Drexel University College of Medicine

Microbiology & Immunology

POLICIES AND PROCEDURES

Dr. Lawrence Bergman
Professor of Microbiology
Director, Microbiology & Immunology Graduate Program
Drexel University College of Medicine
Department of Microbiology & Immunology
2900 Queen Lane
Philadelphia, Pa 19129
TEL: 215-991-8376
FAX: 215-848-2271
L Bergman@drexelmed.edu
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. INTRODUCTION</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>II. BASIC GUIDELINES FOR Ph.D. DEGREE</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>A. CURRICULUM</strong></td>
<td>2</td>
</tr>
<tr>
<td>1. Core Courses</td>
<td>2</td>
</tr>
<tr>
<td>2. Advanced Courses</td>
<td>2</td>
</tr>
<tr>
<td>3. Special Topics Courses</td>
<td>2</td>
</tr>
<tr>
<td>4. Lab Rotations</td>
<td>2</td>
</tr>
<tr>
<td>5. Teaching Experience</td>
<td>3</td>
</tr>
<tr>
<td>6. Research</td>
<td>3</td>
</tr>
<tr>
<td>7. Committee Meetings</td>
<td>3</td>
</tr>
<tr>
<td><strong>B. ADVISORY COMMITTEE</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>C. EXAMINATIONS</strong></td>
<td>5</td>
</tr>
<tr>
<td>1. Preliminary Examination</td>
<td>5</td>
</tr>
<tr>
<td>2. Qualifying Examination</td>
<td>5</td>
</tr>
<tr>
<td><strong>D. EVALUATION OF PROGRESS</strong></td>
<td>6</td>
</tr>
<tr>
<td>1. End of First Year</td>
<td>6</td>
</tr>
<tr>
<td>2. End of Second Year</td>
<td>7</td>
</tr>
<tr>
<td><strong>E. DISSERTATION AND DEFENSE</strong></td>
<td>7</td>
</tr>
<tr>
<td><strong>III. GUIDELINES FOR M.D./Ph.D. DEGREE</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>A. PROGRAM</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>IV. BASIC GUIDELINES FOR M.S. PROGRAM</strong></td>
<td>9</td>
</tr>
<tr>
<td><strong>A. RESEARCH THESIS OPTION</strong></td>
<td>9</td>
</tr>
<tr>
<td><strong>B. NON-THESIS OPTION</strong></td>
<td>10</td>
</tr>
<tr>
<td><strong>V. GRADUATE STUDENT LEAVE, CODE OF BEHAVIOR AND CODE OF ETHICS</strong></td>
<td>13</td>
</tr>
</tbody>
</table>
I. INTRODUCTION

This booklet:

• describes academic policies and procedures pertaining to graduate studies in the Microbiology and Immunology Graduate Program;
• supplements procedures and general rules of the Office of Biomedical Graduate Studies;
• 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, M.D./Ph.D and M.S. degrees. The goal of the Graduate Program is to provide an intensive 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:

- Research rotations
- Required and elective courses
- Preliminary and Qualifying Examinations
- Dissertation research proposal
- Research dissertation and defense

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

For the M.S. degree, the requirements are modified to include all of the above except for the Qualifying Examination, the dissertation research proposal, and manuscript submission, which are not required.
II. BASIC GUIDELINES FOR THE Ph.D. DEGREE

A. CURRICULUM

1. Required Core Courses

- IDPT-521 Molecular Structure and Metabolism
- IDPT-526 Cells to Systems
- MIIM-508-05 Immunology I
- MIIM-512-05 Molecular Pathogenesis I
- MIIM-513-05 Molecular Pathogenesis II
- IDPT-501-05 Biostatistics - Part I
- IDPT-500-05 Responsible Conduct of Research

2. Advanced Courses and Electives

In consultation with the Advisory Committee and according to the area of selected research, the student may select a minimum of 2 courses from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge.

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

3. Journal Club and Seminars

Students are required to participate in the Departmental Seminar and to take one Journal Club each semester throughout their graduate program. Graduate students are expected to present their research at least once each year in a departmental seminar.

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.

4. Lab Rotations

Three rotations must be arranged during the first year in consultation with the Graduate Advisor and the host faculty in the Microbiology and Immunology 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 thesis research topic

Approximately 20 hours per week for a two-month period are required for each rotation. Students must satisfactorily complete all rotations.

<table>
<thead>
<tr>
<th>Unsatisfactory Performance in Laboratory Rotations</th>
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<tbody>
<tr>
<td>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.</td>
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5. Teaching Experience (Optional)

The ability to teach is essential for some careers in the biomedical sciences. Teaching experience may be fulfilled in a variety of ways, including teaching/preparation for the medical school laboratory, "hands on" teaching of medical students or in first year graduate student courses, or other teaching experiences approved by the faculty.

6. Research

A minimum of two years of full-time research is required following the choice of the thesis research laboratory (generally by the end of the first summer). Additional time is required for writing the dissertation and research publications.

7. Committee Meetings

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

Committee meetings will be held every six months. 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 his/her program and the Biomedical Graduate Studies office.

B. ADVISORY COMMITTEES

1. The Program Director will serve as advisor during the first year. A new Preliminary Examination committee is formed every year.
2. After successful completion of the Preliminary Examination (see below), a research advisor will be selected by the student. The student and advisor select an Advisory Committee consisting of two additional Program faculty. The Advisory committee meets every six months.

3. Prior to the Qualifying Examination, the committee will be expanded to five members by including two more faculty members. At least one member must be recruited from outside the Program or outside Drexel University. A full description of the composition and function of the Advisory Committee is given below. A list of the prospective committee members must be submitted to the Program Director for approval prior to the initial meeting of the student’s committee. All members of the committee, with the exception of an external (outside of the College of Medicine) must be members of the Graduate Faculty. At the first meeting of the committee, a chair of the dissertation committee will be elected who is not the dissertation advisor. The dissertation committee shall evaluate the student’s progress every 6 months.

4. The Advisory Committee will be comprised of five voting members. Three or four of the five voting members must be graduate faculty from the same program as the student’s discipline. The remaining voting member(s) must be outside of the program. At least one voting member on the committee must be outside of the College of Medicine. No more than three members may have their primary appointment in one department. Members from outside the University must be approved by the Biomedical Graduate Education Committee.

The chair of the dissertation committee must have the rank of Assistant Professor or higher within the program that appoints the chair. The chair must be a tenure track faculty member within the College of Medicine. Full time faculty with research prefix or non-tenure track status and adjunct graduate faculty within the College of Medicine may serve as thesis committee members.

The committee should be formed by the end of the second year of matriculation. Absolute deadline for submission of the composition of the committee for approval by the program steering committee and certification by the Office of Biomedical Graduate and Postgraduate Studies is no later than the end of the third year of matriculation.

The committee will assume supervision of the student’s graduate education as well as ensure compliance with all graduate program and university policies. The faculty member under whom the student elects to conduct dissertation research will be the student’s primary research advisor. Only tenure track graduate faculty may serve as the student’s primary research advisor. The primary research advisor cannot serve as the chair of the dissertation committee. Full time faculty with research prefix or non-tenure track status may serve as co-advisors.
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. Microbiology and Immunology Graduate Program faculty are involved in preparing and evaluating this exam. The results of the exam are included in the student's permanent file.

Format: After successful completion of the first year classes, the students are given a specific research question whose complete answer requires the integration of several overlapping fields of scientific investigation. Students are given one or more publications that represent an appropriate starting point for the assignment and have approximately three weeks to research and evaluate the given topic in the form of a written outline (6 pages with additional space for diagrams and references). One week later, students orally present their solution to the assignment to a panel of M & I faculty. The oral exam lasts 60-90 minutes. Detailed instructions regarding the entire examination process are distributed prior to the start of the examination period.

2. Qualifying Examination: This is a mock NIH grant proposal that is defended orally. The purpose of the examination is to assess students' scientific creativity, ability to design a research project, and oral and written communication skills. The student’s Thesis Advisory committee administers the exam. All required coursework must be fulfilled prior to the qualifying exam (exceptions are Statistics and Responsible Conduct of Research). The qualifying exam must be completed by the mid-point of the student’s third year in residence (i.e. by the 30th month in the Program).

Written Part (A): The format of the written portion is that of a NIH predoctoral fellowship grant proposal. The topic may be directly related to the student’s research project or may be a subject outside of the student’s research project. For a topic directly related to the student’s research project, the student will submit a 1-page summary, which includes an abstract, hypothesis and brief outline of the specific aims of the proposal to the Thesis Advisory Committee. For a topic outside the student’s own research area, the student will submit the same material (1-page abstract, hypothesis and outline of the specific aims) for each of the three topics to the Thesis Advisory Committee. The Thesis Advisory Committee must approve the topic and proposal outline within one week of receipt from the student. Upon approval, the student will have 30 days to submit the written version of the proposal to the Committee. The written proposal should follow the style and format of an NIH grant application and include sections titled Abstract and Specific Aims, Research Strategy and Literature Cited. The strictly enforced page limit is 7 pages (excluding the Literature Cited, single spaced with 0.5 inch margins and 11 point Arial font). The following section lengths are suggested: Abstract and Specific Aims (1 page) and Research Strategy, which includes Significance, Innovation and Approach (6 pages). The actual length of each section may vary depending on the format chosen (related or unrelated to thesis project). All figures, tables,
graphs, diagrams and charts must appear in the body of the text and are included in the page limits. The proposal should outline a realistic three-year research plan. The proposal should be submitted electronically, in a pdf format, to the Chair of the Committee. During preparation of the proposal, the student is expected to spend at least 50% of his/her time in the conduct of ongoing research in his/her laboratory. Graduate student peer review is recommended, but no direct faculty or postdoctoral assistance is permitted. The student will schedule an oral defense of the written proposal within two weeks of submission of the proposal.

**Oral Part (B):** At the time of the oral defense, the student will present a brief (20-25 minute) PowerPoint presentation summarizing his/her intended research project followed by a defense of the project to the Thesis Advisory Committee. Due to the difficulty in arranging a time for the 5-member committee to meet for the exam, only 4 members of the Thesis Advisory Committee are required to be present for the oral presentation. The Thesis Advisory Committee will then approve, approve upon correction of deficiencies, or disapprove of the project. If the project is approved, the student may continue with his/her thesis research. If the proposal is approved upon correction of deficiencies, the corrected proposal must be submitted within the time frame established by the examining committee. If the proposal is not approved, the student must re-submit a revised or new proposal within two months. If the Thesis Proposal is disapproved a second time, the student will be recommended for a terminal Master's degree.

**Failure on Qualifying Exam** - One retake will be permitted, within two months of the first attempt. The retake may constitute submission of a new proposal, a 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. The student may petition the faculty to be allowed into the M. S. program.

**D. EVALUATION OF PROGRESS**

Overall performance in coursework, on exams, in laboratory rotations, and oral presentations will be evaluated every 6 months by the Advisory Committee or dissertation committee. In addition:

1. **End 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 to the second year of 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, with reapplication to Ph.D. program possible after completion of M.S.

b. **Students with <3.0 average or who have less than a B in a core course** are not eligible to take the Preliminary Exam, except with the permission of the faculty. The faculty in this request considers satisfactory performance in rotations.

2. **End of second year**

To continue into the third year and beyond of the Ph.D. program, students are required to achieve an overall GPA $\geq 3.0$ and satisfactory performance in the laboratory. Students must also successfully complete the Qualifying Exam.

E. **DISSERTATION AND DEFENSE**

The preparation and public oral defense of the Ph.D. dissertation are conducted as outlined in the Office of Biomedical Graduate Studies guidelines. Students are strongly encouraged to examine dissertations of recent graduates of the Program for guidelines regarding content and format. Copies are available in either the Departmental Conference Room or in the Biomedical Graduate Office. 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, is responsible for evaluating the dissertation, conducting the oral defense, and recommending approval to the Associate Dean, Biomedical Graduate Studies. **Students in the Microbiology and Immunology Graduate Program must submit their final, completed dissertation to their thesis committee at least two weeks prior to the oral defense date.**
III. GUIDELINES FOR M.D./Ph.D. DEGREE

A. PROGRAM

1. Except where agreed upon by the student and his/her advisory committee, the MD/PhD program consists of two or three years of graduate work following the second pre-clinical year of medical school. The general schedule for the MD/PhD program is (1) to complete the first two years of medical school. It is strongly recommended that students complete the rotation 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 two years of medical school, finishing and defending the dissertation prior to December 31st of the year of the return to Medical School.

2. 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. A single two-month lab rotation is required. A second rotation may be arranged if appropriate.
   b. The same core and elective courses are required as for the Ph.D. degree, except where equivalent courses have been passed during medical school training.
   c. Selection of the research advisor should be made immediately following the lab rotation(s).
   d. Teaching is not required but may be arranged if requested by the student and approved by the Advisory Committee.

3. The MD/PhD student upon entry into the graduate program is equivalent to a beginning second year student, and as such will select a thesis committee and take the Qualifying Exam at the end of the first year in the Graduate Program. Committee meetings will be held every six months.

4. The manuscript preparation requirement and the dissertation preparation and defense guidelines are identical to those of the Ph.D. program. The dissertation must be written and defended before returning for the last two years 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.
IV. GUIDELINES FOR MASTER OF SCIENCE PROGRAM

M.S. students will have specific research goals, relating to a chosen area of Microbiology and Immunology. There is an increasing demand within biotechnology industries for M.S. level research assistants with expertise in microbiology, immunology, and molecular biology. Students who achieve outstanding performance during the M.S. may apply to the Ph.D. program and proceed with Ph.D. research after successfully completing the first-year core curriculum and Preliminary Exam. General requirements for admission to and completion of the M.S. program may be found in the Drexel University College of Medicine Graduate Student Handbook. Specific departmental requirements are similar to those for the Ph.D. degree (see Guidelines for the Ph.D. program), with the exceptions and clarifications noted below.

RESEARCH THESIS OPTION

A. GENERAL REQUIREMENTS

1. Full time M.S. students are expected to complete their program within two and a half 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 Graduate Student Handbook.
3. Opportunities for teaching are available to interested students.
4. Satisfactory performance is required on the Preliminary Examination.

B. COURSE REQUIREMENTS

1. Core Curriculum I and II, Molecular Pathogenesis I and II, Immunology I.
2. Additional required courses: Biostatistics and Responsible Conduct of Research.
3. Attendance at Journal Club and Seminar Series is required every semester.
4. A GPA \( \geq 3.0 \) must be maintained to successfully complete the program.

C. RESEARCH REQUIREMENTS

1. In the second semester of the first year, the students will complete at least one and no more than two rotations in departmental laboratories for a maximum period of four months. These rotations are designed to expose the student to a variety of important techniques and research problems.
2. The MS preliminary exam will be composed of a Literature Review and Thesis Proposal regarding the research to be completed, followed by an oral defense of the proposal to the Program’s Year 1 Advisory Committee. The exam is to be completed by the end of the third semester of enrollment.
3. After completion of the MS Preliminary Exam, the student in conjunction with
his/her advisory committee will select a research project with clearly defined objectives and feasibility. The composition and function of the Advisory committee is discussed below. The project should require approximately one year of full time research. A suitable objective is the preparation of a publishable research paper.

4. The preparation and defense of the M.S. Thesis is conducted as described in the Graduate Student Handbook. 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 Advisory Committee.

5. Committee meetings will be held every six months.

6. The committee will be comprised of three voting members. Two voting members must be graduate faculty from the same program as the student's discipline and one voting member must be from a program other than that of the major field or from outside the College of Medicine. Members from outside the University must be approved by the Biomedical Graduate Education Committee.

The chair of the thesis committee must have the rank of Assistant Professor or higher within the program that appoints the chair. The chair must be a tenure track faculty member within the College of Medicine. Full time faculty with research prefix or non-tenure track status and adjunct graduate faculty within the College of Medicine may serve as thesis committee members.

The committee should be formed by the beginning of the second year of matriculation. Absolute deadline for submission of the composition of the committee for approval by the program steering committee and certification by the Office of Biomedical Graduate and Postgraduate Studies is no later than the end of the fall semester of the second year of matriculation.

The committee will assume supervision of the student’s graduate education as well as ensure compliance with all graduate program and university policies. The faculty member under whom the student elects to conduct thesis research will be the student's primary research advisor. Only tenure track graduate faculty may serve as the student’s primary research advisor. The primary research advisor cannot serve as the chair of the thesis committee. Full time faculty with research prefix or non-tenure track status may serve as co-advisors.

NON-THESIS OPTION

A. Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Molecular Structure and Metabolism</td>
<td>5</td>
</tr>
<tr>
<td>Cells to Systems</td>
<td>5</td>
</tr>
<tr>
<td>Statistics</td>
<td>2</td>
</tr>
<tr>
<td>Responsible Conduct of Research</td>
<td>2</td>
</tr>
</tbody>
</table>
Molecular Pathogenesis I 3 credits
Immunology I 3 credits
Molecular Pathogenesis II 3 credits

Seminar (2 semesters) 2 credits (total)
Journal Club (2 semesters) 2 credits (total)

Literature Review 4 credits

B. Advanced Electives (a minimum of 9 credits is required)

Lab Research Rotation I 4 credits
Microbial Pathogenesis 3 credits
Advanced Virology 3 credits
Advanced Immunology 3 credits
Advanced Molecular Biology 2 credits
Emerging Infectious Diseases 2 credits
Experimental Therapeutics 2 credits
Vaccine and Vaccine Development 2 credits

C. Comprehensive Exam

A comprehensive exam, with written and oral components, is required and must be completed prior to the start of the Advanced Elective coursework (generally at the end of the first year). The format of the exam is the presentation of a written outline and oral presentation based on the topic of the scholarly paper based on the literature. The exam is presented to the student’s advisory committee, which includes the primary mentor and two other faculty members.

D. Scholarly Paper (Literature Review)

A scholarly paper based on the literature will be completed, with advising from a primary mentor. The paper should be 25-40 double spaced pages (without references). Upon completion, the topic of the scholarly paper will be presented in a 1-hour lecture format open to all members of the Department. The Advisory Committee will verify successful completion of the scholarly paper.

E. Proposed Curriculum:

First Year Fall Semester

Molecular Structure and Metabolism 5 credits
Molecular Pathogenesis I 3 credits
Immunology I 3 credits
Seminar 1 credit
Journal Club 1 credit
Lab Research Rotation¹ 4 credits

¹Lab Research Rotation is a rotation that is typically taken in the first year.
**First Year Spring Semester**

- Core Curriculum II 5 credits
- Molecular Pathogenesis II 3 credits
- Seminar 1 credit
- Journal Club 1 credit
- Statistics\(^2\) 2 credits
- Responsible Conduct of Research 2 credits

**Second Year**

- Electives\(^3\)
- Literature Review 4 credits

\(^1\)Elective Course
\(^2\)May be taken in Second Year but course only offered in Spring Semester
\(^3\)Must take total of 9 credits of electives
GRADUATE STUDENT LEAVE

During the first year of graduate training, Ph.D. students under university support may be eligible for up to two weeks of approved leave, in addition to the observance of traditional holidays. All requests must be made to and approved by the program director. Any leave beyond two weeks (ten working days) must be approved by the Biomedical Graduate Education Committee. If a student takes an unapproved leave, his/her stipend will be suspended until he/she returns. Any leave for Ph.D. students 3rd year and beyond must be negotiated with the student’s mentor.

CODE OF BEHAVIOR

The Graduate Program in Microbiology and Immunology 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 in Microbiology and Immunology 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 Microbiology and Immunology subscribes to the Code of Academic Integrity (presented in its complete form in the Student Handbook) 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 in Microbiology and Immunology is therefore contingent upon the student's understanding of this policy, and his/her agreement to adhere to its guidelines.
DREXEL UNIVERSITY COLLEGE OF MEDICINE
MICROBIOLOGY AND IMMUNOLOGY
Typical Graduate Program Schedule for First Year PhD Student
Required Courses

FALL

Meet with Dr. Lawrence Bergman, Advisor to New Graduate Students

Molecular Structure and Metabolism 5 credits IDPT-521
Molecular Pathogenesis I 3 credits MIIM-512
Immunology I 3 credits MIIM-508
Journal Club 1 credit MIIM-502
Rotation Research I (20 hrs/wk) 4 credits MIIM-504
Student Seminar Series 1 credit MIIM-507
Departmental Seminar 1 credit MIIM-606

SPRING

Meet with Dr. Lawrence Bergman

Cells to Systems 5 credits IDPT-526
Molecular Pathogenesis II 3 credits MIIM-513
Journal Club 1 credit MIIM-502
Rotation Research II (20 hrs/wk) 4 credits MIIM-505
Rotation Research III (20 hrs/wk) 4 credits MIIM-506
Student Seminar Series 1 credit MIIM-507
Departmental Seminar 1 credit MIIM-606
Biostatistics (1st or 2nd year) 2 credits IDPT-501

Examination Committee Meeting (by May 15)

SUMMER

Preliminary Exam (late May-early June)
  Written and oral segments must be passed.
Rotation Research (if needed)

Choose Research Advisor by 8/15
*, Alternate courses may be substituted at the discretion of the course director (see below).
### Typical Graduate Program Schedule for Second Year PhD Student

#### Required and Elective Courses

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<thead>
<tr>
<th>FALL</th>
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<tbody>
<tr>
<td>Journal Club</td>
<td>1 credit</td>
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<tr>
<td>Student Seminar Series (Faculty Presentations)</td>
<td>1 credit</td>
</tr>
<tr>
<td>Thesis Research</td>
<td>9 credits</td>
</tr>
<tr>
<td>Departmental Seminar</td>
<td>1 credit</td>
</tr>
<tr>
<td>Advanced Elective(s)*</td>
<td>3-6 credits</td>
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Committee Meeting

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<tbody>
<tr>
<td>Journal Club</td>
<td>1 credit</td>
</tr>
<tr>
<td>Student Seminar Series (Faculty Presentations)</td>
<td>1 credit</td>
</tr>
<tr>
<td>Thesis Research</td>
<td>9 credits</td>
</tr>
<tr>
<td>Advanced Elective(s)*</td>
<td>2-6 credits</td>
</tr>
<tr>
<td>Biostatistics (Year 1 or 2)</td>
<td>2 credits</td>
</tr>
<tr>
<td>Responsible Conduct of Research</td>
<td>2 credit</td>
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</table>

Committee Meeting

Qualifying Exam - Mock NIH Grant Proposal due by end of November, Year 3

Oral Qualifying Exam defended by end of December Year 3

* Elective courses chosen with consent by Advisory Committee

- MIIM-555 Molecular Mechanisms of Microbial Pathogenesis
- MIIM-607 Immunology II
- MIIM-612 Molecular Mechanisms of Viral Pathogenesis
- MIIM-613 Emerging Infectious Diseases
- MIIM-615 Experimental Therapeutics
- MIIM-630 Advanced Molecular Biology
Addendum

Courses offered 2010-11

MICROBIOLOGY & IMMUNOLOGY (Ph.D. & M.S.)

IDPT-521 Molecular Structure and Metabolism
IDPT-526 Core Curriculum II

Required for Biomedical Graduate Studies:
IDPT-500 Responsible Conduct of Research
IDPT-501 Biostatistics I

Required Courses for Program:
MIIM-502 Microbiology & Immunology Journal Club
MIIM-504 Microbiology & Immunology 1st Lab Research Rotation
MIIM-505 Microbiology & Immunology 2nd Lab Research Rotation
MIIM-506 Microbiology & Immunology 3rd Lab Research Rotation
MIIM-507 Microbiology & Immunology Student Seminar Series
MIIM-508 Immunology I
MIIM-512 Molecular Pathogenesis I
MIIM-513 Molecular Pathogenesis II
MIIM-600 Microbiology & Immunology Thesis Research
MIIM-606 Microbiology & Immunology Seminar

Suggested Electives:
MIIM-555 Molecular Mechanisms of Microbial Pathogenesis
MIIM-607 Immunology II
MIIM-604 Special Topics in Virology
MIIM-613 Emerging Infectious Diseases
MIIM-615 Experimental Therapeutics
MIIM-630 Advanced Molecular Biology