www.gsbs.utmb.edu/><http://www.utmb.edu/departments.asp>