

MD/MS IN GENOMIC MEDICINE

Be a part of the future of genomic and personalized medicine!

This 4-year concurrent master's degree in Genomic Medicine will provide you with the background, knowledge, and understanding to integrate the ever expanding field of genomics into your practice. No matter which medical specialty you choose, genomic medicine is increasingly becoming an integral part of patient care with the use of predictive clinical sequencing, pharmacogenetics, and whole genome analysis.

Educational Mission of the MD/MS Program in Genomic Medicine

The educational mission of the program is to graduate clinicians with the ability to integrate genomic knowledge into their clinical practice. In collaboration with the Hussman Institute for Human Genomics, graduates will be trained in human genetics, family history, diagnostic genomic tests, high throughput sequencing, pharmacogenomics and the newest genomic concepts and approaches. The MD/MS degree will prepare students to be leaders in the adoption and integration of these methods in routine clinical care.

The MD/MS degree program in Genomic Medicine will provide:

- Both degrees obtained during 4 year MD degree
- Integrated and innovative training in both clinical and human genomics
- Online coursework coupled with small group learning sessions for smooth integration into your schedule
- Hands-on experience analyzing and interpreting genome sequence data
- Capstone experience featuring clinical case descriptions, journal club, and individual research projects

Applying for the MD/MS Program in Genomic Medicine: Online application (<http://biomed.med.miami.edu/apply/apply-md-ms-in-genomic-medicine/>)

- Applicants must be accepted first-year medical students in the UM Miller School of Medicine. The first block of MS courses begin in the 2nd academic semester (spring) of the first year.
- Applications are due by November 1st of each year.
- The academic prerequisites are the same as those for the regular MD program.
- Graduate Record Exam (GRE) test scores are not required to apply to the program.
- Applicants will be notified of their acceptance status in late November or early December for coursework that will begin in the Spring semester of the first year of medical school.
- Acceptance is contingent upon successful completion of first semester coursework.
- Tuition is equal to UM Miller School of Medicine dual degree tuition.

For additional information (<http://medgen.med.miami.edu/education/msgm/>), please contact Dori McLean, Manager of Programs, DMclean@med.miami.edu . (dmclean@med.miami.edu)

Curriculum Requirements

Students will complete all GNM courses and follow the NextGenMD curriculum listed below.

Code	Title	Credit Hours
MD Requirements (136 credits)		
Phase 1: Pre-Clerkship		
MDR 550	Introduction to the Medical Profession	3
MDR 526	Biomedical Principles of Health I	5
MDR 527	Biomedical Principles of Health II	5
MDR 531	Medicine as a Profession 1	4
MDR 532	Medicine as a Profession 2	4
MDR 533	Medicine as a Profession 3	1
MDR 520	Symptoms, Signs, and Disease 1	3
MDR 521	Symptoms, Signs, and Disease 2	4
MDR 522	Symptoms, Signs, and Disease 3	6
MDR 523	Symptoms, Signs, and Disease 4	3
MDR 524	Symptoms, Signs, and Disease 5	6
MDR 525	Symptoms, Signs, and Disease 6	5
Phase 2: Integrated Clerkships		
MDR ###	Transition to Clerkships	1

MDR 715	Integrated Pediatrics and Obstetrics and Gynecology	12
MDR 717	Integrated Medicine	12
MDR 716	Integrated Surgery, Emergency Medicine, and Anesthesiology	12
MDR 718	Integrated Psychiatry, Neurology, and Family Medicine	12
MDR ### Medicine as a Profession Clerkships 1		1
MDR ### Medicine as a Profession Clerkships 2		3
MDR ### Medicine as a Profession Clerkships 3		2
Phase 3: Advanced		
MDR ### Sub-Internship		4
MDR ### Clinical Selective		4
MDR ### Integrated Science Selective		4
MDR ### Critical Care Selective		2
MDR ### Transition to Residency		2
MDR ### Specialty Boot Camp		2
Electives		14
MS Requirements (30-35 credits)		
GNM 602	Clinical Applications of Genomic Medicine II	3
GNM 605	Research Ethics	1
GNM 610	Clinical Applications of Genomic Medicine I	3
GNM 630	Clinical Applications of Genomic Medicine III	4
GNM 631	Genomic Medicine Laboratory	3
GNM 660	Computational Methods for Genomic Medicine	3
GNM 680	Genomic Ethics and Public Policy	3
GNM 690	MSGM Capstone	6-12
MDR 890	Genetics and Metabolic Diseases (two 2-week rotations are required for a total of 4 credits)	4
Total Credit Hours		166-172

Plan of Study- Medical

Students will complete all GNM courses and follow the NextGenMD curriculum listed on the MD Program curriculum tab. (<http://bulletin.miami.edu/graduate-academic-programs/medicine/md/#curriculumtext>)

Plan of Study- Genomic Medicine

The Master's in Genomic Medicine (MSGM) coursework is concurrent with the UM Miller School of Medicine MD Program beginning in Spring semester of the first year and ending upon completion of the MD program in the 4th year. Each course is made up of self-guided online instruction and reading and in-person small group work. In the first two years, self-guided instruction is expected to require approximately 3 hours per week of time commitment. Small group work is an additional 3-hour block of time per week that will be determined upon the MD program schedule for that semester. Up to 3 additional hours per week may be required for assignments, projects, and review. Years 3 and 4 contain a clinical clerkship elective and the MSGM Capstone that will culminate in a written portfolio and public presentation of the Capstone experience.

Year One		
Fall		Credit Hours
Application process occurs during Fall semester and no courses are offered for the Fall in Year 1.		
Credit Hours		0
Spring		
GNM 610	Clinical Applications of Genomic Medicine I	3
GNM 680	Genomic Ethics and Public Policy	3
Credit Hours		6
Summer		
GNM 602	Clinical Applications of Genomic Medicine II	3
GNM 605	Research Ethics	1
GNM 660	Computational Methods for Genomic Medicine	3
Credit Hours		7

Year Three		
Fall		
MDR 890	Genetics and Metabolic Diseases (two 2-week sessions - 2 credits each (shared credits with MD Program (taken anytime during Year 3 and/or Year 4; Phase 3))	4
Credit Hours		4
Spring		
GNM 630	Clinical Applications of Genomic Medicine III	4
GNM 631	Genomic Medicine Laboratory	3
Credit Hours		7
Year Four		
Fall		
GNM 690	MSGM Capstone (Taken anytime during Phase 3)	6-12
Credit Hours		6-12
Total Credit Hours		30-36

Mission

The educational mission of the Master of Science in Genomic Medicine (MSGM) program at the University of Miami Miller School of Medicine (UMMSM) is to graduate clinicians with the ability and desire to integrate genomic knowledge into clinical practice. Graduates will be trained in the use of detailed family genetic history, diagnostic genomic tests, high throughput sequencing, and pharmacogenomics, and will develop an understanding of the ethical and policy implications of genomic medicine.

Goals

The MSGM degree will prepare students to be leaders in the adoption and integration of these methods in routine clinical care. While multidisciplinary, this degree program's core emphasis is on clinical and translational research skills. Students completing this program will continue on to graduate medical training and future careers in medicine, incorporating the tools of genomic medicine into their clinical practices.

Student Learning Outcomes

- Students will demonstrate an overall knowledge and understanding of the core concepts in Genomic Medicine, including the essential skills to evaluate research in the field and apply results to the practice of medicine.
- Students will demonstrate critical thinking skills, the capability to develop clinical research hypotheses, and the ability to evaluate these hypotheses, paying attention to the responsible conduct of research as appropriate.
- Students will demonstrate the ability to write effective research reports and present results orally.

GNM 602. Clinical Applications of Genomic Medicine II. 3 Credit Hours.

The Clinical Applications of Genomic Medicine series provides genomic medicine case studies and systems-based learning. Topics covered in the fall include cardiovascular, respiratory, renal/urinary, gastrointestinal/nutritional systems.

Components: LEC.

Grading: GRD.

Typically Offered: Fall.

GNM 605. Research Ethics. 1 Credit Hour.

This course introduces foundational concepts in research ethics in preparation for conducting the genomic medicine practicum. Online Human Subjects Research and Responsible Conduct of Research training through the CITI program website will be supplemented with three hours of in-person discussion sessions.

Components: LEC.

Grading: GRD.

Typically Offered: Fall.

GNM 610. Clinical Applications of Genomic Medicine I. 3 Credit Hours.

This course provides introductory background for understanding genomics, genomic techniques as well as provides genomic medicine case studies and systems-based learning. Initial topics include basic concepts of genomic medicine, genomic techniques involved in clinical applications, integration of genomic medicine into clinical setting, importance of translational research, benefits for patient and physician, transitioning with the medical curriculum into case studies. This course is focused on complex genetic disorders, and use of web-based tools to use in clinical work.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

GNM 630. Clinical Applications of Genomic Medicine III. 4 Credit Hours.

The primary objective of this course is to prepare students to evaluate the clinical utility of a genetic test and apply that information in a clinical setting. Illustrations of these concepts are drawn from the systems-based curriculum spanning December (ophthalmology and dermatology) and spring (rheumatology, infection & immunity, hematology & oncology, diabetes & metabolism, endocrinology & reproductive medicine). The class will meet once each week (2 hours each session), for literature-based discussion sessions and case-based learning.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

GNM 631. Genomic Medicine Laboratory. 3 Credit Hours.

Students will rotate in the molecular genetics and biochemical genetics diagnostic laboratories, gaining experience with genomic testing in a clinical setting and interpretation and communication of results.

Components: LAB.

Grading: CNC.

Typically Offered: Spring.

GNM 660. Computational Methods for Genomic Medicine. 3 Credit Hours.

The objective of this course is to gain a working knowledge of computational methods utilized in primary and secondary analysis of genomic technologies and apply these to a clinical setting. This will prepare students to perform practical data analysis in the GNM 631 course offered in Spring.

Components: LEC.

Grading: GRD.

Typically Offered: Fall.

GNM 680. Genomic Ethics and Public Policy. 3 Credit Hours.

This course provides an introduction to the scientific, socio-ethical and policy issues arising in the context of genomic medicine. It is designed to improve your critical thinking and give you the tools to evaluate the wide range of challenges that genomic medicine brings to individuals and societies alike. We will cover a broad spectrum of topics, from the history of eugenics, to genetic testing and screening through the life cycle (i.e. pre-implantation and pre-natal testing, newborn, population and carrier screening, direct-to-consumer genetic testing), as well as bioethical (i.e., informed consent, privacy, confidentiality, etc.), policy (i.e., professional duties, patents, discrimination, etc.), and societal issues (i.e. health disparities).

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

GNM 690. MSGM Capstone. 6-12 Credit Hours.

The purpose of the Capstone Segment is to provide the research and clinical application aspects of training. It can be initiated at any point after admission to the MSGM Program, and results in 6 credits earned in Spring of Year 4. All components (case reports, mentored research project, genomic medicine education) will be summarized in a portfolio of work and presented at the end of the Capstone.

Components: LAB.

Grading: SUS.

Typically Offered: Spring.