

Graduate Education In Biomedical Sciences

Associate Dean for Graduate Studies: Douglas F. Paulsen, PhD

Overview

MSM is accredited by the Southern Association of Colleges and Schools to offer programs of study leading to the M.S. in Biomedical Research, M.S. in Biomedical Technology, M.S. in Clinical Research, and PhD in Biomedical Sciences. The Ph.D. program's first graduates finished in 1998. The M.S. in Biomedical Sciences programs are new, accepting our first students in 2008. The primary goal of these programs is to produce basic scientists (especially underrepresented minorities) well trained to teach and conduct biomedical research. MSM-trained biomedical scientists are encouraged to have a special commitment to educating underrepresented minority students and to performing research on diseases that disproportionately affect minority populations. The mission is a key factor in guiding the selection of applicants for admission and in developing the program curriculum.

These graduate programs are overseen by the Graduate Education in Biomedical Sciences Committee (GEBSC) a committee of the Graduate Faculty which sets program policy and serves in an advisory capacity to the MSM Academic Policy Council in general and to the Associate Dean for Graduate Studies in particular.

The **Ph.D. in Biomedical Sciences** program is designed to develop independent investigators capable of assuming leadership roles in academic, government, and corporate biomedical research. It involves a core-didactic curriculum followed by extensive dissertation research directed toward contributing new discoveries that will advance the field in which the students' interests lie.

The **M.S. in Biomedical Research (MSBR)** program provides a core-didactic and thesis-based curriculum for college graduates seeking a terminal, thesis-based Master's degree or considering the pursuit of doctoral degrees in research or the health sciences. The program allows students to obtain a graduate degree; further explore career options in the biomedical sciences; document their ability to handle graduate-level coursework; and conduct a mentored research project in an area of interest to them.

The **M.S. in Biomedical Technology (MSBT)** program is a non-thesis program for college graduates preparing for, or already engaged in, biomedical technology careers. The classroom curriculum is similar to that of the thesis-based program. Beyond the classroom, students in this program will focus

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and you can apply online by setting up a secure account at <http://www.applyweb.com/apply/mh2/indexa.html>. This system allows you to work on your application, save your work, and return until you're ready to submit. Completed applications for the Fall admissions cycle, including a \$35 non-refundable application processing fee, are due by February 1 at the latest. **Applications completed by January 15, will receive priority consideration for Fall admission, with applicant notification by March 15 or earlier.** In exceptional cases involving outstanding applicants with substantial graduate and research experience, applications for entry January 1 will be accepted if they are completed by October 1.

Additional information about application materials and the admissions process may be obtained by calling the Office of Admissions and Student Affairs at (404) 752-1650, by sending an email to phdadmissions@msm.edu, or by sending your request to:

Office of Admissions and Student Affairs
Morehouse School of Medicine
Graduate Education in the Biomedical Sciences
720 Westview Drive SW
Atlanta, GA 30310-1495

Additional information about the PhD program can be obtained by contacting the Office of Graduate Education in Biomedical Sciences. Telephone 404-752-1580, FAX 404-752-1179.

International Applicants

Additional requirements for international applicants are included on the web page listed above for application instructions. If you have difficulty accessing this document online, you may request that a copy be sent by email, FAX, or post, through one of the contact points listed above.

PhD, MSBR, MSBT Selection Criteria

Selection of applicants for the graduate degree programs in the biomedical sciences is competitive. Applications are evaluated by the Graduate Admissions Committee. The evaluations are based on undergraduate background and performance in general and performance in the sciences in particular. In addition, performance on the Graduate Record Examination and letters of reference from former or current science instructors and research mentors are important in judging a student's preparedness for graduate study. Prior research experience is

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- A letter of recommendation from your MSM department chair.
- Three individual letters from MSM or other faculty who are capable of speaking to your professional skills and goals.
- A copy of your official appointment to MSM's Faculty.
- 2-3 page research abstract or narrative.
- Fully completed online application.
- Transcripts and other documents as noted by the Admissions Office.
- A wallet-size photograph must be submitted with your application.

MSCR Application Process

Prospective fellows may apply over the internet by visiting the Master of Science in Clinical Research website at www.msm.edu/educational/mcrprogram.htm selecting the "apply to MSCR program". Completed applications for the Fall admissions cycle, are due by April 4.

Additional information about application materials and the admissions process may be obtained by calling the Office of Admissions and Student Affairs at (404) 752-1650 or the MSCR Program Office at (404) 752-1780.

Office of Admissions and Student Affairs
Morehouse School of Medicine
Master of Science in Clinical Research Program
720 Westview Drive SW, Atlanta, GA 30310-1495

MSCR Applicant Selection Criteria

Selection will be based on academic qualifications, commitment to clinical research as evidenced by a personal typewritten narrative statement not to exceed 2-3 pages, quality of letters of recommendation and a personal interview conducted by the MS for Clinical Research Admissions Committee (MSCRAC). Acceptance to the MS in Clinical Research will be based on the total profile of the applicant.

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Once students have passed the CCE, they complete their lab rotations and select an advisor who will help them select their elective courses, their dissertation research project, and their dissertation committee. The second part of the qualifying exam process involves a competency certification (ECC) covering the student's elective studies. To complete this requirement, students must submit a form signed by their dissertation committee members certifying that the student has achieved the expected level of competency regarding the elective studies. The student's dissertation committee will determine the form and nature of the evaluation process for this certification. The third part of the qualifying exam process is the development of a formal dissertation research proposal describing the background, experimental design, methods, and timeline for the student's dissertation research. After submitting the proposal, the student will defend it in an oral presentation to the dissertation committee. The committee will thus assess both the student's grasp of the subject matter covered in the elective courses and the dissertation proposal. Committee approval of both the proposal and information covered in the elective courses constitutes successful completion of the second and third parts of the qualifying exam.

Degree Candidacy

Students having an overall B average in their graduate course work and having passed all parts of their qualifying exam are eligible for degree candidacy. Thereafter, students will expend most of their effort completing their dissertation research and preparing their dissertation. During the conduct of the dissertation research, the student is required to convene regular meetings of the dissertation committee to report progress and receive direction.

Completion of Degree Requirements

Once the dissertation research is completed to the satisfaction of the student's committee, the student must prepare a written dissertation describing the background, approach, and results of the work, including a discussion of the significance of the findings in advancing scientific knowledge. Successful dissertation research must constitute a significant, original contribution to scientific knowledge as judged by the dissertation committee. Once the dissertation has reached its final stages, the student must, with the approval of the committee, schedule a public presentation and defense of the work. The student's committee will determine whether the student has successfully defended the dissertation. The committee usually requires final adjustments to

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Third-Year Curriculum

Seminar in Biomedical Sciences III	1
Seminar in Biomedical Sciences IV	1
Biomedical Sciences Presentation II	1
Elective(s)	TBD
Dissertation Research	TBD

Fourth-Year Curriculum**

Seminar in Biomedical Sciences V	1
Seminar in Biomedical Sciences VI	1
Dissertation Research	TBD

*The PhD curriculum is subject to ongoing revisions and may change during a student's tenure, including changes that affect graduation requirements.

**Depending on the rate of progress toward achieving research goals, dissertation research often continues beyond the fourth-year of matriculation in the PhD program. The student's dissertation committee determines when, and whether, sufficient research has been successfully completed to merit the PhD degree.

Master of Science in Biomedical Sciences

Program Director: Douglas F. Paulsen, MD, PhD

General Requirements for the MS in Biomedical Sciences Degrees

Coursework

The first six months of M.S. study are devoted primarily to instruction in core (required) courses covering fundamental aspects of biochemistry, cell, and tissue structure and function, as well as introducing biostatistics, methods, instrumentation, ethics, writing skills, and critical thinking necessary for success in professional science. Students are required to maintain a B (3.0) average in all their course work to advance in the program. Laboratory rotations in the second half of the first semester and the first half of the second semester help the students select their advisor.

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Committee approval of both the proposal and information covered in the elective courses constitutes successful completion of the second and third parts of the qualifying exam.

Degree Candidacy

Students having an overall B average in their graduate course work and having passed all parts of their qualifying exam are eligible for degree candidacy. Thereafter, students will expend most of their effort completing their thesis research and preparing their thesis. During the conduct of the thesis research, the student is required to convene regular meetings of the thesis committee to report progress and receive direction.

Completion of Degree Requirements

Once the thesis research is completed to the satisfaction of the student's committee, the student must prepare a written thesis describing the background, approach, and results of the work, including a discussion of the significance of the findings in advancing scientific knowledge. Successful thesis research must constitute a significant contribution to scientific knowledge as judged by the thesis committee. Once the thesis has reached its final stages, the student must, with the approval of the committee, schedule a public presentation and defense of the work. The student's committee will determine whether the student has successfully defended the thesis. The committee usually requires final adjustments to the written thesis after a successful oral defense. Once the thesis has been successfully defended and the final modifications accepted by the committee, copies of the final document must be submitted to the graduate office to complete the requirements for the M.S. degree.

MS in Biomedical Research Curriculum Outline*

First-Year Curriculum

Course	Semester	Credit Hours
Graduate Biomedical Sciences Sequence		
Biochemistry		4
Biochemistry Lab		3
Cell & Tissue Structure		3
Cell & Tissue Lab		3
Fundamentals of Professional Science I		3

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advisory committee will determine the form and nature of the evaluation process for this certification. The third part of the qualifying exam process is the development of a formal technical apprenticeship proposal describing the objectives and details of the program of technical training agreed upon by the student, advisor, and committee. After submitting the proposal, the student will defend it in an oral presentation to the technical advisory committee. The committee will thus assess both the student's grasp of the subject matter covered in the elective courses and the proposal. Committee approval of both the proposal and information covered in the elective courses constitutes successful completion of the second and third parts of the qualifying exam.

Degree Candidacy

Students having an overall B average in their graduate course work and having passed all parts of their qualifying exam are eligible for degree candidacy. Thereafter, students will expend most of their effort accumulating the required clock hours of supervised technical apprenticeship and preparing their compilation of Laboratory Protocols in the Biomedical Sciences. During the technical apprenticeship period, the student is required to convene regular meetings of the technical advisory committee to report progress and receive direction.

Completion of Degree Requirements

As the required technical apprenticeship is underway, the student should be compiling detailed technical protocols for the methods in which he or she is training. These protocols are intended to be included in a bound compendium to be entitled Laboratory Protocols in the Biomedical Sciences. This document should include an introductory chapter explaining the objectives of the student's training program and the relationship of the protocols included to those objectives. The introductory chapter should be followed by individual chapters detailing the protocols learned and developed during the training period. Once the apprenticeship has reached its final stages, the student must, with the approval of the committee, schedule a public presentation of one or more of the methods described in the protocol document. The student's committee will determine whether the student has successfully presented his or her work. The committee usually requires final adjustments to the protocol document after a successful oral presentation. Once the presentation has been successfully completed and the final modifications to the protocol document accepted by the committee, copies of the final document must be submitted to the graduate office to complete the requirements for the M.S. degree.

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Master of Science in Clinical Research

Program Director: Elizabeth Ofili, MD, MPH

Associate Director: Alexander Quarshie, MBChB, MS

Overview

Upon completion of the MSCR degree program, the student should be able to:

- Demonstrate knowledge of ethical issues in the field of clinical research including the use of data involving human subjects, and be able to prepare a human consent form for a research protocol
- Understand the principles of the design and conduct of clinical trials with attention to protocol preparation, randomization, sample size, trial monitoring, ethical issues, and data analysis; understand principles of health services research and methods in assessing health care quality and costs
- Prepare a National Institute of Health proposal including a budget using Public Health Service Form 398
- Design observational and experimental studies, demonstrate understanding of potential sources of bias, confounding and methods of addressing them in the design and execution of studies
- Critically review and summarize the literature on a given topic
- Identify and evaluate demographic, behavioral, social and environmental factors that have an impact on the distribution of disease in populations
- Participate as a team member in identifying clinical research questions and selecting appropriate study designs and methods to address those questions
- Identify and access sources of health and medical data such as vital statistics records, disease registries, national surveys, and medical records, describe how these data are collected and their role in surveillance and disease prevention
- Assist in the design and administration of instruments for collection of epidemiological/medical data for the purposes of surveillance or research
- Give oral presentations and produce written reports on topics relevant to academic medicine; appreciate the role of genetic factors and their interaction with environmental factors in the etiology and prevention of human disease
- Perform basic statistical tests, recognize the assumptions behind the analysis and interpret the results

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2. A practical skill workshop series offered in the summer consists of an introduction to principles of clinical research and an introduction to medical informatics.
3. Clinical Research Seminar Series: this weekly series features Clinical Research Education and Career Development (CRECD) trainees, Morehouse School of Medicine instructors, consultants, and mentors as well as distinguished outside speakers. Trainees will have an opportunity to gain exposure to a variety of role models from within, as well as outside the Morehouse School of Medicine community. Trainees will also present their work for critical review and comments. This format will expose the trainees to contemporary critical thinking on health disparities, generate new ideas, and foster research collaboration within Morehouse School of Medicine and other collaborating institutions.
4. Mentored Research Project: the mentored research project will account for 12 of the 36 credits hours required for successful completion of the MS in Clinical Research. Applicants to the MS program will develop research proposals in consultation with their clinical chairs and/or research mentors and submit them for review and approval by the Curriculum Committee. The proposal will form the basis for the mentored research project.

A Practical Skill Workshop Series is offered during the summer of the first year. This series is designed to help trainees begin work on their mentored projects. Topics covered include: an introduction to clinical research, obtaining research support and grant funding mechanisms, proposal development, study designs, analysis of secondary data, cultural competency, career development, human subject advocacy and introduction to medical informatics.

M.S. in Clinical Research Curriculum Outline

First-Year Curriculum

Course	Semester Credit Hours
Medical Informatics	2
Principles of Clinical Research	2
Clinical Research Seminar I	1
Fundamentals of Biostatistics	3
Mentored Research Project I (P/F)	1
Clinical Trials	2
Analysis of Frequency Data	3
Clinical Research Seminar II	1

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Mentored Research Project

The mentored project is to be performed under the supervision of an established clinical investigator and a mentoring committee. It involves reviewing the literature and writing a scientific proposal to answer a specific clinical research question(s). Data will be collected and analyzed for a presentation at a national scientific meeting as well as for publication in a peer reviewed medical journal.

The mentoring should incorporate appropriate procedures learned in formal course work. The research mentoring may focus on a therapeutic clinical trial, intervention study, observational study, or a clinical evaluation program.

The mentoring must be presented at a seminar and then provided in written form suitable for publication. A mentoring committee appointed by the Curriculum Committee must approve the oral and written presentations.

Outcomes of Mentored Research Project

- **Preparation of a literature review:** Using unbiased means of identifying primary studies, the candidate will compose a comprehensive review of the literature pertinent to his or her research question. This review should take the form of a three to five page single-spaced report similar in format to the “Background and Significance” section of an NIH proposal. All candidates will present their review during a session of the Master’s Seminar. This requirement should be completed by the end of the fall semester of the first year in the program. It is anticipated, although not required, that many candidates will submit their literature reviews for publication.
- **Presentation at a national meeting:** This requirement involves submission of a first-authored abstract to a nationally recognized scientific meeting/conference within the candidate’s academic field and acceptance of that abstract for either poster or oral presentation. The abstract should describe a study of a comparative nature and not simply a case report or case series. While the topic of the abstract is expected to be closely related to the candidate’s systematic literature review, the abstract should not solely consist of a systematic review or meta-analysis.
- **Publication as first author of a peer-reviewed clinical research report:** Using data analyzed during residence in the Master’s program, the candidate will prepare and submit a first-authored manuscript for publication in an approved peer-reviewed journal. It may be acceptable in selected cases, upon approval