



DREXEL UNIVERSITY

Graduate School of

**Biomedical Sciences
and Professional Studies**

College of Medicine

**Drexel University College of Medicine
Graduate School of Biomedical Sciences &
Professional Studies**

**MOLECULAR & CELL BIOLOGY & GENETICS
M.S. PROGRAM**

POLICIES AND PROCEDURES

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I. INTRODUCTION

This booklet:

- describes academic policies and procedures pertaining to M.S. graduate study in the Molecular & Cell Biology & Genetics (MCBG) Graduate Program;
- supplements policies, procedures, and general rules of the Division of Biomedical Science Programs;
- contains current guidelines that are revised periodically by faculty in the Program.

The Graduate Program offers coursework and research opportunities leading to the M.S. degree. The goal of the Graduate Program is to provide an intensive interdisciplinary research training and classroom experience in order to prepare graduates for significant contributions to their field. Research interests of the faculty members are described elsewhere.

There are three components of requirements to be fulfilled for obtaining an M.S. degree:

1. Research rotation(s)
2. Required and elective courses
- 3A. Research thesis and defense (Thesis Track)
- 3B. Literature Review (Non-Thesis Track)

M.S. students will have specific research goals, relating to a chosen area of Molecular & Cell Biology & Genetics. There is an increasing demand within biotechnology industries for M.S. level research assistants with expertise in all areas of Molecular Cell Biology & Genetics. Students who achieve outstanding performance during the M.S. program may apply to the Ph.D. program. The admission into the Ph.D. program is contingent upon successful completion of the M.S. degree, successful completion of Preliminary Examination at the Ph.D. level, and financial support from his or her mentor for Ph.D. dissertation studies.

Full time M.S. students are expected to complete their program within two years, and in no more than four years. General requirements for admission to and completion of the M.S. program may be found in the policies and procedures of the Division of Biomedical Science Programs.

II. BASIC GUIDELINES FOR THE M.S. DEGREE (Thesis Track)

A. CURRICULUM

1. Required Core Courses

IDPT-521S	Molecular Structure and Metabolism
IDPT-526S	Cells to Systems
BIOC-603S	Advanced Topics in Biochemistry and Molecular Biology (Fall 1 st year)
MCBG-506S	Advanced Cell Biology (Spring 1 st year)

Required Courses for Biomedical Graduate Studies

IDPT-501S	Biostatistics I
IDPT-500S	Responsible Conduct of Research

2. Advanced Elective Courses

In consultation with the Advisory Committee and according to the area of selected research, the student must select a minimum of 2 advanced elective courses from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge. A minimum of 5 credits is required to satisfy the advanced elective course requirements. Suggested elective courses are listed on the last page.

NOTE: All formal courses must be completed within the first two years.

3. Seminars and Journal Club

Students are required to sign up for and participate in the Molecular and Cell Biology and Genetics Student Seminar Series (MCBG-513S) and Journal Club (MCBG-512S).

4. Lab Rotations

The Molecular & Cell Biology & Genetics (MCBG) Graduate Program is an interdisciplinary Program that includes participating faculty from several departments. The student therefore has the opportunity to pursue laboratory rotation(s) in any participating laboratory.

At least one and no more than three rotations must be arranged during the first year in consultation with the Program Director and faculty members within the Graduate Program. It is highly recommended that M.S. students do no more than two laboratory rotations. These rotations are designed to expose the student to a variety of important techniques and research problems.

The research areas may be chosen to complement the student's long-term research interests. Research rotations should provide an opportunity to:

- Practice scientific logic and experimental design
- Acquire useful technical expertise
- Extend scientific and personal interactions within and between labs
- Explore the possibility for a future thesis research topic

At least 20 hours per week (minimum) for a three-month period are required for each rotation. The first rotation must begin no later than mid-August of the first year, and students must satisfactorily complete all rotations by the end of summer of the first year. A written summary and oral presentation of the research experience is prepared by the student at the end of each rotation and is evaluated by the faculty and the student. Upon completion of the third rotation, a student must immediately choose and enter a research lab to start thesis research.

At any time after the first laboratory rotation, M.S. students can choose a thesis advisor. The student in conjunction with his/her thesis committee and advisor will select a research project with clearly defined objectives and feasibility. The thesis committee will consist of at least three members of the graduate faculty.

5. Research

The research project requires approximately one year of full time research. A suitable objective is the preparation of a publishable research paper. Additional time may be required for writing the thesis.

The preparation and defense of the M.S. Thesis is conducted as described in the policies and procedures of the Division of Biomedical Science Programs. The Thesis may follow the traditional format, or may consist of a research paper submitted or accepted for publication, with any additional material deemed necessary by the Thesis Committee

6. Committee Meetings

Meetings between the student and his/her Thesis Committee serve to provide an objective, supportive and critical feedback evaluation of academic and scientific progress throughout Graduate School training. They are an essential part of the mentoring process.

Committee meetings must be held every six months, or more frequently if deemed necessary by the research advisor, student, or thesis committee. It is the responsibility of each student to convene committee meetings at a mutually convenient time and to provide evidence of such meetings in writing to the Program Director and the Division of Biomedical Science Programs.

7. Teaching

Teaching is not required but may be arranged if requested by the student and approved by the Advisory Committee.

8. Academic Standing

A GPA of 3.0 must be maintained to successfully complete the program.

B. ADVISORY COMMITTEES

1. The Program Director will serve as advisor during the first year. Student must meet with the Program Director every six months. The Program Director will

inform the MCBG steering committee of the progress of first year graduate students at least twice during the first year. The Steering Committee will serve as the Advisory Committee for an MCBG student until a thesis committee is formed for that student.

2. By the end of the 1st year of graduate studies, the M. S. Student must identify their thesis mentor. The student and advisor select a three-member Thesis Committee that consists of three faculty members in the MCBG program, including the research advisor. At this time a chair of the thesis committee will be selected who is **not** the thesis advisor. The thesis committee will evaluate the student's progress every 6 months or more frequently if deemed necessary by the research advisor, student, or thesis committee. It is the responsibility of each student to convene committee meetings every six months and to provide evidence of such meetings in writing to the Program Director and the Division of Biomedical Science Programs.

C. EXAMINATIONS

1. **Preliminary Examination:** The M. S. Student is not required to take the Preliminary Examination unless he or she has intention of pursuing a PhD degree in the MCBG program. The purpose of the Preliminary Exam is to assess the student's ability to integrate, process and utilize knowledge gained prior to and during the first year of Graduate School. Molecular and Cell Biology and Genetics Graduate Program faculty are involved in preparing and evaluating this exam. The results of the exam are included in the student's permanent file. The preliminary exam is taken at the end of the 1st year of graduate study.

Format: The students are given a specific research question whose complete answer requires the integration of several overlapping fields of scientific investigation. The student is given a general hypothesis-driven question whose solution requires the student to integrate the core curriculum. Students have approximately two weeks to research and evaluate the given topic in the form of a written outline (3-5 pages with additional space for diagrams and references). One to two weeks later, students orally present their solution to the assignment to a panel of MCBG faculty. The oral exam lasts 60-120 minutes. This exam must be completed prior to the start of the fall semester of the second year. Successful completion of the preliminary exam is necessary for admission into the MCBG Ph.D. program with advanced standing.

D. EVALUATION OF PROGRESS

The Program Director, Advisory Committee, or Thesis Committee will evaluate performance in coursework, on exams, in laboratory rotations and oral presentations every 6 months or more frequently if deemed necessary by the research advisor, student, or thesis committee. In addition:

1. **Summer of First Year**

Students with 3.0 GPA and satisfactory rotation performance are allowed to take the Preliminary Examination if they have intentions of pursuing a PhD

degree in the MCBG program after completion of the M. S. degree.

Pass on Preliminary Exam - qualifies the student to apply to the MCBG Ph. D. program with advanced standing.

Failure or Deficiency on Preliminary Exam - the student is permitted a single retake of the Exam, to be scheduled within one month of the original examination.

Failure on retake of Preliminary Exam - the student is not allowed to apply to the MCBG Ph.D. program with advanced standing.

E. THESIS AND DEFENSE

M. S. Students must conduct at least two semesters of Thesis Research in order to conduct "Thesis Defense". M.S. Students are not required to register for "Thesis Defense". However, the student's thesis committee, research advisor, and the program director must approve thesis writing during the second semester of Thesis Research. If the student's thesis committee determines that the student needs additional time to complete his or her thesis, the student may register for "Thesis Defense" after the second semester of Thesis Research.

The preparation and public oral defense of the M.S. thesis are conducted as outlined in the policies and procedures of the Division of Biomedical Science Programs. The Thesis may follow the traditional format, or may consist of a research paper submitted or accepted for publication, with any additional material deemed necessary by the Thesis Committee. The student's thesis committee must approve the thesis and is responsible for evaluating the thesis, conducting the oral defense, and recommending approval to the Director of the Division of Biomedical Science Programs. Students in the Molecular & Cell Biology & Genetics Graduate Program must submit their final, completed thesis to their thesis committee at least two weeks prior to the oral defense date.

III. BASIC GUIDELINES FOR THE M.S. DEGREE (Non-Thesis Track)

Students may enter the M.S. program in the non-thesis track. This track is predominately designed for individuals who may want to acquire an advanced degree so as to enhance already existing skills. For example, a typical student might be an individual already working in industry or an individual wanting to learn specific laboratory skills. This track may also be an option for students unable to successfully complete the standard Ph.D. or M.S. program preliminary exam.

A. GENERAL REQUIREMENTS

1. Students in the non-thesis master of science track are expected to complete their program within two years, and in no more than four years.
2. A temporary advisory committee will be assigned upon admission to the program. After satisfactory completion of the first year, a formal advisory committee will be selected as described in the policies and procedures of the Division of Biomedical Science Programs.
3. The teaching requirement is waived; however, opportunities for teaching are available to interested students.
4. At beginning of the second year, the student will choose an MCBG faculty advisor and, in consultation with the advisor, choose a topic for a scholarly literature review. Student will choose two additional committee members to evaluate the review. This review will be publication quality (although

publication is not required for graduation). At the discretion of the student's evaluation committee, the student may be asked to present an oral summary of the written review.

6. Total credits required: minimum of 37 credits. Student must fulfill all course requirements including a minimum of 3 advanced level graduate courses. Students must maintain a minimum 3.0 grade-point-average to be considered in good academic standing.

B. COURSE REQUIREMENTS

1. Required Core Courses

IDPT-521S	Molecular Structure and Metabolism
IDPT-526S	Cells to Systems
BIOC-603S	Advanced Topics in Biochemistry and Molecular Biology (Fall 1 st year)
MCBG-506S	Advanced Cell Biology (Spring 1 st year)

Required Courses for Biomedical Graduate Studies

IDPT-501S	Biostatistics I
IDPT-500S	Responsible Conduct of Research

2. Advanced Elective Courses

In consultation with the Advisory Committee and according to the area of selected research, the student must select a minimum of 3 advanced elective courses from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge. A minimum of 7 credits is required to satisfy the advanced elective course requirements. Suggested elective courses are listed on the last page.

NOTE: All formal courses must be completed within the first two years.

3. Seminars and Journal Club

Students are required to sign up for and participate in the Molecular and Cell Biology and Genetics Student Seminar Series (MCBG-513S) and Journal Club (MCBG-512S).

4. Literature Review (IDPT-850S)

5. Academic Standing

A GPA of 3.0 must be maintained to successfully complete the program.

C. RESEARCH and LITERATURE REVIEW

1. Two lab rotations are suggested but not required (general elective). These would be designed to provide skills that would be useful for an industrial job search or supplement already existing skills (if student is already employed in industry).

2. Committee meetings will be held every six months or more frequently if deemed necessary by the student, mentor, or advisory committee. Advisory Committee will evaluate performance in coursework, on exams, and in literature review. It is the responsibility of each student to convene committee meetings at a mutually convenient time and to provide evidence of such meetings in writing to the Program Director and the Division of Biomedical Science Programs.

CODE OF BEHAVIOR

The Graduate Program in Molecular & Cell Biology & Genetics subscribes to the **Code of Behavior** for all of its members. This policy states that professional behavior appropriate to a faculty and students in an academic research setting is expected and required at all times. Admission to and continued participation in the Graduate Program is therefore contingent upon the student's understanding of this policy, and his/her agreement to adhere to its guidelines.

CODE OF ETHICS

The Graduate Program in Molecular & Cell Biology & Genetics subscribes to the **Code of Academic Integrity** (presented in its complete form in the policies and procedures of the Division of Biomedical Science Programs) for all its members. This policy states that cheating, plagiarism, forgery, or other forms of academic misconduct are not tolerated at our institution. Admission to and continued participation in the Graduate Program is therefore contingent upon the student's understanding of this policy, and his/her agreement to adhere to its guidelines.

JOURNAL CLUBS, SEMINARS AND LABORATORY ROTATIONS

Participation in the graduate program journal club and seminar series and successful completion of laboratory rotations are considered an integral part of the education of a graduate student. Accordingly, the Division of Biomedical Science Programs Education Committee has established the following guidelines for all graduate programs:

Unsatisfactory Performance in Journal Clubs and Seminar

Three unexcused absences are allowed per year for journal clubs and seminar. More than three absences will result in a grade of Unsatisfactory (U). The "U" must be remediated to the satisfaction of the program. If not, it will be grounds for dismissal.

Students who are registered for thesis defense during the semester are exempted from attending Journal clubs and Seminar Series.

Unsatisfactory Performance in Laboratory Rotations

Laboratory rotations are graded on a Satisfactory (S) or Unsatisfactory (U) basis. Students receiving an "S" are rated on a performance scale ranging from Outstanding (1) to Poor (5). A "U" for a lab rotation is reserved for students that do not meet performance requirements, including attendance, of the rotation as stipulated by the program. A "U" for a laboratory rotation is grounds for dismissal.

**Drexel University College of Medicine
Molecular & Cell Biology & Genetics (Thesis-Track)
Typical Graduate Program Schedule for First Year
Required Courses**

FALL

Meet with Dr. Todd Stochlic, Advisor to New Graduate Students

Core Curriculum I	5 credits	IDPT-521S
Advanced Topics in Biochemistry & Molecular Biology	2 credits	BIOC-603S
Molecular & Cell Biology & Genetics 1st Lab Rotation	4 credits	MCBG-501S
Molecular & Cell Biology & Genetics Journal Club	1 credit	MCBG-512S
Molecular & Cell Biology & Genetics Seminar	1 credit	MCBG-513S

SPRING

Meet with Dr. Todd Stochlic, Advisor to New Graduate Students

Core Curriculum II	5 credits	IDPT-526S
Advanced Cell Biology	2 credits	MCBG-506S
Biostatistics	2 credits	IDPT-501S
Molecular & Cell Biology & Genetics 2nd Lab Rotation (suggested as a general elective)	4 credits	MCBG-502S
Molecular & Cell Biology & Genetics Journal Club	1 credit	MCBG-512S
Molecular & Cell Biology & Genetics Seminar	1 credit	MCBG-513S

**Choose Research Advisor by 8/1

**Drexel University College of Medicine
Molecular & Cell Biology & Genetics (Thesis Track)
Typical Graduate Program Schedule for Second Year
Required and Elective Courses**

FALL

Thesis Research	9 credits	MCBG-600S
Molecular & Cell Biology & Genetics Journal Club	1 credit	MCBG-512S
Molecular & Cell Biology & Genetics Seminar	1 credit	MCBG-513S
Elective	2-3 credits	
*Committee Meeting		

SPRING

Thesis Research	9 credits	MCBG-600S
Responsible Conduct of Research	2 credits	IDPT-500S
Molecular & Cell Biology & Genetics Journal Club	1 credit	MCBG-512S
Molecular & Cell Biology & Genetics Seminar	1 credit	MCBG-513S
Elective	2-3 credits	
*Committee Meeting		
*Thesis Defense		

The student has the opportunity to take elective courses chosen with consent from the Advisory Committee. Suggested Electives are listed on the next page.

Advanced Electives		
In consultation with the Advisory Committee and according to the area of selected research, the student must select a minimum of 2 advanced elective courses (3 for Non-Thesis Master Track) from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge. A minimum of 5 credits (7 for Non-Thesis Master Track) is required to satisfy the advance elective requirements.		5 - 7
Suggested Electives		
MCBG 507S	MACROMOLECULAR STRUCT & FUNCTION	2
MCBG 514S	Cell Cycle and Apoptosis	2
BIOC 508S	Experimental Approaches to Biochemical Problems	3
BIOC 510S	Cancer Biology	3
BIOC 511S	Writing for Researchers: Grants and Papers	1
BIOC 512S	Advanced Cancer Biology	1
MIIM 555S	Molec. Mech. Of Micro. Path	3
MIIM 508S	Immunology I	3
MIIM 607S	IMMUNOLOGY II	3
MIIM 613S	Emerging Infectious Diseases	2
MIIM 615S	EXPERIMENTAL THERAPEUTICS	2
MIIM 630S	Advanced Molecular Biology	2
PHRM 512S	Graduate Pharmacology	3
PHRM 525S	Drug Discovery and Development I	3
PHRM 526S	Drug Discovery and Development II	3
PHRM 602S	RESEARCH METHODS IN PHARMACOLOGY	2
PHRM 507S	Prin. of Neuropharmacology	3
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 511S	Advanced Cellular and Developmental Neuroscience	1
NEUR 512S	Advanced Systems and Behavioral Neuroscience	1.5