



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
Ph.D. PROGRAM**

POLICIES AND PROCEDURES

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I. INTRODUCTION

This booklet:

- describes academic policies and procedures pertaining to Ph.D. 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 Ph.D, and M.D./Ph.D degrees. 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 five components of requirements to be fulfilled for obtaining a Ph.D. degree:

1. Research rotations
2. Required and elective courses
3. Preliminary and qualifying examinations
4. Dissertation (thesis) research proposal
5. Research dissertation (thesis) and defense

In addition, the MCBG Program requires a Ph.D. candidate to submit at least one manuscript for publication by a peer-reviewed journal and to prepare a second manuscript for submission.

II. BASIC GUIDELINES FOR THE Ph.D. DEGREE

A. CURRICULUM

1. Required Core Courses

IDPT-533S	Core Principles in Biochemistry & Cell Biology
MCBG 515S	Techniques in Molecular & Cell Biology & Genetics
MCBG-506S	Advanced Cell Biology (Spring 1 st year)

Statistics Requirement

Select at least one of the following statistics courses for a minimum of two credits.

BIOC 521S	Introduction to Biochemical Data
CR 520S	Applications of Clinical Research Biostatistics
IDPT 501S	Biostatistics I
MIIM 517S	Applied Statistics for Biomedical Sciences
NEUR 500S	Statistics for Neuro/Pharm Research

Required Courses for Biomedical Graduate Studies

IDPT-500S	Responsible Conduct of Research
IDPT-502S	Learn Early as Professionals (LEAP I)
IDPT-504S	Learn Early and Practice (LEAP II)

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. 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 rotations in participating laboratories.

A minimum of three rotations must be arranged during the first year in consultation with the Program Director and faculty members within the Graduate Program. 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 dissertation 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 August 1st 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. Rotation studies are evaluated by the faculty and the student at three stages during each rotation (intake, midterm, end-evaluations). Upon completion of the third rotation, a student must immediately choose and enter a research lab to start dissertation research.

Students in good academic standing (GPA 3.0 and above), who have extensive previous academic lab research experience (1 year minimum, full time), have already identified/selected a specific dissertation laboratory for their these work, and/or have a Master of Science in a field related to biomedical research may petition the Program Director to opt out of the third rotation. The students must provide a letter from their chosen dissertation advisor to verify that the student has been accepted in that lab for dissertation work. The Program Director will forward the student's request to the MCBG Steering Committee for consideration. If approved, students must immediately start their dissertation research.

5. Research

A minimum of three years of full-time research is required following the choice of the dissertation research laboratory (which must occur by the end of the first summer). Generally, the time required to complete a Ph.D degree is five years. Additional time may be required for writing the dissertation and research publications.

6. Committee Meetings

Meetings between the student and his/her Dissertation 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 dissertation 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 dissertation committee is formed for that student.
2. After successful completion of the Preliminary Examination the student and advisor select a five-member Dissertation (Thesis) Committee that consists of at least three faculty members in the MCBG program, including the research advisor, and one faculty outside of the graduate program. At this time, the chair of the dissertation committee will be selected who is **not** the dissertation advisor. The dissertation committee will evaluate the student's progress every 6 months or more frequently if deemed necessary by the research advisor, student, or dissertation 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 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 specific research questions whose complete answer requires the integration of several overlapping fields of scientific investigation. The student is given general hypothesis-driven questions whose solution requires the student to integrate the core curriculum. Students have approximately 10 days to research and evaluate the given topic in the form of a written outline (3-5 pages with additional space for diagrams and references). 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 to go on to the second year of study.

2. **Qualifying Examination:** This is a mock NIH grant proposal that is defended orally. The purpose of the examination is to assess the students' scientific creativity, ability to design a research project, and oral and written communication skills. The student's dissertation committee administers the exam.

Written Part (A): The focus of the qualifying exam can be directly related to

ongoing research in the advisor's laboratory and the student's dissertation work. If the student chooses to conduct the qualifying exam on the dissertation project, a "Specific Aims" page must be presented to the Dissertation Committee for approval at least one week prior to the start date for the written portion of the exam (see below for timeline). If the student chooses to do the qualifying exam on a topic that is not related to his/her dissertation research, a list of three topics, presented in the form of "Specific Aims" must be presented to the student's Dissertation Committee at least one week prior to the start date of the written portion of the exam; the Dissertation committee will select one topic. The exam must follow NIH instructions for a F31 pre-doctoral fellowship. However, no budget is required. Specific Aim (limit 1 page), Research Strategy (limit 6 pages), and Bibliography (literature cited, no page limit) are required. The proposal must cover a research project that would take 2 years to complete.

Once the Specific Aims are approved, approximately four but no more than five weeks are spent to prepare the proposal (**to be handed in to the Dissertation Committee in the summer of the second year in the program and no later than November 1 of the third year**). Students spend up to 50% time during this period on researching the current status of the proposed topic and the preparation of the mock grant. Graduate student peer review is recommended, but no faculty or post-doctoral assistance is permitted. The student may choose one faculty member of the dissertation committee to provide advice on construction of a grant proposal. This faculty member cannot be the dissertation advisor and will only provide advice relevant to constructing a grant proposal and will not help the student formulate ideas for his/her specific proposal. The proposal must be submitted to the Dissertation Committee **at least 7 days** prior to the date of qualifying exam.

Oral Part (B): Within five weeks of beginning preparation for the qualifying exam, an oral presentation and defense are performed, and evaluated by the student's Advisory Committee. At this time both the theoretical knowledge that is pertinent to that branch of science and the experimental design and evaluation of the proposed research are examined. The mock grant and the committee's evaluation of performance are included in the student's permanent file. Successful completion of the qualifying exam is necessary to continue in the Ph.D. program.

D. EVALUATION OF PROGRESS

The Program Director, Advisory Committee, or Dissertation (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 dissertation committee. In addition:

1. Summer of First Year

- a. *Students with 3.0 GPA and satisfactory rotation performance* will take the Preliminary Examination.

Pass on Preliminary Exam - qualifies the student to continue in the Ph.D. program.

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 must withdraw from the Ph.D. program, and is eligible to apply for the M.S. program.

- b. Students with <3.0 average or who have less than a B in core courses are not eligible to take the Preliminary Exam, unless so decided by the program Steering Committee. As part of this decision, the Steering Committee considers satisfactory performance in rotations. If the Steering Committee decides that the Preliminary Exam will be administered:

Pass on Preliminary Exam - student may continue in the Ph.D. program under probationary status, upon recommendation of the faculty and in accord with Office of Biomedical Graduate Studies policies regarding any necessary course remediation.

Fail on Preliminary Exam - the student must withdraw from the Ph.D. program. To be eligible for the M.S. on probationary status, core courses must be remediated, and student must obtain permission of the faculty and approval from the Graduate School.

2. **Summer of Second Year or Fall of Third Year**

To continue into the third year of the Ph.D. program, students are required to achieve an overall GPA of 3.0, satisfactory performance in the laboratory, and pass the Qualifying Exam. The qualifying exam must be completed no later than November 1 of the third year.

Failure on Qualifying Exam - One retake will be permitted, within one month of the first attempt. The retake may constitute submission of a new proposal, revision of the first proposal, and/or a repeat of the oral presentation and defense. A second failure will result in withdrawal from the Ph.D. program. A student may petition for admittance into the M. S. program.

E. REGISTERING FOR “THESIS DEFENSE”

When all program requirements have been completed, including all necessary research activity for generating required publications, a student must register for “Thesis Defense.” The student’s dissertation committee, research advisor, and the program director must approve registration for “Thesis Defense”.

F. DISSERTATION AND DEFENSE

The preparation and public oral defense of the Ph.D. dissertation are conducted as outlined in the policies and procedures of the Division of Biomedical Science Programs. In conjunction with the dissertation, the student must have submitted one manuscript and prepared a second manuscript for publication. The student's dissertation committee must approve the dissertation proposal and is responsible for evaluating the dissertation, conducting the oral defense, and recommending approval to the Director of the Division of Biomedical Science Programs. Students in the Molecular and Cell Biology and Genetics Graduate Program must submit their final, completed dissertation to their dissertation committee at least two weeks prior to the oral defense date.

III. GUIDELINES FOR M.D./Ph.D. DEGREE

* For detailed policies and procedures regarding the MD/PhD Program, please refer

to the MD/PhD Program.

A. PROGRAM

1. Except where agreed upon by the student and his/her advisory committee, the MD/PhD program consists of three or four years of graduate work following the third year of medical school. The general schedule for the M.D./Ph.D. program is: (1) complete the first three years of medical school. It is strongly recommended that students complete rotations and any required graduate school courses that are offered during the summers preceding formal enrollment into the Graduate Program, (2) complete the required graduate program courses, exams and research during the next three to four years, (3) complete the last year of medical school, finishing and defending the dissertation prior to starting Year 4 of Medical School.
2. The M.D./Ph.D. student, upon entry into the graduate program, is equivalent to a beginning second year student. The MD/PhD student completes all of the standard requirements of medical school, and all of the requirements for the Ph.D. degree, with the following exceptions:
 - a. M.D./Ph.D. students must complete two laboratory research rotations. The first rotation must be scheduled in the summer between Years 1 and 2. The second rotation should be scheduled after Year 3 of Medical School. The rotation laboratory supervisor(s) should be chosen in consultation with the M.D./Ph.D. Program Director and the Program Director of the specific graduate program.
 - b. MD/PhD students are not required to take Core Principles in Biochemistry & Cell Biology, Biostatistics, LEAP I, LEAP II, Techniques in MCBG, and Advanced Cell Biology. MD/PhD students are not required to take the preliminary examination.
 - c. The same advanced elective courses are required as for the Ph.D. degree. MD/PhD students are also required to take MCBG Journal Clubs, MCBG Seminar Series, and Responsible Conduct of Research.
 - e. Selection of the research advisor must be made immediately following the lab rotation(s).
 - f. Teaching is not required but may be arranged if requested by the student and approved by the Advisory Committee.
3. The M.D./Ph.D. student, upon entry into the graduate program, is equivalent to a beginning second year student, and as such will take the Qualifying Exam by the summer of the second year or fall of the third year. Rules for taking the Qualifying Exam and for the timeline of completion of all coursework are the same as for students in the Ph.D. program. A Dissertation (thesis) Committee must be established within six months of entering the program. The make up of the Dissertation Committee is the same as for students in the Ph.D. program. Dissertation Committee meetings must be held every six months or more frequently if deemed necessary by the research advisor, student, or dissertation 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 Biomedical Graduate Studies office.

4. The program and manuscript-preparation requirements and the dissertation preparation and defense guidelines are identical to those of the Ph.D. program. The dissertation must be written, defended, and submitted to ProQuest prior to starting Year 4 of medical school. In exceptional cases, the dissertation committee, in accord with the Office of Biomedical Graduate Studies guidelines, may grant an extension to this deadline.

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 their 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 their 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 (dissertation) 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 (PhD Program)
Typical Graduate Program Schedule for First Year
Required Courses**

FALL

Meet with Dr. Eishi Noguchi, Advisor to New Graduate Students

Core Principles in Biochemistry & Cell Biology	4 credits	IDPT-533S
Learn Early as Professionals (LEAP I)	1 credit	IDPT-502S
Techniques in Molecular and Cell Biology & Genetics	2 credits	MCBG-515S
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. Eishi Noguchi, Advisor to New Graduate Students

Learn Early and Practice (LEAP II)	1 credit	IDPT-504S
Responsible Conduct of Research	2 credits	IDPT-500S
Advanced Cell Biology	2 credits	MCBG-506S
Molecular & Cell Biology & Genetics 2nd Lab Rotation	4 credits	MCBG-502S
Molecular & Cell Biology & Genetics Journal Club	1 credit	MCBG-512S
Molecular & Cell Biology & Genetics Seminar	1 credit	MCBG-513S
Select at least one of the following statistics courses for a minimum of two credits.		
Introduction to Biochemical Data	2 credits	BIOC 521S
Applications of Clinical Research Biostatistics	3 credits	CR 520S
Biostatistics I	2 credits	IDPT 501S
Applied Statistics for Biomedical Sciences	2 credits	MIIM 517S
Statistics for Neuro/Pharm Research	2 credits	NEUR 500S

SPRING to SUMMER

Molecular & Cell Biology & Genetics 3rd Lab Rotation	4 credits	MCBG-503S
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Preliminary Examination (by July 1)
Written and oral segments must be passed.

**Choose Research Advisor by 8/1

**Drexel University College of Medicine
Molecular & Cell Biology & Genetics (PhD Program)
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
Advanced Elective	2-3 credits	
Advanced Elective	2-3 credits	
*Committee Meeting		

SPRING

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
Advanced Elective	2-3 credits	
*Committee Meeting		

Qualifying Exam - Mock NIH Grant Proposal by summer of second year or no later than November 1 of third year. Written and oral segments must be passed.

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 – PhD Program		
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 advance elective requirements.		7 - 9
BIOC 508S	Experimental Approaches to Biochemical Problems	
BIOC 511S	Communication for Researchers	
BIOC 521S	Introduction to Biochemical Data ***	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
CBIO 510S	Cancer Biology	
CBIO 512S	Advanced Cancer Biology	
MCBG 514S	Cell Cycle and Apoptosis	
CR 515S	Intro to Clinical Trials	
MIIM 508S	Immunology I	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 607S	Immunology II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	Experimental Therapeutics	
MIIM 630S	Advanced Molecular Biology	
NEUR 508S	Graduate Neuroscience I	
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
PHRM 507S	Prin of Neuropharmacology	
PHRM 512S	Graduate Pharmacology	
PHRM 518S	New Frontiers in Therapy	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
PHRM 602S	Research Methods in Pharmacology	

General Electives – PhD Program		
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	