GRADUATE PROGRAM IN MICROBIOLOGY

Graduate Student Handbook*


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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Contents</td>
<td>2</td>
</tr>
<tr>
<td>Preface</td>
<td>4</td>
</tr>
<tr>
<td>I. The Graduate Program in Microbiology</td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td>5</td>
</tr>
<tr>
<td>B. Advisory Services for Graduate Students</td>
<td>6</td>
</tr>
<tr>
<td>C. Financial Assistance</td>
<td>6</td>
</tr>
<tr>
<td>D. Health Insurance</td>
<td>6</td>
</tr>
<tr>
<td>E. Timetable for Students Pursuing the Ph.D. Degree</td>
<td>6</td>
</tr>
<tr>
<td>II. Detailed Description of Ph.D. Program Activities and Requirements</td>
<td></td>
</tr>
<tr>
<td>A. Overview of Requirements for the Ph.D. Degree</td>
<td>7</td>
</tr>
<tr>
<td>B. Course and Semester Hour Requirements</td>
<td>7</td>
</tr>
<tr>
<td>1. Rationale for Coursework</td>
<td>8</td>
</tr>
<tr>
<td>2. Semester Hour Requirements</td>
<td>8</td>
</tr>
<tr>
<td>3. Course Levels</td>
<td>8</td>
</tr>
<tr>
<td>4. Guidance in Course Selection</td>
<td>9</td>
</tr>
<tr>
<td>5. Academic Performance</td>
<td>10</td>
</tr>
<tr>
<td>6. Enrollment/Registration Procedure</td>
<td>10</td>
</tr>
<tr>
<td>C. Laboratory Research Rotations</td>
<td>11</td>
</tr>
<tr>
<td>1. Rationale for Rotations</td>
<td>11</td>
</tr>
<tr>
<td>2. Selection of a Rotation Laboratory</td>
<td>11</td>
</tr>
<tr>
<td>3. Rotation Evaluation</td>
<td>12</td>
</tr>
<tr>
<td>D. Seminars, Journal Clubs, and Lab Research Meetings</td>
<td>12</td>
</tr>
<tr>
<td>1. Seminars</td>
<td>12</td>
</tr>
<tr>
<td>2. Journal Clubs</td>
<td>12</td>
</tr>
<tr>
<td>3. Lab Research Meetings</td>
<td>12</td>
</tr>
<tr>
<td>E. Faculty Committees for Training Graduate Students</td>
<td>12</td>
</tr>
<tr>
<td>1. Selection of a Mentor</td>
<td>12</td>
</tr>
<tr>
<td>2. Role of the Ph.D. Advisor</td>
<td>13</td>
</tr>
<tr>
<td>3. Composition of the Ph.D. Committee</td>
<td>13</td>
</tr>
<tr>
<td>4. Role of the Ph.D. Committee</td>
<td>13</td>
</tr>
<tr>
<td>5. Composition of the Comprehensive Examination Committee</td>
<td>13</td>
</tr>
<tr>
<td>6. Role of the Comprehensive Examination Committee Chair</td>
<td>14</td>
</tr>
<tr>
<td>7. Mandatory Annual Meeting</td>
<td>14</td>
</tr>
<tr>
<td>8. Annual Progress Report/Individual Development Plan (APR/IDP)</td>
<td>15</td>
</tr>
<tr>
<td>9. Role of the Director of Graduate Studies (DGS)</td>
<td>15</td>
</tr>
<tr>
<td>F. The Comprehensive Examination Protocol</td>
<td>15</td>
</tr>
<tr>
<td>1. The Purpose of the Comprehensive Examination</td>
<td>15</td>
</tr>
<tr>
<td>2. The Comprehensive Examination Process</td>
<td>16</td>
</tr>
<tr>
<td>3. Timetable for Completing the Exam</td>
<td>16</td>
</tr>
<tr>
<td>4. Composition of the Examination Committee</td>
<td>16</td>
</tr>
<tr>
<td>5. Submission of Possible Topics for the Exam Proposal</td>
<td>16</td>
</tr>
<tr>
<td>6. Abstract Preparation and Submission</td>
<td>17</td>
</tr>
<tr>
<td>7. Comprehensive Examination Abstract Meeting</td>
<td>17</td>
</tr>
<tr>
<td>8. Potential Outcomes of the Evaluation and the Student Abstract</td>
<td>17</td>
</tr>
<tr>
<td>9. Student Response to Outcomes 8a through 8d</td>
<td>18</td>
</tr>
<tr>
<td>Figure 1. Comprehensive Exam Flow Chart: Initial Phase</td>
<td>19</td>
</tr>
<tr>
<td>Figure 2. Comprehensive Exam Flow Chart: Evaluation Phase</td>
<td>20</td>
</tr>
<tr>
<td>G. Preparation of the Comprehensive Examination Proposal</td>
<td>21</td>
</tr>
</tbody>
</table>
1. Timetable 21
2. General Guidelines 21
3. Scope of the Student Proposal 21
4. Composition of the Student Proposal 21
5. Pitfalls and Alternatives 25
6. Fatal Flaws to Avoid in Research Proposal 25
8. Alternative Outcomes of the Comprehensive Examination 27

III. Ph.D. Thesis Research 28
A. General 28
B. Regular Checkpoints on Student Progress 28
C. Ph.D. Dissertation Preparation and Defense 28
D. Publication Requirements for Ph.D. Students 29

IV. Master of Science (M.S.) Degree 29
A. Introduction 29
B. Requirements for the M.S. Degree 30
C. Matriculation into the Ph.D. Program 30

V. Performance in Teaching 30

VI. Facilities, Equipment, and Logistic Matters 31
A. Teaching and Research Equipment 31
B. Travel to Scientific Meetings 31
C. Departmental Administration 31
D. Radiation and Health Safety 32
E. Library Services 32
F. Computers 32
G. Grievance Review Committee 33

APPENDIX 36
Graduate Training Timetable (All Years) 37
Form A. Lab Rotation Report 40
Form B. Annual Progress Report/Individual Development Plan (APR/IDP) 41-47
Form C. Student Teaching Evaluation 48
Annual Progress Report/Individual Development Plan (APR/IDP) Instructions 49-50
PREFACE

The University of Iowa General Catalog (https://registrar.uiowa.edu/general-catalog), and the Manual of Rules and Regulations of the Graduate College (http://www.grad.uiowa.edu/graduate-college-manual), contain useful information about requirements for advanced degrees at the University. Since regulations and practices vary among departments, this handbook provides specific information about graduate student training in the Graduate Program in Microbiology. The handbook is organized into the following major sections:

I. The Graduate Program in Microbiology
II. Detailed Description of Ph.D. Program Activities and Requirements
III. Ph.D. Thesis Research
IV. Master of Science (M.S.) Degree
V. Performance in Teaching
VI. Facilities, Equipment, and Logistical Matters

There is also an Appendix containing a suggested graduate training timetable and copies of various report forms.
I. THE GRADUATE PROGRAM IN MICROBIOLOGY

A. Introduction

1. Training and Degrees Offered: The Graduate Program in Microbiology offers research training for the Doctor of Philosophy (Ph.D.), Master of Science (M.S.), and Bachelor of Science (B.S.) degrees. Students will typically be admitted for Ph.D. training without the necessity of also writing a M.S. thesis. However, the M.S. can be a degree objective, a tool for improving writing skills, or a terminal degree for Ph.D. candidates who do not fulfill all of the demands for the Ph.D. degree. Both degrees require the writing and defending of a thesis on a research topic. The objectives of the Graduate Program in Microbiology are to facilitate the education of students so that they:

   a. gain basic information about microbiology and immunology, and become experts in specific areas of microbiology and immunology,
   b. become technically able to investigate new problems and successfully acquire knowledge about new problems, and
   c. can communicate acquired knowledge to peers in the field.

   The specific areas included in the program are: immunology, bacterial genetics and physiology, pathogenic bacteriology, virology, parasitology, and bioinformatics. Several of these areas involve interdisciplinary training within and outside the Department, so that students receive a broad background of information during their course of study.

2. Requirements for the Ph.D. Degree: To achieve the Ph.D. degree, a student must:

   a. successfully complete the necessary course and rotation requirements,
   b. pass the comprehensive examination,
   c. demonstrate research ability and write a dissertation,
   d. present a research seminar before the faculty, and satisfactorily defend the dissertation research before the student's Ph.D. Committee, and
   e. be a first author on a peer-reviewed manuscript accepted for publication.

3. Student Teaching: Since students are expected to become qualified in the teaching of microbiological topics, all students will serve as teaching assistants for at least part of two semesters during their graduate training. Students are typically placed in general courses for which all are expected to have academic competence. In some cases students will be assigned to specialized courses for which they have special aptitude and training. Graduate teaching assistant duties range from teaching laboratory sections in general courses, preparing laboratories in advanced courses, grading of examinations, and in special cases, presenting formal lectures. All teaching activities are evaluated and a report/evaluation may be added to the student's file (see page 31 and Form C, page 45).

4. Expectations and Performance during the First Year: As established by the Graduate College and the Graduate Program in Microbiology, all students must maintain the minimum grade point average of 3.0 to continue study in the Ph.D. program (see page 10). An average of <3.0 will result in assignment of an unsatisfactory status for one semester and termination from the Microbiology Ph.D. program if the probation status is not resolved within 6 s.h. Students who are unable to remove the unsatisfactory status may, however, petition for completing a M.S. degree provided they have a mentor to support them.

   All first year students are required to satisfactorily complete three rotations. Two of these rotations may be in the same laboratory. Students entering with an M.S. degree or in the M.D./Ph.D. program can petition the Graduate Advisory Committee (GAC) to do only two rotations. The opportunity to study in a particular laboratory, either as a rotation or as part of a degree research project, is a privilege that needs to be taken seriously. Rotating students are expected to keep regular
and reliable schedules, and to be working in the laboratory between classes. Rotation evaluations are made by the mentor and an unsatisfactory rotation report can result in a "U" (unsatisfactory) grade in MICR:7261. Unsatisfactory performance in one or more rotations can lead to dismissal from the program.

B. Advisory Services for Graduate Students: The Director of Graduate Studies (DGS) will help incoming students plan a program of studies for the first year, taking into account the student’s background and scientific interests. To facilitate this process, it is important that new students arrive on campus at least one week before classes begin to attend an Orientation Session and meet with the DGS. The DGS will serve as the student’s official advisor until the student selects a Ph.D. advisor. Prior to the Orientation Session, incoming students should familiarize themselves with the range of research interests of the departmental faculty. This information is available on the Departmental Website http://www.medicine.uiowa.edu/microbiology. Students are encouraged to meet and become acquainted with faculty members and their research. This usually takes place by discussion sessions with faculty.

It is also permissible for first year students to be advised by Departmental faculty rather than the DGS. In such cases, the student must inform the DGS of the faculty member providing this service. While the DGS no longer serves as the student’s official advisor after the first year, the DGS and the GAC remain the major advisory body throughout the graduate program. All progress and exam reports are monitored by this advisory body.

C. Financial Assistance: Financial assistance is available to students in the form of research stipends, tuition, and fees. Graduate students are required to maintain satisfactory performance, as determined by the student’s Ph.D. committee and the DGS, to continue receiving financial support. Evaluation of student performance will be based on coursework, research, and teaching.

The Graduate Program in Microbiology limits the length of financial assistance to 5 years. Students must apply to the DGS for extension of this time limit. Students with research stipends are not permitted to work for financial support outside the Department unless they have specifically received such permission from their Research Advisor and their Ph.D. Advisory Committee. Such requests for permission must be made in writing, along with a rationale for the request, to the Advisor and Committee. A copy of the request, and the action taken by the Advisor and Committee, will be placed in the student’s file.

D. Health Insurance: Health insurance is offered through the University. All incoming students will receive a letter describing this program and the options available. Arrangements for health insurance are made through the University Benefits office, not the Department of Microbiology and Immunology.

E. Timetable for Students Pursuing the Ph.D. Degree*: The timetable described applies to students entering the graduate program in the Fall Semester. Changes in this timetable will be made for those who begin in the Spring Semester.

Several features of the timetable are worthy of special attention.

1. Students in the first year are enrolled, on average, in 4 courses and participate in three research rotations, two of which may be in the same laboratory. Additional coursework may be required by the student’s committee during the second and third years.

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*A detailed timetable covering up to six years is provided in the Appendix. Especially beginning students should thoroughly familiarize themselves with this timetable.
2. Thesis advisors are selected the week of May 7th after completion of all rotations. The timetable for the 2017-2018 rotations is as follows:

First Rotation: August 21 – November 10  
Second Rotation: November 13 – February 9  
Third Rotation: February 12 – May 4

Comprehensive Exam committees are formed during the summer/third semester and a mandatory meeting of the committee is held in Oct-Dec of the third semester at which time the Comprehensive Exam Chairperson is selected (see page 13).

3. Abstracts for the comprehensive examination proposal are due after completion of three semesters, with an absolute deadline of February 15 of the second year (page 17; Figures 1 & 2, pages 19-20).

4. All initial proposal defenses will be conducted on assigned dates during the fourth semester.

5. After completion of the comprehensive examination, students officially become candidates for the Ph.D. degree.

6. A meeting of the student’s Ph.D. committee is required annually after completion of the second year. One week prior to the meeting students must provide each Ph.D. committee member a copy of the Annual Progress Report/Individual Development Plan (APR/IDP) (Form B, page 41-47). Students are required to schedule a meeting and submit an updated APR/IDP at least every 12 months until completion of the Ph.D. defense.

7. Following completion of the comprehensive examination, the number of subsequent years required to complete the Ph.D. will depend on the student’s research progress (see page 28).

II. DETAILED DESCRIPTION OF PH.D PROGRAM ACTIVITIES AND REQUIREMENTS

A. Overview of Requirements for the Ph.D. degree
1. Complete the necessary course and rotation requirements.
2. Pass the Comprehensive Examination.
3. Demonstrate research ability culminating in:
   a. a written dissertation
   b. a formal seminar on the research
   c. a satisfactory defense of the dissertation before the Ph.D. (Thesis) Committee
   d. publication in a peer-reviewed journal

B. Course and Semester Hour Requirements
1. Rationale for coursework: Lecture-based courses (didactic) are designed to fill in large bodies of needed information in the student’s repertoire. Students entering the graduate program from major colleges and universities with certain degrees (e.g. microbiology, biochemistry, and cell and molecular biology) should require few additional didactic courses in graduate school (see 3a, below). Students from small colleges with limited opportunities for advanced courses may be advised to enroll in courses that would normally be taken by University of Iowa undergraduates. It is the goal of the program to help students transition from the undergraduate didactic approach to the Socratic approach in graduate training as soon as possible. Although an encyclopedic background of information can be valuable, success in graduate school and science is largely based on mastery of the scientific method as an essential learning process. Consistent with that philosophy, performance evaluations in a Ph.D. program are based on the preparation and defense of the Comprehensive Examination Proposal (IIIF) and Ph.D. research accomplishments (III).
2. Semester hour requirements:

a. Candidacy requirement. Graduate students normally register for 15 semester hours of credit each fall and spring semester for the first four semesters but are not required to register during the summer. 72 s.h. must be accumulated before the student can officially be considered as a Ph.D. candidate. The 72 s.h. minimum includes credits earned in courses, research, seminars, and special topics. Students may, however, initiate the Comprehensive Examination process before they have accumulated 72 s.h.

b. Graduation requirement. The total semester hour requirement is the same as the requirement for candidacy, i.e. 72 s.h. Students will accumulate additional semester hour credits because of their need to: (a) maintain their enrollment, (b) enroll in required seminar courses, e.g., Graduate Student Research Seminar MICR:7263, and (c) enroll in special courses recommended by the student’s Ph.D. (Thesis) Committee.

c. Minimum course requirements. A minimum of 12 s.h. of credit in graduate level courses (for which letter grades are given) are required for a Ph.D. Credits received for research (Graduate Research in Microbiology MICR:7261), seminars, undergraduate courses, and courses graded “Unsatisfactory/Satisfactory”, do not count toward the minimum requirement. Graduate level courses may be taken at Iowa or elsewhere and accepted toward fulfilling the graduate program requirements. Acceptance of credits earned at other institutions is made by the Graduate Advisory Committee.

3. Course Levels:

a. Graduate versus Undergraduate Courses. Graduate level courses are distinguished from undergraduate courses by number. Some classes may contain both graduate and undergraduates enrolled under different course numbers, e.g. MICR:3159 versus MICR:6259. Students enrolled in graduate level courses have additional requirements in the courses, such as discussions of primary literature or the preparation of mini-research proposals. None of the courses included in the undergraduate curriculum fulfill the 12 s.h. For example, a graduate student who has not taken biochemistry as an undergraduate could be required to take Biochemistry and Molecular Biology I and II (BIOC:3120 and BIOC:3130), but these courses could not be used to fulfill the 12 s.h. for the graduate program.

b. Interdisciplinary and Non-Microbiology Courses. A number of Interdisciplinary Training Programs operate on campus and their course listings are given in the University General Catalog. The graduate level course requirements can be fulfilled by taking some graduate level courses in interdisciplinary programs outside the department.

c. Considerations in Coursework Enrollment. First year students with weak background may need to enroll in a full year of undergraduate biochemistry (BIOC:3120 and BICO:3130) at The University of Iowa. Students with previous graduate experience may wish to enroll in more advanced courses offered as modular courses during the first and second semester.

d. Partial List of Courses. Listed below are the major courses available to first and second year students.

<table>
<thead>
<tr>
<th>Graduate Courses in Microbiology</th>
<th>Course No.</th>
<th>s.h.</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate Immunology and Human Disease</td>
<td>MICR:6247</td>
<td>4</td>
<td>Fall</td>
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<tr>
<td>Graduate Immunology</td>
<td>MICR:6201</td>
<td>3</td>
<td>Spring</td>
</tr>
<tr>
<td>Advanced Topics in Immunology</td>
<td>MICR:6207</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>Integrated Topics in Infectious Diseases</td>
<td>MICR:7217</td>
<td>1</td>
<td>Fall &amp; Spring</td>
</tr>
<tr>
<td>Microscopy for Biomedical Research</td>
<td>MICR:5218</td>
<td>3</td>
<td>Fall &amp; Spring</td>
</tr>
<tr>
<td>Advanced Microscopy for Biomedical Research</td>
<td>MICR:5220</td>
<td>3</td>
<td>Fall &amp; Spring</td>
</tr>
<tr>
<td>Graduate Bacteria and Human Disease</td>
<td>MICR:6259</td>
<td>3</td>
<td>Spring</td>
</tr>
<tr>
<td>Graduate Microbial Physiology</td>
<td>MICR:6260</td>
<td>3</td>
<td>Spring</td>
</tr>
<tr>
<td>Graduate Research in Microbiology</td>
<td>MICR:7261</td>
<td>arr.</td>
<td>All semesters</td>
</tr>
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</table>
Graduate Student Research Seminar          MICR:7263  1  Fall & Spring
Graduate Animal Viruses and Human Disease  MICR:6267  4  Fall
Biology and Pathogenesis of Viruses        MICR:6268  2  Spring
Graduate Microbial Genetics                MICR:6270  3  Fall
Modular Graduate Bacteriology Courses      MICR:7221-7226 1-2  Fall
Graduate Bacterial Diversity and the Human Microbiome

Non-Microbiology Courses
Scholarly Integrity & Responsible Conduct of Research  GRAD:7270 1  Fall & Spring

4. **Guidance in Course Selection:** The selection of courses is determined by the interest of the student, recommendation of the DGS, the Ph.D. advisor, and the Ph.D. Thesis Committee. The Comprehensive Examination Committee may also offer guidance, especially if deficiencies in training are noted. The DGS assists first year students in course selection in the week prior to the start of classes.
Sample Curricula for First Year Students

Sample A. Interest in Bacterial Pathogenesis/Physiology/Genetics

Fall Semester | Spring Semester
--- | ---
Grad Microbial Genetics | Grad Bacteria and Human
3 sh | 3 sh
Modular Courses | Disease
2 sh | 
Grad Student Seminar | Modular Courses
1 sh | 2 sh
Grad Research | Grad Student Seminar
6 sh | 1 sh

Sample B. Interest in Virology

Fall Semester | Spring Semester
--- | ---
Grad Viruses and Human | Biol & Path Viruses
3 sh | 2 sh
Disease | Modular Courses
1-3 sh | 1-3 sh
Modular Courses | Grad Student Seminar
1 sh | 1 sh
Grad Student Seminar | Grad Research
5 sh | 6 sh
Grad Research | 

Sample C. Interest in Immunology

Fall Semester | Spring Semester
--- | ---
Grad Immunology and Human | Grad Immunol
4 sh | 3 sh
Disease | Modular Courses
1-3 sh | 1-3 sh
Modular Courses | Grad Student Seminar
1 sh | 1 sh
Grad Student Seminar | Grad Research
4 sh | 5 sh
Grad Research | 

Sample D. Undecided

Course will be selected in consultation with DGS.

5. **Academic Performance:** All students in the Graduate Program in Microbiology must maintain a GPA of at least 3.0. If the GPA falls below 3.0 based on a minimum of at least 6 semester hours of GRADED (A, B, C, D, F) coursework, students have the next six semester hours of GRADED (A, B, C, D, F) coursework to restore their GPA back to 3.0 or above. In the meantime, such students will be assigned an unsatisfactory status. All records are maintained in the student’s file and are available for review by faculty. Students who fail to restore their GPA to 3.0 may still be able to remain in the program by switching to the Master of Science Degree Program (see page 29) provided their GPA is at least 2.8.

Only courses that are given letter grades count toward the calculation of the students GPA. Seminar courses and rotation credits (registered as Graduate Research in Microbiology MICR:7261) are often graded satisfactory/unsatisfactory and do not enter into the GPA calculation.

6. **Enrollment/Registration Procedure:** At the beginning of the registration period, **ALL** graduate students can register on-line after meeting with the Director of Graduate Studies to discuss the student’s coursework and acquired credit hours. Students will not be able to register/enroll for coursework without prior authorization of the Director of Graduate Studies. Registration can be completed using MyUI on the University Website.
In the case of MICR:7261 (Graduate Research in Microbiology), which is the course number used for rotations in the first year and for Ph.D. research later, section numbers are required. Students enrolling in MICR:7261 should use the faculty code of the DGS. After selection of a laboratory, students use the faculty code of their Ph.D. advisor.

The University of Iowa has a drop/add policy that allows students to drop their registration for a particular course and/or add additional courses. These changes require a form that must be signed by the instructors involved and the faculty advisor. For all first year students, the DGS is the faculty advisor. There is a deadline for dropping or adding courses. These dates are published on the University Calendar.

C. Laboratory Research Rotations

1. Rationale for Rotations: The Ph.D. in Microbiology is a degree given for mastery in conducting scientific research. The aptitude of a student for such research is initially evaluated while he/she conducts a mini-research project with an advisor. These mini-research projects (approximately 12 weeks long) are referred to as “rotations”, i.e., a type of internship. Rotations are designed to:

   a. acquaint students with a particular area of research,
   b. provide training in specific laboratory techniques,
   c. facilitate the transition from undergraduate to graduate education,
   d. allow the student to experience the environment and personnel of a particular laboratory, and
   e. allow faculty to evaluate a student's aptitude for research.

   If after three rotations a student is unable to find a mentor, he/she can petition the GAC for the opportunity to do a fourth rotation. To petition, the student must have identified a mentor for the fourth rotation, and this mentor must be willing to accept the student if the rotation is judged satisfactory. The fourth rotation would typically be done immediately following the third rotation. If a student cannot find a mentor who will support them after three or four rotations, he/she may still petition the GAC to switch to a M.S. program, again with the provision that a mentor is available to accept and support them.

2. Selection of a Rotation Laboratory

   a. Incoming students can familiarize themselves with the research of various faculty by:
      • consulting the Departmental Website (www.medicine.uiowa.edu/microbiology),
      • personal interviews with faculty members at the time of recruitment or after admission, and
      • conversations with senior level graduate students in the program.

   b. Students can arrange their three rotations during the first year. However, following admission to the Microbiology Graduate Program, and prior to arriving at The University of Iowa at the beginning of the academic year, an incoming student may contact faculty members (e.g., by email and/or telephone) to discuss the possibility of performing rotations.

   c. Rotations should be approximately 12 weeks in length, although extensions may be granted under special circumstances. The reason for this restriction is to allow an orderly exchange of rotation students since few faculty will allow two rotating students at the same time.

   d. Students should select laboratories likely to accept new graduate students the following Spring. Students need to ask this important question during their discussion with potential rotation mentors. Under special circumstances, a rotation may be done primarily with the goal of learning about a discipline without further training aspiration.

   e. Acceptance into a laboratory for pursuit of a Ph.D. or M.S. degree depends on several factors. First is the willingness of a faculty member to serve as the student's mentor. This will depend on the student's rotation performance with that faculty member. The Rotation Report (Form A, page 40) allows the faculty member to officially indicate their willingness to
accept a student. Second, acceptance may depend on the financial resources of the faculty member since he/she will become responsible for your stipend beginning at the current policy date determined by the Biomedical Research Training Group. Third, popular laboratories will often have as many as three rotation students in one year, and if all are acceptable, the faculty member has the last word in the decision-making process. Therefore, it is essential that rotation students make every effort to perform at their best since their performance may determine the faculty member's decision to accept them.

3. Rotation Evaluation
   a. Since the Ph.D. program in Microbiology is a research degree, student performance during rotations is perhaps the most reliable indicator/predictor of a student's potential. For this reason, rotations are evaluated by the research mentor in a serious manner.
   b. The student's performance on rotations will be noted by the DGS. A letter will be filed and sent to the student in cases were major problems (deficiencies) are indicated. This information is available only to the faculty and, of course, the student.
   c. Students will be allowed a maximum of four rotations. Students unable to find a laboratory that will accept them will be terminated from both the Ph.D. and M.S. degree programs.
   d. Rotating students are typically asked to present at the lab research meeting of the laboratory where they do their rotation.

   Form A (page 40) is to be completed and sent to the DGS, who reviews the evaluation and places it in the student’s file. The rotation mentor will conduct an exit interview with the student to discuss the evaluation. An important aspect of the evaluation is whether the mentor would accept the rotating student as a graduate student. The mentor is required to review the evaluation with the student during an exit interview.

D. Seminars, Journal Clubs, and Lab Research Meetings
   1. Seminars: Regular seminar programs are offered in Microbiology on a weekly basis. All graduate students and faculty are expected to attend.

   Attendance of all students is required in Graduate Student Research Seminar (MICR:7263) and the Department of Microbiology and Immunology weekly seminar. Each week during the Fall and Spring semesters, a graduate student will present his/her research to other Microbiology graduate students in MICR:7263. ALL students enrolled in the Microbiology Ph.D. program MUST attend the seminars presented by individual students in the Program when such a student defends his/her thesis research.

   Various subdisciplines have their own seminar programs that may be relevant to Microbiology. These include the Immunology Seminar Program, Genetics Seminar Program, Biology Seminar Program, Bacterial Physiology Group Meeting, Infectious Disease Research Conference, and Anatomy and Cell Biology Seminar Program. There are also many other seminars offered through the College of Medicine, e.g., Pathology Seminar and Biochemistry Seminar, as well as programs in other colleges of the University, e.g., Chemistry Colloquium. When relevant issues are involved, students are encouraged to attend seminars outside their own department.

   2. Journal Clubs: Various discipline-related journal clubs meet regularly. All graduate students are encouraged to affiliate themselves with a journal club and to become a regular participant.

   3. Lab Research Meetings: Most laboratories have a weekly lab research meeting.

E. Faculty Committees for Training Graduate Students
   1. Selection of a Mentor: Students must select a Ph.D. Advisor from the Microbiology Faculty (primary or secondary) after completion of their third rotation. Neither students nor faculty members
are allowed to divulge their choices until after completion of all three rotations. Students will rank their choice of lab while faculty will rank their choice of student, usually based on their rotation experience. Not every student or faculty member will get their first priority. Disputed issues will be resolved by the Department Chair and the GAC.

2. Role of the Ph.D. Advisor: The Ph.D. Advisor will be responsible for the day-to-day advice and guidance in the technical and intellectual aspects of the scholarly pursuit of the Ph.D. degree. The Advisor will play the major role in directing the student’s Ph.D. research. Important input is also provided by the entire Ph.D. Committee.

3. Composition of the Ph.D. Committee: The Ph.D. Advisor and the student will select a Ph.D. Committee (also referred to as the Thesis Committee) prior to the completion of the third semester of graduate study. The Ph.D. Advisor will serve as the Chair of the Ph.D. (Thesis) Committee.

The Ph.D. (Thesis) Committee must be composed of at least five members of the graduate faculty at The University of Iowa. For the final examination, one member of the committee must be a member of the graduate faculty from outside the Department of Microbiology and Immunology. The outside member may NOT be a primary faculty member of another department with a secondary (joint) appointment in Microbiology. Those individuals are considered departmental faculty for this purpose. Therefore, four of the five committee members must hold either a primary or secondary faculty appointment in Microbiology, and at least one of these four members must be a primary faculty member the Department of Microbiology and Immunology. Departments may request the graduate dean’s permission to replace one of the five members by a recognized scholar of professorial rank from another academic institution. Upon recommendation by the DGS, the graduate dean may also appoint additional qualified persons (not necessarily of the graduate faculty; see “optional member” on Form B, page 43) to serve as voting members of the Ph.D. Committee. In all cases where a potential member is from outside UI, the committee chair must first request and receive permission from the graduate college dean to include that person on the thesis committee.

4. Role of the Ph.D. Committee: The Ph.D. Committee is the source of intellectual and research guidance for the students. The Committee functions are to:

a. annually review student’s progress in research and overall performance,

b. review the Annual Progress Report/Individual Development Plan (APR/IDP)

c. meet for additional special sessions to review the student’s progress,

d. make recommendations to the Department Chair regarding the means and basis for continuance of the student’s stipend,

e. assist in the guidance and technical aspects of the student’s research, and

f. judge the merit of the dissertation, final research seminar, final oral defense of the thesis research, and the overall fulfillment of the requirements for the Ph.D. degree.

5. Composition of the Comprehensive Examination Committee: The Comprehensive Examination Committee will consist of the Ph.D. Committee but with the Ph.D. Advisor replaced by another faculty member. Since the Ph.D. Advisor shall not be involved in any aspect of the Comprehensive Examination, the Advisor shall not be present for either discussions of the abstract or for the examination itself.

Second year students should arrange a meeting of the Ph.D. Committee towards the end of the third semester, i.e., Oct-Dec. At this meeting, a Chair for the Comprehensive Exam Committee will be selected. This individual will be designated the “Comprehensive Exam Chair”. Except under special circumstances, faculty members who are neither primary nor secondary faculty of the Department of Microbiology and Immunology should not be asked to become the Comprehensive Exam Chair. The Ph.D. Advisor must then notify the departmental administration and the DGS of the committee make-up
and of the designated Comprehensive Exam Chair. All subsequent correspondence regarding the Comprehensive Exam will be with this Chair.

6. Role of the Comprehensive Examination Committee Chair: The Comprehensive Exam Chair (hereafter called Chair) will receive the student’s abstract and assure that it is distributed to the other three faculty members. Thereafter a decision should be made among the four regular committee members regarding selection of a fifth committee member. Since selection of the fifth member (or additional members) may depend on the nature of the proposal, the regular members need to review the proposal prior to selecting the fifth member. Before convening a formal meeting to discuss the abstract, it is recommended that the choice of the fifth committee member be discussed with the student. Three-fifths of the committee must be Departmental members. Thereafter, the five member examination committee should formally meet together with the student as described on page 18 under “Comprehensive Examination Abstract Meeting”. Preparation of the abstract and its evaluation should proceed as described below.

In addition, the Chair will organize the activities of the Committee and assure that the appropriate collegiate documentation is completed and filed with the Department and Graduate College prior to the examination. The Chair will notify the Departmental Administrative Associate concerning the: (a) time of the exam, and (b) plan of study of the student. The Comprehensive Exam Chair will be responsible for designating two members of the examining committee to write critiques of the exam proposal. The Chair should keep the Ph.D. Advisor apprised of the student’s progress at each stage of the examination process and upon its conclusion. After a positive committee decision has been made and the Report on Doctoral Comprehensive Examination has been signed and returned to the departmental office, the role of the Chair is complete.

7. Mandatory Annual Meeting: Students are required to meet with the Ph.D. Committee at least once per year and file an Annual Progress Report/Individual Development Plan (APR/IDP) (Form B, page 41-47). The student is responsible for arranging the date, time, and location of the meeting, and notifying the committee members. One week prior to the meeting, students must provide each Ph.D. committee member with a copy of the APR/IDP with sections 1-3 completed (see below). Students typically make an oral presentation and the Committee provides comments and suggestions. Although it is recommended that the entire Committee meet, business can be conducted with four members as long as the fifth or additional members are polled to vote on critical decisions. The purpose of these meetings is both advisory and judgmental. The advisory function includes suggestions from committee members regarding experimental procedures or alternative directions for the research. Collegial sharing of ideas, techniques, lab equipment, and time is encouraged. The judgmental role of the Committee involves determining whether the student’s research is proceeding on schedule. If the research is not progressing, with the prospect of publication, the Committee must decide whether the student’s performance is inadequate or whether the experimental design or procedures used are inadequate. Decisions and evaluations by the Committee must be distilled by the Ph.D. Advisor in section 4 of the APR/IDP (Form B) and communicated to the student.

First year students typically do not schedule a meeting in year 1.

Second year students schedule a Comprehensive Examination Committee meeting between Oct-Dec of the second year. The first Ph.D. committee meeting will typically occur in the summer between years 2-3 or the fall semester of year 3.

Third year students and beyond are required to schedule annual meetings at least once every 12 months.

Although only one annual meeting is officially required, students nearing the end of their study may require 2-3 meetings/year with their Ph.D. Committee. Historically, students whose Committee seldom meets have a protracted tenure.
8. Annual Progress Report/Individual Development Plan (APR/IDP). An APR/IDP (Form B) must be completed at least once every 12 months for students entering year 3 and beyond. The APR/IDP consists of four sections:

1. Student progress towards fulfilling general graduation requirements (to be completed by the student)
2. Student self-assessment of skills (to be completed by the student)
3. Student research progress and development (to be completed by the student and Ph.D. advisor)
4. Ph.D. Committee evaluation of student Progress (to be completed by the Ph.D. advisor and Ph.D. committee.)

Reprints of manuscripts may also be provided as evidence of progress.

An updated APR/IDP is required at least every 12 months until completion of the Ph.D. defense. The Ph.D. Advisor is responsible for submitting a completed copy of the APR/IDP to the DGS after each Ph.D. committee meeting. The APR/IDP will be placed in the student’s file. This is very important in cases of grievances or any other situations in which a “paper trail” is valuable.

Students that fail to complete an APR/IDP updated within the past 12 months and signed by each Ph.D. committee member will receive a grade of Incomplete (I) for MICR:7261. Failure to comply can also jeopardize the student’s stipend and opportunity to remain in the program.

9. Role of the Director of Graduate Studies (DGS): The DGS will coordinate the yearly assessments of student’s progress. The DGS will receive all APR/IDPs and monitor Ph.D. Committee activity through evaluation of the written report. Students who are delinquent in fulfilling scheduled demands must petition the DGS for an extension. The DGS will receive all student requests for extensions and waivers and bring the written requests to the attention of the GAC for action.

F. The Comprehensive Examination Protocol

1. The Purpose of the Comprehensive Examination: The Comprehensive Examination in Microbiology is designed to measure the student’s ability to write and defend a research proposal. The format of this proposal follows the guidelines for research proposals outlined by major external funding agencies (i.e., NIH, NSF, and USDA). Guidance in the design of these proposals is provided by the GAC and according to “model proposals” made available to students.

The term “comprehensive” is a hold-over from a former time (>30 years ago) when Ph.D. candidates were held responsible for a comprehensive knowledge of their discipline. In those days, examinations were given later in the curriculum of the aspiring Ph.D. at a time when students had completed much of their research, all of their coursework, experienced many seminars, read many published scientific papers, and often published one of their own. Furthermore, many may have completed a Masters Degree and therefore might realistically have gained a comprehensive view of the discipline since the rate of appearance of new information was slow relative to the situation now in the 21st century.

The modern Comprehensive Examination is different because the information explosion has made it impossible for any student to obtain a comprehensive knowledge of a subject in 2-3 years. Since the Ph.D. is a research degree, the major objective of the program is to train students in the use of the scientific method to solve scientific problems. Not coincidentally, the practical ability of an aspiring young scientist to obtain research funding from a federal granting agency also depends on one’s ability to properly use the scientific method. While differences exist between “real research grants” and student proposals, the academic portion of each is the same. Thus the modern
Comprehensive Examination consists of preparing a research proposal that must be defended before a faculty committee.

2. The Comprehensive Examination Process: The process involves the following steps and timetable:

   a. Meeting of the Ph.D. Committee during the third semester and selection of the Chair of the Comprehensive Exam Committee (hereafter called "Chair").
   b. Meeting with the GAC during the summer/fall of the second year of graduate school to discuss the process.
   c. Submission of at least two proposed topics to the Chair no later than January 15.
   d. Preparation of an abstract of the proposal and its submission to the Chair no later than February 15. By this time the student should be approaching 72 s.h. of accumulated graduate credit.
   e. If the abstract is approved, a date will be set for the examination 6-10 weeks in advance by the Comprehensive Examination Committee (Figure 2, page 20).
   f. Prepare a full length proposal following the guidelines (pages 21-24) and models provided.
   g. Following a successful defense of the proposal, a Comprehensive Examination Report will be filed with the Graduate College and the student officially becomes a candidate for the Ph.D. degree.

3. Timetable for Completing the Exam: Students may take the Comprehensive Examination as they approach the accumulation of 72 s.h., but no later than the second semester of the second year (Figure 1, page 19). Students must take note of two important deadlines in this process. (i) By January 15, students must submit to the Chair at least two proposed topics for the exam proposal (see below). (ii) The abstract of the proposal must be submitted to the Chair no later than February 15 of the fourth semester. Failure to meet this deadline will constitute an initial failure of the Comprehensive Exam (see below). Requests for extensions must be made by the student to the DGS. Decisions concerning extensions will be made by the DGS in conference with the GAC and the Chair of the Department.

4. Composition of the Examination Committee is covered on page 13.

5. Submission of Possible Topics for the Exam Proposal: Students may develop an exam proposal on a topic related to their thesis research. The topic for the exam can be a subject of current research in the thesis mentor’s laboratory and can be a subject that might be pursued in the foreseeable future. However, in some cases it may be considered beneficial for the student to prepare a proposal unrelated to their Ph.D. research. Ultimately, the decision on the area of topic for the comprehensive exam rests with the Comprehensive Examination Committee of each student.

   Students will work with their Committee to choose an appropriate topic as follows. The student will propose two or three possible topics to the exam committee. The proposed topics should be single-sentence statements of a subject area to be explored. At this stage the student is not presenting experimental aims or hypotheses. These proposed topics will be submitted to the Examination Committee Chair by January 15. The Examination Committee will consult and within one week will indicate to the student whether any or all of the topics are acceptable. The student will then choose a single topic from among those judged acceptable for abstract development.

   The purpose of “pre-flighting” potential exam topics is to enable the student to get feedback from the committee on whether the topic comes with serious pitfalls that are likely to hinder development of a viable proposal. This feedback would come before the student has invested months in developing an abstract.
Students should note two important points: (i) The student should be breaking new ground in the exam, and (ii) The earlier topics are submitted to and approved by the Committee, the more time the student will have for abstract development.

6. Abstract Preparation and Submission: A single abstract of the proposed research will be prepared by the student and submitted to the Comprehensive Exam Chair on or before February 15 of the student’s fourth semester (Figure 1, page 19). It is vitally important that the student demonstrates independence during the preparation of the abstract. After the topic selection process, therefore, the student shall have no communication with the PhD Advisor or the Committee members concerning development of the abstract. If the abstract is deemed unworthy by the Committee (see “Comprehensive Examination Abstract Meeting”, below), the student will be given one chance to either repair the abstract (through submission of a revised abstract) or by submitting an entirely new project. Careful reading and thoughtful preparation by the student will facilitate the Committee’s review of the proposal. The following abstract guidelines should be followed:

a. Should not be more than 2 single-spaced pages, including citations, tables and figures.
b. Should use Arial font size of 11 with 0.5" margins.
c. Should consist of 3-4 paragraphs; the first summarizes the historical background and states the overall problem; the second describes a set of specific aims that test the major hypothesis; the third (optional) describes specific aims designed to test a second or corollary hypothesis; and the last paragraph summarizes why the work is significant to the discipline of science. Failure to follow these guidelines can in itself result in rejection of the abstract.

7. Comprehensive Examination Abstract Meeting: This meeting is held 1-2 weeks after submission of the abstract to allow the Comprehensive Examination Committee to discuss and evaluate the abstract and to communicate their evaluation to the student (Figure 2, page 21). The meeting should not last beyond 1 hour and should never be a “mini-defense” of the abstract. Each member of the Committee should bring to this meeting a brief critique of the abstract addressing the following specific criteria: 1) demonstration that the questions posed are hypothesis-driven; 2) appropriate rationale for hypotheses and approaches; 3) appropriate scope/breadth of inquiry; 4) sufficient depth of inquiry; 5) acceptable writing quality.

The meeting typically follows the format below:

a. A short meeting of the Committee (10 min.) without the student. At this time, the committee must determine if a defendable proposal could arise from the abstract provided. This is the most critical part of the abstract evaluation process.
b. A brief session with the student (optional), to discuss issues in the abstract not clarified in the written document.
c. A closed door discussion by the Committee without the student to reach a final decision.
d. A meeting with the student to convey the decision of the Committee (see below). This must be done with the entire committee present. The Chair must be certain the student fully understands the decision and the critique.

Note: Experience has shown that proper scrutiny by faculty of the abstract is a key element in the successful defense of the subsequent proposal. Highly scrutinized proposals can prevent subsequent student failures. Furthermore, students who enroll in graduate courses that critique primary literature and write mini-proposals as a class requirement often perform better.

8. Potential Outcomes of the Evaluation and the Student Abstract

a. The Committee finds (through majority vote) that the research area is inappropriate and the student must search for a new area and submit a new abstract within one month (Figure 2, page 20).
b. The Committee decides that the abstract is scientifically flawed and/or the hypotheses proposed are untestable to the extent that a successful defense is highly unlikely. Student must submit a new abstract within **one month** (Figure 2, page 20).

c. The Committee decides that the hypothesis or the specific aims will not provide the optimum results and the student is asked to make a thoughtful reappraisal of the problem and rewrite the abstract. **One month** will be allowed to accomplish this (Figure 2, page 20).

d. The Committee finds the abstract acceptable scientifically, but poorly written, and it inadequately conveys the intent of the research. The student must submit a revised abstract within **one month** (Figure 2, page 20).

e. The Committee approves the abstract. The student will prepare a research proposal that will be defended before the same Committee on a specified date 8-10 weeks after approval (Figure 2, page 20).

9. **Student Response to Outcomes 8a through 8d**

a. The Comprehensive Exam Chair will organize the views of the Committee members into a concise and meaningful critique, and a written document is placed in the student’s file and copies provided to the DGS and the student.

b. If a revision of the abstract or a new abstract is still unacceptable, this will constitute the final failure of the comprehensive examination. The entire process can be repeated only after a four month interim. This outcome will be documented as described in 8a (above).

c. If the second attempt results in an acceptable abstract, the student will be allowed to proceed with the remainder of the exam process.

d. If the second attempt also results in failure, the student must either leave the program or make application to the DGS to enter the M.S. program (see page 29).
Figure 1. Comprehensive Exam Flow Chart: Initial Phase

2nd semester/Summer → Select Ph.D. Committee, convene first in 3rd semester and select a Chairman of the Comprehensive Exam Committee

Summer/3rd Semester → Attend session with DGS on how to prepare a proposal abstract and a good research proposal

3rd Semester → Study the relevant literature and formulate a hypothesis that will form the basis of your Comprehensive Proposal

January 15 → Submit two proposed topics for the exam proposal

4th Semester (February 15) → Submit a Proposal Abstract to the Chairman of the Comps Committee

End of the 4th Semester → Complete Comprehensive Exam
Figure 2. Comprehensive Exam Flow Chart: Evaluation Phase

Consult the Handbook Text for Details.
G. Preparation of the Comprehensive Examination Proposal

1. Timetable (See Figure 2, page 21)
   a. At the time of abstract approval, the Comprehensive Exam Committee will fix a date 8 weeks in advance for the proposal defense.
   b. After abstract approval, the student will have a maximum of 6 weeks to submit a full proposal.
   c. The Examination Committee must receive the proposal 2 weeks prior to the defense.

2. General Guidelines
   a. The proposal must be entirely written in the student’s words and all sources of information acknowledged. The problem and the proposed solution must represent original thought by the student. Plagiarism will not be tolerated.
   b. The student should apply information from courses, seminars, journal articles and research experience to compose a technical solution to the research problem of the proposal.
   c. The student may consult with non-committee members about methods and other technical information, but not regarding hypotheses or experimental design. Under no circumstances is a student to give his/her proposal to any faculty member for evaluation or proofreading. However, it is strongly recommended that it be reviewed by a peer and that the student and his/her peers conduct a “mock” examination. A mock examination is conducted with postdoctoral fellows or more senior graduate students serving as the Comprehensive Exam Committee.
   d. The proposal should not exceed 12 single-spaced pages and this is inclusive of all figures and tables. The font and margin sizes should be as for the abstract. Citation lists can be extra.

3. Scope of the Student Proposal: Students are often uncertain of how ambitious to make their proposals, and proposals have varied in the amount of research proposed from one well-controlled experiment to projects that would keep a medium-sized lab busy for ten years. The first approach is much too narrow and does not require the student to understand and apply multiple approaches and techniques. The second approach is too broad and results in a written proposal that is necessarily short of detail. You should propose a project that would keep two well-trained, full-time investigators busy for about two years. Such a project would probably produce two to three publications.

4. Composition of the Student Proposal
   a. General. Student exam proposals and grants submitted to federal agencies and private foundations contain the same essential ingredients. They typically differ in the nomenclature for different sections that serve analogous roles. The content of the Comprehensive Exam Proposal for students in Microbiology is described below. Although students are not required to write grants for external funding, tips for doing so are included for perspective and for future reference.
   b. Abstract or Summary. This provides the Committee or funding agencies with a synopsis of the project so the three “W’s” can be clarified:
      • Which study group at the funding agency (real grant) will review the proposal or Who will be the fifth member of the Comprehensive Exam Committee (student proposals)?
      • What is to be accomplished?
      • Why is it important?
   c. Student Proposals Versus Research Grants. An important distinction between a student abstract and the "abstract” or “summary” of a research grant proposal is length. Funding agencies specify that the abstract fit into a certain space and be restricted to a certain number of words. However, such
abstracts are submitted together with the entire proposal. Student abstracts, while comprised of the same ingredients, are of necessity somewhat longer (usually 2 pages) since these abstracts must be first submitted for evaluation without the attached proposal. Student abstracts are analogous to pre-proposals submitted in response to RFPs (Requests for Proposals) or "Letters of Interest" published by funding agencies. The student’s Comprehensive Exam Committee bases its decisions on this abstract just like granting agencies approve or disapprove a pre-proposal. Thus, more information is needed for evaluation by the student’s Comprehensive Exam Committee than is normally present in the “Summary” or the “Abstract” of a complete grant. We do not want students to attempt to prepare proposals that are predictably undefendable since funding agencies will not approve RFPs that propose undefendable research. This is a major reason for the abstract submission step of the Comprehensive Exam process.

It is very important to emphasize that you are not being trained in "grantsmanship", rather in science alone. Funding of federal grants depend on politics, advocacy on the review panel, and "fashionable science", but unfortunately not always on the quality of the science. While we refer to "real grant proposals", the exercise here is to demonstrate your scientific logic and reasoning, not your grantsmanship. If you propose to do a study in Aardvarks, it would most likely be rejected by a federal agency, not on the science, but because it is not what is "fashionable".

d. **Rationale or Rationale & Significance.** How will the work proposed resolve a major issue in the selected area of research? This should be a small paragraph of 5-6 sentences.

e. **Hypothesis.** What is the specific hypothesis (or hypotheses) which drive the proposed research? Successful proposals are “hypothesis driven” as opposed to studies designed to describe a phenomenon. For example, “most alley cats are black because they hunt at night and color provides camouflage” [hypothesis driven] versus “what is the hair color distribution among alley cats”? [descriptive science].

f. **Background or Literature Review.**
   (i) **Be comprehensive.** Let the reviewer know that you have a broad understanding of the subject. Avoid building a story around one or two observations or “painting on too small of a canvas”.
   (ii) **Recognize and discuss controversy and inconsistency.** This sends the message that you have carefully studied the relevant literature and your proposal is likely to focus on resolving controversies in the literature.
   (iii) **Discuss alternative explanations of published data.** Avoid writing a proposal that follows a trail to a single outcome (the one you hope for!) since it typically suggests you have not considered all the alternatives. As apparent hypotheses emerge from discussions in the background, describe and discuss alternative outcomes and how these may impact changes in the experimental design that you will later outline.
   (iv) **Maintain a “flow of logic”.** Write the proposal so the various background issues progressively lead the reader to understand why you are proposing to test certain hypotheses. In a good proposal the reviewer will usually be able to anticipate the specific aims from reading the background since you have masterfully led him/her to “the edge of the unknown” and the key questions should now be obvious.

g. **Specific Aims (Rationale and Specific Aims)**
   (i) **Distinguish specific aims from hypotheses.** Specific aims describe a plan to obtain specific bits of information that are missing from the current literature and that you must first obtain to address the hypothesis(es) of your proposal. If the necessary information is available, the specific aim could become a hypothesis. A good proposal must sound like it is “hypothesis driven”. Your written logic should be so clear that it becomes obvious why you plan to do the

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1 Some agencies combine the Rationale with the Specific Aims to encourage the applicant to explain the Rationale for each Specific Aim.
tests in the order you propose them. Don’t propose to “do everything to everything”; i.e., don’t propose to perform every test on every tissue, bacterium or animal in the experiment. Carefully decide which are really important and which are unnecessarily redundant. Your ability to apply “Occam’s razor” to a project indicates that you have carefully thought out the experiment and know when you can save time and energy without jeopardizing the results. If you do propose to “do everything to everything”, or simply list tests you wish to conduct without justifying them in terms of hypothesis testing, your proposal will solicit the often-used comment that it is a “fishing expedition”. Remember that the “fishing” needs to be done before you write the grant (by others or yourself). This is the purpose of the “Background Section”. You then develop your testable hypotheses out of their “catch”.

(ii) Independence of Specific Aims. **Do not** prepare a proposal in which the entire proposal hinges on success in Specific Aim #1. If this appears to be the case, busy reviewers will not read much farther, and your proposal will either be “triaged” or given a low priority.

(iii) Describe simple, testable hypotheses. Complex hypotheses can be confusing to reviewers and may often solicit negative reviews. Simple experiments almost guarantee that some data will be generated whereas complicated experiments imply risk.

(iv) Accept alternatives. Be sure to indicate that in testing certain hypotheses, alternative outcomes may require you to modify your “plan of attack”. If necessary, include contingency specific aims that can be pursued if your favorite hypothesis is proven to be flawed.

(v) Limit specific aims. It is recommended that the proposal contain not more than two specific aims including any contingency specific aims. Justify the number of specific aims in terms of the Research Timetable. Proposals with too many specific aims are labeled “overambitious” and score poorly since reviewers believe that since you are unrealistic about what you can accomplish, you are probably also naive about the work you are proposing.

h. Rationale and Experimental Design

(i) **First**, do not confuse the description of the experimental design with the description of how a particular assay is performed. However, if you propose to use a particular method you will be expected to understand the chemistry and biology of the method. Failure to do so will score bad marks on your oral defense.

(ii) **Second**, the experimental design is not how you will determine whether alley cats are black, but how you plan to organize your study so you can make that determination. Some funding agencies do not rigorously distinguish between “Experimental Design” and “Specific Methods”. However, don’t use this as a defense because your Exam Committee will surely make the distinction! Thus, the “Methods” section of proposals is usually over-rated by the applicant and often overdone in preparation. Examiners want to know “how you think” not “what you can do with your hands”. There are numerous “methods” books, websites, and journals, devoted almost exclusively to methods. Mastering methods is primarily a job for technicians, designing experiments is the job of the scientist, and Ph.D.s are awarded when there is evidence that someone is a scientist, not merely a technician.

(iii) **Third**, good experimental design does not propose collecting data in a vacuum. Good experimental designs include controls, both positive and negative, that become the “gold standards” against which “test samples” are compared. For example, include deliberate controls in which black, white, and gray alley cats are released so you can determine the reliability of measurement in your unknown sample of alley cats.

(iv) **Fourth**, don’t just describe the experimental design, but inform the reader as to how you will interpret the results being sure to consider your favorite outcome as well as possible alternative outcomes.

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2 Some agencies prefer that you include a completely separate section to deal with this issue. In the outline provided here, this format has been followed. However, this issue is not whether you follow a rigid format, but whether you have considered the pitfalls and alternatives (see 5, below). Whether you discuss them here or later is your preference.
(v) Fifth, remember a scientific “fact” becomes one because all experiments lead to the same conclusion. Therefore, be sure to convey how each hypothesis will be tested by more than one method, since different methods give different results. Impress upon the reviewer that you are fully aware of methodological pitfalls and “the need to reach the same summit from different paths.”

i. Specific Methods and Procedure. This is a tabulation of the specific procedures to be used in the design of the studies.

j. Research Timetable. Provide a timetable of what you expect to accomplish during each year. This gives the reviewer perspective and insight into how realistic you are about doing science.

k. Significance

   (i) Global impact. Briefly state the “global” implications of your work. How do they relate to major problems in the field? Emphasize how the basic discoveries from your work will move the science one step forward in gaining an understanding about an important issue.

   (ii) Designer proposals. If you are applying to a certain funding agency (not simply preparing a Student Comprehensive Exam Proposal), make sure you know what they want to hear! Most will indicate the key areas in which they will fund research. Indicate those aspects in the significance portion of your abstract and proposal that specifically address areas that the agency wishes to fund.

   (iii) Realism. Don’t propose to “solve all the major problems in the area of proposed study”. Reviewers know you can’t do that and that you will raise more new questions than answers. Let the reviewers know that you are being realistic.

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3 Some agencies identify separate sections in which significance is discussed. Others combine Significance with Rationale early in the proposal which is often more desirable since the reviewers (or agency) can immediately evaluate the importance of the work and does not have to read volumes before reaching the section entitled “Significance”.
5. Pitfalls and Alternatives

a. All good grants should either include a section at the end of each specific aim that alerts reviewers to your awareness of potential problems with your approaches or provides a separate section on the topic. Such a section helps to convince reviewers that your ideas are well thought out and you are fully aware of the limitations and foreseeable problems. Even more important is that you give reviewers confidence that you have alternative approaches and if your first attempts fail you have “an ace in the hole”.

b. Demonstrate to the reviewer that you are fully aware of all the possible outcomes of your proposed study, not merely your favorites. The poorest proposals are those in which the investigator has proposed interdependent specific aims and has a single outcome in mind for the proposed research and fails to consider alternatives.

c. Don’t be afraid to indicate in Specific Aims that if a particular outcome leads you in the direction of a highly complicated study that you fully appreciate you cannot complete it in the course of the proposed research. Provide the reader with the feeling that should you encounter such complications, you are aware that you may not definitively answer all the questions in the time available.

d. Indicate that you recognize that certain proposed tests are weak and could give ambiguous results. Indicate how you have backed up these tests with other technical approaches that could resolve the ambiguity.

e. This is a good place to reiterate the discussion that because of the importance of certain results, you are going to use a battery of methods to be sure that the results obtained with a single method are not method-biased but also can be obtained using an alternative method.

6. Fatal Flaws to Avoid in Research Proposal

a. Fatal flaws
   (i) Interdependence of specific aims. Specific Aim #1 is risky or has a fairly high likelihood of failure, and subsequent specific aims are totally dependent upon the success of Specific Aim #1.
   (ii) Methodological ignorance. Proposing the use of a particular approach or technique because you saw it quoted in a paper, although you do not have a thorough knowledge of its strengths and limitations when applied to your own experimental design. You must, for any method you propose:
       • describe its physical and biochemical workings,
       • know its limitations and sensitivity, and
       • defend its selection for the specific application.
   (iii) Reagent availability. Many of the key experiments of the proposal depend upon a key reagent (antibody, cell line, or clone) which you must first produce, and which may be technically difficult or unfeasible to make.
   (iv) Correlation versus causality. Your major hypothesis is that event A causes event B, but all your experiments only test correlative associations between A and B, not causality. Experiments that show correlations are good introductory studies, but without studies that show causation, your proposal will get low marks.
   (v) Tunnel vision. “Tunnel vision thinking” means that you have planned from the “get-go” that all experiments will proceed exactly as you have planned and in a linear path.
   (vi) Lack of alternatives. Failure to consider entirely different outcomes than you anticipate, even if the literature leads you to anticipate a particular outcome.
b. Helpful hints that may assure success
   (i) Feedback and “in-house” review. Discuss your ideas and plans with your peers, especially those who have successfully passed their Comprehensive Exam in this or other departments/programs. Ask a few of these colleagues to read a draft of your proposal and give you candid feedback. Better yet, schedule a mock defense using your peers as the examining faculty. In case of extramural grant applications, arrange for your colleague “in-house” to read it before submission.
   (ii) Language skills. Sloppy grammar, sentence structure, spelling, etc., are noticed by reviewers and create the negative impression that you are also “sloppy” in your scientific reasoning. Since all modern word processing programs come with “spell-checkers”, misspellings are inexcusable.
   (iii) Review models. Ask your mentor (or others) if you can read the research plan portion of a funded grant proposal. However, be aware that grant funding is not merely based on the quality of the science but the politics of the issue, the collaborative contacts of the investigator, the preliminary data provided, and the track record of the applicant. Thus, successful faculty grants are not necessarily good models for a student proposal since politics, preliminary data, collaborations, and previous accomplishments do not affect the success of student proposals. Thus, a review of proposals from peers that were successful is more likely to reveal the pure academic quality of the proposal.
   (iv) Plagiarism of a research proposal (or any part thereof) that has previously been authored by the student’s Ph.D. mentor will not be accepted.
   (v) “Master of the house”. Exude confidence; don’t be a wimp. If you have thoroughly reviewed the background and carefully constructed your experimental design, you should know more than your examiners. Given this background, you have no reason to be intimidated by your examiners. They are busy scientists concerned with other matters and have taken less time than you to focus on the subject of your proposal.

7. Protocol for the Proposal Defense

   a. At the time of abstract approval, the Comprehensive Examination Committee will fix a specific date for the exam. If your abstract was approved in mid/late Feb, a mid-April/May date would be selected. The Comprehensive Examination Committee Chair will assign two members of the Exam Committee to prepare a written critique of the proposal. Each critique will be in the form of a summary statement. These statements should be completed in time for the oral defense, but may be modified to reflect discussion during the defense.

   b. Four weeks prior to the scheduled examination date, the Comprehensive Examination Chair must request that the Department’s Administrator begin proceedings to recommend that the Graduate College sanction a Comprehensive Examination for the student.

   c. The proposal defense meeting usually starts with a short closed-door review of the student’s academic and research history and with the Chair outlining an agenda for questioning.

   d. The student is invited into the room and may be asked to give a brief overview of the proposal, e.g., a 10 minute PowerPoint presentation.

   e. In most cases, the examination will start with a round of questions that will probably deal exclusively with the proposal. Generally, each member will take 10 to 15 minutes per round.

   f. A second round of questions may extend to more global issues that test the student’s general knowledge of microbiology.

   g. A third round of questions would not be unusual, especially if the examiners have concerns about the student’s performance based on the first two rounds.
h. The meeting ends in a closed-door session. The agenda would include a discussion of the qualities of the proposal and the defense of the proposal and an analysis of the breadth and depth of knowledge of microbiology. This discussion would culminate in a vote.

i. Regardless of the exam outcome, within one day of the completion of the exam, Exam Committee members who prepared summary statements should provide those statements to the Committee Chair and to the student. In the case of a successful exam, these documents provide feedback about the strengths and weaknesses of the student’s proposal that the student may find valuable for the future. In the case of an exam reservation or failure, these documents should provide guidance to the student in satisfying the reservation or in preparing for a new exam.

8. Alternative Outcomes of the Comprehensive Examination

a. Satisfactory. The student has passed the exam, becomes a Ph.D. candidate, and continues with research to satisfy the dissertation requirement of the Ph.D. degree.

b. Reservation. The Manual of Rules and Regulations of the Graduate College (http://www.grad.uiowa.edu/graduate-college-manual) outlines the criteria for allocating a “Reservation” status following a comprehensive exam.

c. Re-examination to remove a reservation. Re-examination may require evaluation of a revised proposal but without an oral defense. Re-examination could also require re-defense.

d. Unsatisfactory. Two or more “unsatisfactory” votes either on the initial proposal or upon evaluation of a revision, render the overall Committee report unsatisfactory. In the latter case, it would mean the "reservation" had not been satisfied. Both constitute a failure. The Manual of Rules and Regulations of the Graduate College specify that the student may be allowed re-examination, but this re-examination is entirely at the discretion of the Comprehensive Examination Committee. If the Committee decides not to permit re-examination, the student will be terminated from the Ph.D. Program. If the Committee decides to re-examine the student, this examination may not be scheduled prior to 4 months after the initial examination. This is usually a re-examination of the same proposal although the Committee can recommend that an entirely new proposal be written and defended. In cases of re-examination, the student has one more chance to successfully pass the exam.

e. If re-examination occurs, failure on this attempt under options c or d (above) will require the Committee to specify that the student switch to a master’s degree program or be dismissed from the graduate program. Note: Failure on the first attempt does not allow faculty to propose pursuance of an M.S. degree. This choice is up to the student, not the faculty.
III. PH.D. THESIS RESEARCH

A. General: The Graduate Training Timetable (page 39) indicates that following the first four semesters of graduate school, nearly all of the remaining time in the program is spent doing laboratory research. In other words, following the successful completion of the Comprehensive Exam, the Ph.D. Candidate is expected to devote >90% of his/her time to completion of his/her Ph.D. research. Ph.D. research is credited by enrollment in MICR:7261 and by using the section identification code of the Advisor. The minimum number of semester hour (s.h.) credits required for the Ph.D. is 72. The student's research is evaluated on a day-to-day basis by his/her Advisor (mentor) and on a regular basis by the Ph.D. (Thesis) Committee. Many Committees meet twice yearly although the mandatory requirement is once per year. As indicated above, an APR/IDP is filed as a direct result of the required meeting.

The length of time that a student remains in the program depends on the rate of progress made by the student. The current average tenure of a graduate student is approximately 5 years, although completing the program in 4 to 4.5 years is possible and should be a goal for industrious and talented students.

The written Ph.D. thesis must meet certain standards established by the Graduate College. The final thesis will contain numerous chapters, some of which may also have been published in peer-reviewed journals during the student's tenure as a graduate student.

B. Regular Checkpoints on Student Progress: The Ph.D. Committee will review the student’s intellectual and research progress. The Committee will make certain that the highest level of ethical conduct is demonstrated at all times during the course of study. The student will submit APR/IDP to each member of the Ph.D. Committee and DGS, and to the departmental office. The one exception to this will be the year in which the student is taking the Comprehensive Exam. Reports in years 3, 4 and 5 may contain excerpts from manuscripts and posters. Reprints of manuscripts may be provided as evidence of progress. Following submission, a meeting of the Ph.D. (Thesis) Committee is convened.

Only one APR/IDP is officially required per year, but students nearing the end of their study typically require 2-4 meetings/year with their Ph.D. Thesis Committee. Historically, students whose Committee seldom meets also have a protracted tenure. The Ph.D. Advisor is responsible for submitting an APR/IDP after each Ph.D. committee meeting. APR/IDPs are placed in the student’s file. This is very important in cases of grievances or any other situations in which a “paper trail” is valuable.

C. Ph.D. Dissertation Preparation and Defense: To be awarded the Ph.D. degree, a candidate must satisfactorily write a scientific documentation of the research conducted and defend the work before the respective Ph.D. Thesis Committee. The procedure to be followed by the student regarding the thesis/dissertation preparation and defense is outlined below:

1. The student’s completed or nearly completed research should be presented orally to members of the Committee. This will often be accomplished in the yearly (or more frequent) meetings of the Ph.D. (Thesis) Committee and the subsequent Progress Reports filed with the Director of Graduate Studies. Eventually the Committee will advise the student to begin writing the thesis/dissertation. Each semester the Graduate College establishes deadlines for the first deposit and final deposit of theses. These deadlines must be met to fulfill graduation requirements.

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4 Expenses of typing the document, any illustrative material, and copies of the document for the Committee and College, are the responsibility of the student.
2. The student's Advisor will monitor the progress of the writing. The style of the document must conform to the thesis guidelines established by the Graduate College (www.grad.uiowa.edu). When a draft of the document has been approved by the Advisor, a copy will be distributed to each member of the student's Committee. If the Thesis Committee approves this draft thesis and the research, the Ph.D. Advisor will inform the Departmental Administrator of the impending final examination at least 4 weeks prior to examination. The Administrator will then prepare a formal examination form that will later be taken to the defense.

3. The student then completes the thesis and distributes it to the Committee at least two weeks before the scheduled date of the final defense.

4. The Ph.D. student will present a public seminar on the dissertation research. All graduate students and faculty in the Department will be encouraged to attend. The seminar will be followed by a defense of the dissertation before the student's Ph.D. Committee and any other individuals with interest in the work. The public seminar shall not precede the defense by more than one month and is generally held the same day.

5. The defense of the thesis will proceed in a manner similar to the proposal defense of the Comprehensive Examination. At this point in training, the student is expected to be an expert in the chosen field of research. Failure to demonstrate an outstanding level of expertise in the dissertation and in the experimentation conducted to answer the research problem(s) will be judged by the Committee to be a failed dissertation examination. The Graduate College states that two unsatisfactory votes will make a Committee report unsatisfactory. The forms prepared by the Departmental Administrator are taken to the thesis defense. The Chair of the Ph.D. Committee (Advisor) will gather the signatures from the Committee members at the conclusion of the defense. The forms will be returned to the Administrator who will send all appropriate materials to the Graduate College. If the candidate fails the defense, he/she must wait until the next semester for re-examination and will have this single re-examination opportunity to adequately demonstrate a mastery of the research topic and the experimental procedures.

6. A stipulation may be attached to an otherwise successful defense. The Committee may suggest further corrections to the document before final acceptance. This requires no re-defense, but the committee will not sign the Certificate of Approval page of the thesis until the corrections have been made. The final, corrected copies of the document must be submitted to the Graduate College per their deadline.

7. In addition to the copies required by the Graduate College, the student will present one final copy of the document to the Department for the permanent library file, at least one copy to the student's Advisor, and to members of the Committee per their request.

D. Publication Requirements for Ph.D. Students: Graduate students must have at least one peer-reviewed, first author publication in press (or published) before defending their thesis. Completion of this requirement will be monitored by the Ph.D. Thesis Committee. In exceptional circumstances, a student's Ph.D. Thesis Committee may petition the Graduate Advisory Committee for exemption from this requirement.

IV. MASTER OF SCIENCE (M.S.) DEGREE

A. Introduction: Although the Graduate Program in Microbiology does not recruit students aspiring only for the M.S. degree, those who enter as Ph.D. aspirants may feel the need to change their final objectives. Alternatively, some students may wish to complete a M.S. degree during the course of obtaining a Ph.D. There is much to be said for this course of action, especially if students feel uncomfortable in moving directly to Ph.D. candidacy. Therefore, the Graduate Program in Microbiology
does offer a M.S. degree. In any case, the student must petition the GAC through the DGS if he/she wishes to pursue the M.S. track.

**B. Requirements for the M.S. Degree:** There are differences in three categories between the Ph.D. and M.S. Degree:

1. Semester hour and course requirement
2. Thesis Committee and Comprehensive Examination
3. Research and thesis requirements

The Graduate College requires a minimum of 30 s.h. for a M.S. degree. Of these 30 s.h., not more than 9 s.h. from Graduate Research in Microbiology (MICR:7261) can be counted. This means that an aspirant for the M.S. degree must have at least 21 s.h. of course credits. Unlike the Ph.D. program recommendation of 15 s.h., however, undergraduate courses taken as remedial courses count toward the 21 s.h. minimum requirement.

Students aspiring for the M.S. degree need not pass a Comprehensive Examination. Furthermore, the M.S. Thesis Committee consists only of the Advisor and two other members (three total) versus five for the Ph.D. Committee. One of the Committee members *may be* a faculty member outside of the Department of Microbiology and Immunology. The final examination will follow the format of the Ph.D. defense of dissertation including a seminar.

M.S. research should be accomplished in 1 1/2 to 2 years. Considering that such individuals have used one year for rotations, the normal time for a M.S. degree is 3 years. Typically a M.S. Research Project is one-third as complex as a Ph.D. Research Project.

**C. Matriculation into the Ph.D. Program:** All graduate students who complete the requirements for the M.S. degree and wish to continue working towards a Ph.D. **MUST** reapply for admission to the Microbiology Graduate Program. Applications will be reviewed by the Chair of the Graduate Admissions Committee, the members of the student’s M.S. Thesis Committee, and one additional faculty member.

**V. PERFORMANCE IN TEACHING**

The Department of Microbiology and Immunology requires that all students participate in the teaching activity of the Department. Teaching effectiveness may be reviewed by the Ph.D. (Thesis) Committee. Each course director must fill out an evaluation form (Form C, page 45) following the participation of each student in the course under direction. These forms may be included in the student's file and can be used to evaluate the student’s performance at the mandatory annual review of the student’s performance by the Ph.D. (Thesis) Committee (page 29). Assessing Classroom Environment (ACE) evaluation forms will also be completed by students enrolled in courses that have graduate student assistants. A portfolio of teaching evaluations in a student's file can be extremely valuable in providing recommendations for those Ph.D. graduates applying for positions in which teaching skills are important.

The student evaluation will be directed toward improving teaching effectiveness and may include the recommendation for the student to take additional courses or to assist in specific courses in subsequent years. For example, The University of Iowa offers two tests for students for whom English is a second language: the English Proficiency Exam and the Teaching Assistant (TA) certification evaluation. [All such students are required to take these exams, *regardless* of their TOEFL score.] Depending on the results of these exams, certain English courses can be recommended by the examination administrators and the student’s Ph.D. Committee. In the case of a language problem, the Department of Microbiology and Immunology requires that these course recommendations be followed at the rate of one course per semester, until the recommendations are fulfilled or the student passes
the TA certification evaluation. The students are re-evaluated automatically at the end of each recommended class.

While English proficiency is important for teaching, teaching skills are not language-dependent and students for whom English is a second language are not singled out as it may appear from the discussion above. Most teaching skills are learned, i.e., the result of experience. Thus, weak performances as a graduate student assistant may lead to the recommendation that the student gain more experience. Courses that offer the possibility for students to deliver lectures or mini-lectures provide a valuable training opportunity. Students are encouraged to deliver such lectures so long as they are evaluated by faculty. In addition, the University offers several workshops to assist in the training of graduate student assistants. They are typically posted on departmental bulletin boards.

a. Student Teaching Evaluation. Form C (page 48) will be completed by the faculty member that supervises the graduate student assistant. This can be a very important document for students that have completed their training and are applying for positions that require they have teaching duties. ACE evaluation forms are also completed by students enrolled in courses that have graduate student assistants.

b. Miscellaneous Reports. Students who present talks or posters at local or national meetings may have a letter documenting this placed in their file. Awards received by students for their presentation or copies of travel awards may be placed in a student's file. These provide additional sources of information for writing recommendation letters for research positions, teaching positions, and postdoctoral awards.

VI. FACILITIES, EQUIPMENT, AND LOGISTICAL MATTERS

A. Teaching and Research Equipment: The Department has a supply of various types of equipment used for teaching and research in Microbiology and Immunology. The equipment (microscopes, water baths, centrifuges, etc.) used for teaching major classes is not to be moved from the teaching areas without specific permission from the Department Chair or the Course Director. Research equipment is generally available in the core areas where the graduate student is conducting research. Certain pieces of movable equipment (projectors, microscopes, shakers, centrifuges, water baths, etc.) are available in the Department, but permission from the principal investigator in the lab housing the equipment or from the Department Chair is required before equipment is used or moved.

Graduate students and members of the Department are asked to assume responsibility for keeping equipment in first-class working condition. If anyone does not understand, or has any doubt about, the operation of a piece of equipment, please ask for instruction before use. Clean up after using equipment. For example, if tubes were broken in a centrifuge, or cotton plugs were blown from flasks in an autoclave, etc., please clean the equipment before leaving. This is especially critical when radioactivity or pathogenic organisms are involved. If any piece of equipment does not work properly, or if it has been broken, please report the matter to the principal investigator in the area, to the Department Chair, Laynez Ackermann, or the Departmental Office.

B. Travel to Scientific Meetings: If a graduate student presents research results at local or national scientific meetings, the Department may provide partial financial assistance for the necessary travel expenses. Usually, travel to meetings is paid by the mentor or by certain training grants. Students can also apply to the Graduate College and the Dr. Rachel J. Mason Fund for travel awards. The application and guidelines for the Mason Travel Award can be found on the S drive in the Dept Info/Graduate Student Information folder.

C. Departmental Administration
1. Office hours. The office of the Department (Room 3-403) is open from 8:00 AM to 4:30 PM Monday through Friday, except for holidays recognized by the University.
2. Mail. Business mail (journals, etc.) is delivered to the office two times a day, and office staff will sort the material for all personnel in the Department. **It is against University policy to use the office address for unofficial, non-University business such as personal mail, letters, newspapers, non-scientific magazines, credit card bills, etc.**

3. Keys and Identification (ID) Card. Graduate students will be given desk and laboratory space in the various research core areas of the Department. All students will be issued a picture ID card through the University. ID cards can be used for food purchases at University cafeterias, bookstores, and recreation centers. ID cards are initialized to open doors equipped with the Marlock system, i.e., all core doors and the building entrances. Cores are locked after 5:00 PM and before 8:00 AM Monday through Friday. The Bowen Science Building is locked on weekends and from 6:00 PM to 6:30 AM on weekdays. Certain areas (faculty offices, isotope rooms, isolation rooms, storerooms, etc.) require specialized codes or keys, and permission to use these areas must be obtained from the faculty in charge of that particular space.

   **Keys assigned to graduate students must not be loaned or given to other persons without permission.** If keys are lost, the student will be charged for new keys. It is against University regulations for unauthorized persons to have duplicate keys made. All keys are made by the University Key Shop and should be obtained through the Departmental office.

4. Requisitions for Supplies. Supplies for research generally are obtained through or from the faculty research mentor or the principal investigator directing the research.

5. Scheduling Rooms. Scheduling core conference rooms, lectures rooms, or laboratory space in the teaching labs is arranged through the Departmental office staff. It is the responsibility of the users of these rooms to return all books, journals, and computer and projection equipment to their original storage areas and ensure the room is clean for the next user.

D. Radiation and Health Safety
1. Radiation Safety. All users of radioactive materials must complete a yearly training course. There are strict rules regarding the handling of materials and their proper disposal. Students and laboratories not in compliance may lose their license for the use of radioactive materials.

2. Biohazard Safety. The University also has strict guidelines for the handling and disposal of hazardous chemicals such as carcinogens or environmentally unfriendly materials. Students working with human pathogens must complete yearly training. In addition, students who come into direct contact with animals used in experiments must complete the appropriate training programs offered through the Office of Animal Research.

E. Library Services
1. Departmental library. The Department has a small library that contains Ph.D. theses from past graduate students.

2. On-line journals. Numerous journals are available on-line through the University Library web site.

3. Outside libraries. The Hardin Medical Library has most books and journals needed for the study of medicine and microbiology. The Hardin Library Help Desk can acquaint you with the use of the facility.

F. Computers: Nearly all laboratories have multiple computers that can also be used by students. These are linked to various University servers for transfer of scientific data. For example, data obtained from a flow cytometer can be transferred through a server connection to a computer in
the student's lab. Most computers also allow Internet access for using on-line journals, databases, and important websites. The system also includes electronic mail and all graduate students are entitled to an address in the University e-mail system. This can be arranged with the Department Administrator. Since website usage is automatically monitored, computers are periodically checked for evidence that they have been used for personal activities or for contacting such things as pornographic websites.

G. Grievance Review Committee

1. General
a. Graduate students in the Graduate Program in Microbiology are subject to rules of the Graduate College as set forth in the Manual of Rules and Regulations of the Graduate College (see http://www.grad.uiowa.edu/graduate-college-manual), plus any standards established by the Graduate Program in Microbiology that may differ from those of the general Graduate College requirements.

b. The Chair of the Department of Microbiology and Immunology shall appoint a Grievance Committee each year. This Committee will consist of three faculty members from the Department of Microbiology and Immunology (one of whom shall be appointed Committee Chair) and three graduate students from the Graduate Program in Microbiology. Should a grievance ever involve a member of the Committee, that Committee member will be excused from serving on that specific grievance session and the Department Head will appoint a replacement.

c. For a graduate student, the particular grievance procedure for lodging a complaint will depend upon the area involved (student life, academic difficulties, employment, etc.). Generally, graduate students first explore how to pursue a grievance with their Advisor or with the appropriate departmental administration (Department Chair, Administrative Associate, or Director of Graduate Studies). However, if students are uncomfortable or dissatisfied using this route, the students may contact the Graduate College, where the staff will counsel them on the options available. In addition, Counseling Service, the Office of the Ombudsperson, and the Office of Equal Opportunity & Diversity, will counsel graduate students on a confidential basis and will assist them in selecting an appropriate grievance procedure.

d. The Graduate College administers the Academic Grievance Procedure (AGP) for pursuing resolution of complaints and grievances for most academic aspects of a graduate student’s program. This includes issues related to the program of study and research, scholarship, or artistic production, which comprise the core of graduate degree programs. The objective of the AGP is to achieve a fair and equitable resolution of complaints or grievances at the earliest possible time and at the lowest possible level. A graduate student who elects to pursue a complaint or grievance through the Graduate College AGP is first advised by the Graduate College of the different possible ways to proceed. The student then elects whether first to pursue a complaint using an informal process or whether to file a grievance and to proceed by a more formal process.

2. Personal Grievances
a. Personal grievances against other students, staff, or faculty should be submitted in person or in writing to either the Chair of the Grievance Committee or the Department Chair. As stated above, if the injured party does not feel comfortable submitting a complaint through these avenues, a complaint may be lodged with the Graduate College.

b. Every effort will be made to have immediate resolution of the grievance in the Department. Therefore, the Department Chair attempts to arrange a meeting between the Chair and the complainants. If this meeting does not resolve the issue or does not represent a satisfactory method for the complainants, the Department Chair will attempt to have the Grievance Committee meet to decide the correct or the most rational course of action. If the grievance involves staff or faculty only, only the three faculty members will meet. The Department Chair may also attend if the complainants so desire. However, failure to resolve differences between members of the Department will be referred to the Graduate College.
c. Grievances in the Ph.D. Committee: If discord develops between any of the members, students, or faculty of a Ph.D. Committee, the Ph.D. Advisor must submit in writing a specific description of the student's or member's grievance to the Department Chair, who will refer the matter to the appointed Grievance Committee (see above). The submission of this document should be coincident with the scheduling of a meeting of the Ph.D. Committee with the Chair of the Department.

d. If this grievance is directed at the student, a copy of the grievance description must be given to the student and the student must be invited to the meeting of the Grievance Committee. Every effort will be made to obtain the student's opinions and views concerning the academic or research deficiencies or the grievance matter.

e. The Department Grievance Committee usually meets to decide issues of science-based, interpersonal issues. If the grievance involves disability, national origin, racial, or gender-based grievances, or some form of physical or sexual harassment, the complainants may be guided by the Department Chair or the Chair of the Grievance Committee to specific University officials specializing in the particular area of counseling and arbitration. Both the Carver College of Medicine and the Graduate College have ombudsperson systems for the purpose of listening to and settling student complaints. In addition, formal complaints can be lodged with the Office of the University Ombudsperson by students, staff, and faculty. Complaints against faculty that must be handled by formal procedures fall within "Professional Ethics and Academic Responsibility" described in Chapter 15 of the University Operations Manual.

3. Academic Grievances

a. Students who have a grievance relating to their failure to maintain academic standards (see page 10) should arrange a meeting with the Department Chair to voice his/her opinions and views concerning the academic deficiency.

b. The Department Chair will meet with the Ph.D. Advisor, the student, and the Ph.D. Committee to reconcile differences between the contending parties. The Department Chair will develop an Academic Plan that the student must satisfy to remain in the Graduate Program in Microbiology. The Chair will provide both the student and the Ph.D. Advisor with a copy of the Academic Plan. The Academic Plan must provide the student with reasonable time to comply. Copies of the Academic Plan must also be included in the student's file.

c. If the student fails to comply with the Academic Plan, the Ph.D. Advisor will notify the Department Chair of the inadequacy, and the Chair will contact the student with both written and oral notification that the student is being dismissed from the Department. The letter of dismissal must state the specific reasons for the dismissal action.

d. The student may appeal the decision of the Department and file a formal grievance to the Microbiology Department Grievance Committee. The Department Chair will make available all files and correspondence with a short synopsis of events for use by the Grievance Committee. The student will also make a brief written appeal, clearly stating all of the student's viewpoints. All Committee business is highly confidential.

e. The Chair of the Grievance Committee will call a meeting as soon as possible for a complete review of the written information, and oral presentations by the Department Chair, the Ph.D. Committee members, and the Ph.D. Advisor. Likewise, the student will discuss the grievance with the Committee, providing supporting material relevant to the issue. The Committee may vote immediately, or decide to collect more information. A simple majority vote is required for a Committee decision. The review should be completed within two weeks and the decision transmitted in writing to the student, the Department Chair, and a copy placed in the student's folder.
f. The decision of the Department can be further appealed directly to the Graduate College. For specific details concerning the grievance procedure, the student should refer to the following website: http://www.grad.uiowa.edu/academic-grievance-procedure.
APPENDIX

Graduate Training Timetable (All Years)
Form A. Lab Rotation Report
Form C. Student Teaching Evaluation
Form B. Annual Progress Report/Individual Development Plan (APR/IDP)
Instructions for completion of Form B
Graduate Training Timetable (All Years)

Year One

a. Pre-enrollment
   • Obtain information about faculty research from departmental web site and communicate with faculty about research rotations prior to arriving in Iowa City.
   • Attend the Orientation Session in late August with the GAC, the week before classes begin.
   • Meet with the DGS to arrange a schedule of courses for first semester and a preliminary schedule for the second semester.
   • Enroll for Fall semester courses. Registration forms and student numbers are provided in the Departmental Office. Registration may be done by computer using MyUI (https://myui.uiowa.edu).
   • Arrange for starting the first rotation on or before September 1.

b. Fall Semester
   • Complete necessary coursework.
   • Complete first rotation and review Rotation Report (Form A, page 42) with the laboratory mentor.
   • Plan and begin the second rotation.
   • Attend departmental, interdisciplinary, and other relevant seminars.
   • Participate in discipline-related journal clubs and lab research meetings.
   • Periodically meet with the DGS to keep him/her advised of progress and experiences during the first semester.
   • Meet with DGS for discussion of coursework and Spring semester enrollment.

c. Spring Semester
   • Complete second semester coursework.
   • Complete second and third rotations and review Rotation Reports (Form A, page 40) with the laboratory mentors.
   • Attend departmental, interdisciplinary, and other seminars.
   • Attend a meeting with the GAC to review first year coursework, rotations, and to discuss the procedures for Summer and Fall semester of the second year.
   • Officially announce your selection of a Ph.D. Advisor after completion of all three rotations.
   • Participate in discipline-related journal clubs and lab research meetings.

d. Summer
   • Enroll in necessary coursework as advised by the DGS and the Ph.D. Advisor.
   • Begin Ph.D. research project.
   • Determine teaching responsibilities for following year (Course Directors usually meet in July to make teaching assignments).
Year Two

a. Fall Semester
   • The Ph.D. Advisor and the student will select a Ph.D. Committee.
   • Meet with Ph.D. Committee before December 15, and select a Chair for the Comprehensive Examination (see page 13). Immediately provide the name of the Chair to the Departmental Office and to the DGS.
   • Enroll in any necessary coursework.
   • Continue Ph.D. research.
   • Perform student teaching, if required.
   • Participate in discipline-related journal clubs and lab research meetings.
   • Attend departmental, interdisciplinary, and other seminars.
   • Begin to formulate ideas for the Comprehensive Examination.

   b. Spring Semester
      • Enroll in necessary coursework.
      • Continue Ph.D. research.
      • Perform student teaching, if required.
      • Attend departmental, interdisciplinary, and other seminars.
      • Participate in discipline-related journal clubs and lab research meetings.
      • Complete Comprehensive Examination.

   c. Summer Session
      • Continue Ph.D. research.

Year Three

a. Fall Semester
   • Continue Ph.D. research.
   • Attend departmental, interdisciplinary, and other seminars.
   • Perform student teaching, if required.
   • Participate in discipline-related journal clubs and lab research meetings.
   • Re-defend revised or new Comprehensive Examination proposal if initial defense during the Spring Semester was unsatisfactory.

   b. Spring Semester
      • Continue Ph.D. research.
      • Perform student teaching, if required.
      • Attend departmental, interdisciplinary, and other seminars.
      • Participate in discipline-related journal clubs and lab research meetings.

   c. Summer Session
      • Continue Ph.D. research.

   d. Annually
      • Submit APR/IDP to Ph.D. Committee and DGS.
      • Mandatory annual meeting with Ph.D. Committee.
Year Four

a. Fall Semester
   • Continue Ph.D. research.
   • Attend departmental, interdisciplinary, and other seminars.
   • Perform student teaching, if required.
   • Participate in discipline-related journal clubs and lab research meetings.

b. Spring Semester
   • Continue Ph.D. research.
   • Attend departmental, interdisciplinary, and other seminars.
   • Prepare a written outline of your dissertation.
   • Perform student teaching, if required.
   • Participate in discipline-related journal clubs and lab research meetings.
   • Attend special training sessions on computer-formatted dissertations.

c. Summer Session
   • Continue Ph.D. research.
   • Begin writing thesis Introduction and Methods.
   • Participate in discipline-related journal clubs and lab research meetings.

d. Annually
   • Submit APR/IDP to Ph.D. Committee and DGS.
   • Mandatory annual meeting with Ph.D. Committee.

Year Five

a. Fall Semester
   • Continue Ph.D. research.
   • Attend departmental, interdisciplinary, and other seminars.
   • Perform student teaching; if year five is the last year of training, there will be no teaching responsibilities.
   • Review dissertation progress with mentor.
   • Participate in discipline-related journal clubs and lab research meetings.

b. Spring Semester
   • Continue Ph.D. research.
   • Attend departmental, interdisciplinary, and other seminars.
   • Complete first draft of dissertation.
   • Participate in discipline-related journal clubs and lab research meetings.

c. Summer Session
   • Complete and defend Ph.D. dissertation.
   • Participate in discipline-related journal clubs and lab research meetings.

d. Annually
   • Submit APR/IDP to Ph.D. Committee and DGS.
   • Mandatory annual meeting with Ph.D. Committee.

Year Six - Special permission only
FORM A: LAB ROTATION REPORT
Graduate Program in Microbiology

Student Name

Date

Rotation Mentor

Research Topic

Description of Research Topic:

Average No. Hr/week =

Length of Rotation (weeks) =

<table>
<thead>
<tr>
<th>Student Performance</th>
<th>Performance level:</th>
<th>Excellent</th>
<th>Good</th>
<th>Adequate</th>
<th>Inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of material</td>
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<tr>
<td>Research expertise at the beginning of the rotation</td>
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<td>Research expertise at the end of the rotation</td>
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<tr>
<td>Ability to function Independently</td>
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<td>Level of energy in attacking the problem</td>
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<td>Level of research potential</td>
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</table>

Logistic and financial issues aside, would you accept this student in your laboratory to pursue a Ph.D.?   Yes  No

Additional Notes:

☐ By checking this box, I (the faculty mentor) indicate that I have met with the above named student and discussed the contents of this Lab Rotation Report. Email a final copy of this report to DGS and give the printed form with signatures to the Microbiology Office.

Signed

Mentor ____________________       Student ____________________
Form B
Annual Progress Report/Individual Development Plan (APR/IDP)

Red areas to be completed by student

Predoctoral Student:
Date of entry into program:
PhD Advisor:
Latest Revision Date:

GRADUATION REQUIREMENTS
Coursework
   a. Graded courses completed (a minimum of 12 credits is required to graduate)

<table>
<thead>
<tr>
<th>Course Number, Name, Grade</th>
<th>Credits</th>
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</thead>
<tbody>
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</tbody>
</table>

_____ Total graded credits earned

   b. BMED:7270, Principles of Scholarly Integrity (required but no credits earned)
   Section 0001 (date completed):
   Section 0002 (date completed):

   c. Credits of non-graded coursework (graduate student seminar, research, etc)

   Number of non-graded credits earned to date:

   d. Total credits earned (72 credits required to graduate)

   Add credits earned from sections a and b:

Comprehensive examination
  Committee members:
  First committee meeting – (Nov-Dec in 2nd year) – actual date:
  Date of comprehensive examination:
  Outcome of comprehensive examination:

Dissertation committee meetings
  Committee members:
  List dates of all committee meetings:
Student Self-Assessment of Skills (place a check mark in the column that applies):

<table>
<thead>
<tr>
<th>Scholarship Skills</th>
<th>Needs Improvement</th>
<th>Competent</th>
<th>Proficient</th>
<th>Expert</th>
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</thead>
<tbody>
<tr>
<td>Core science knowledge</td>
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<td>Responsible conduct of research</td>
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<td>Overall productivity</td>
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<tr>
<th>Professional Skills</th>
<th>Needs Improvement</th>
<th>Competent</th>
<th>Proficient</th>
<th>Expert</th>
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</thead>
<tbody>
<tr>
<td>Teaching</td>
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<td>Communication</td>
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<td>Interview skills</td>
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</table>
Blue areas be completed by student and advisor comments in yellow boxes

<table>
<thead>
<tr>
<th>1. Research / Scholarly Activity in the Past Year (Progress Review)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Brief overview of your research project &amp; major accomplishments in the past year (250-300 words):</td>
</tr>
<tr>
<td>b. Publications:</td>
</tr>
<tr>
<td>c. Patents:</td>
</tr>
<tr>
<td>d. Honors/Awards (include fellowships with entire funding periods, grants written/applied for/received, professional society or meeting presentation awards or travel awards, etc.):</td>
</tr>
<tr>
<td>e. National or other professional meetings attended (include meeting title, oral or poster presentation):</td>
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<tr>
<td>f. Seminar Presentations (title, department):</td>
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<tr>
<td>g. New areas of research or technical expertise acquired in past year:</td>
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</tbody>
</table>

1. Advisor comments/suggestions – include guidance if adequate progress is being made; identify strengths and areas needing improvement.

2. Research and Other Training Plans (for the Upcoming Year)

a. Research project goals (brief paragraph):

b. Anticipated publications (indicate projected titles):

c. Anticipated meeting or workshop attendance:

d. Fellowship or other funding applications planned (indicate name of award):
e. Other professional training (course work, teaching activity):

### 2. Advisor comments
- Include input on realistic research goals to achieve in a reasonable time frame; include comments on feasibility and prioritizing.

### 3. Teaching Activity (Progress Review)

a. Oversight of graduate, undergraduate, or summer students (name, academic level, project title):

b. Course lectures (department, course name) or lab sections (section title, supervised/unsupervised):

### 3. Advisor comments
- Include guidance to help in identifying teaching opportunities; note if adequate progress is being made; identify strengths and areas needing improvement.

### 4. Other Professional Activities (Progress Review)

a. Committee or other service activity (indicate if you held an office):

b. Other activities (community, etc.) with professional relevance:

### 4. Advisor comments
- Include guidance on collegiality and contributing service while ensuring commitment to scholarly activity.

### Part 5. Career Goals (for the Upcoming Year)

a. Current career goal(s):
   1)
   2)

b. What further research activity or other training is needed before graduation?

c. When do you plan to search for post-doctoral/job search?
5. Advisor comments – discuss career options and offer guidance on networking to assist in achieving his/her goals; identify other contacts who can help in this effort.
Sections below to be completed by Advisor/Dissertation Committee
Date of committee meeting:

### Ph.D. Committee Evaluation of Student Progress

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<tr>
<td>Interview skills</td>
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</table>
PhD committee comments on student progress –

<table>
<thead>
<tr>
<th>Committee Member</th>
<th>Exceptional</th>
<th>Satisfactory</th>
<th>Below Average</th>
<th>Unsatisfactory</th>
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<tbody>
<tr>
<td>1. (Chair).</td>
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<td>6. (Optional member)</td>
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</table>
FORM C: STUDENT TEACHING EVALUATION

Department of Microbiology and Immunology

Student Name         Date

Course Coordinator

Course

Approximate Number of Students:

    Lecture:
    Lab:

Duties for the Teaching Assistant:

    For Lecture:

    For Lab:

Performance level:

<table>
<thead>
<tr>
<th>Student Performance</th>
<th>Excellent</th>
<th>Good</th>
<th>Adequate</th>
<th>Inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of material</td>
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<tr>
<td>Preparation of material</td>
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<tr>
<td>Lecture performance (NA if none given)</td>
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<tr>
<td>Ability to facilitate student learning</td>
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<tr>
<td>Ability to function independently</td>
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<tr>
<td>Overall aid to the course instructor(s)</td>
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</tbody>
</table>

Additional Evaluation Comments:

Suggestions to Improve Performance:
Instructions for Microbiology Annual Progress Report and IDP

... Students complete areas in red

Step 1. Conduct a Self-Assessment
- Assess your skills, strengths and areas which need development. Formal assessment tools can be helpful.
- Take a realistic look at your current abilities. This is a critical part of career planning. Ask your peers, mentors, family and friends what they see as your strengths and your development needs.
- Outline your long-term career objectives. Ask yourself: − What type of work would I like to be doing?
  − Where would I like to be in an organization?
  − What is important to me in a career?

Step 2. Survey Opportunities with Mentor
- Identify career opportunities and select from those that interest you.
- Identify developmental needs by comparing current skills and strengths with those needed for your career choice.
- Prioritize your developmental areas and discuss with your mentor how these should be addressed.

Step 3. Write an IDP
The IDP maps out the general path you want to take and helps match skills and strengths to your career choices. It is a changing document, since needs and goals will almost certainly evolve over time as a graduate student. The aim is to build upon current strengths and skills by identifying areas for development and providing a way to address these.
The specific objectives of a typical IDP are:
  - Establish effective benchmarks and target dates for the duration of your graduate training.
  - Identify specific skills and strengths that you need to develop (based on discussions with your mentor).
  - Define the approaches to obtain the specific skills and strengths (e.g., courses, technical skills, teaching, supervision) together with anticipated time frames.
  - Discuss your draft IDP with your mentor.
  - Revise the IDP as appropriate (e.g., annually).

Step 4. Implement Your Plan
The plan is just the beginning of the career development process and serves as the road map. Now it’s time to take action!
- Put your plan into action.
- Revise and modify the plan as necessary. The plan is not cast in concrete; it must be modified as circumstances and goals change. The challenge of implementation is to remain flexible and open to change.
- Review the plan with your mentor regularly. Revise the plan regularly on the basis of these

... Advisor and Student work together to complete areas in blue

Step 1. Become familiar with available opportunities
- By virtue of your experience you should already have knowledge of some career opportunities.
- But you may want to familiarize yourself with other career opportunities and trends in job opportunities.
- Refer to sources such as National Research Council reports and Science career reviews; see also Resources: Career Opportunities at the end of this document.

Step 2. Discuss opportunities with postdoctoral
• This needs to be a private, scheduled meeting distinct from regular research-specific meetings.
• There should be adequate time set aside for an open and honest discussion.

Step 3. Review IDP and help revise
• Provide honest feedback, both positive and negative, to help graduate students set realistic goals.
• Agree on a development plan that will allow graduate students be productive in their research and adequately prepare them for their chosen career.

Step 4. Establish regular review of progress
• The mentor should meet at regular intervals with the student to assess progress, expectations and changing goals.
• On at least an annual basis, the mentor should conduct a performance review designed to analyze what has been accomplished and what needs to be done.
• A written review should be included to objectively document accomplishments.

... Advisor and PhD committee complete areas in green

Establish regular review of progress
• On at least an annual basis, the committee should conduct a performance review designed to analyze what has been accomplished and what needs to be done.
• Provide a written review to objectively document accomplishments and plans for upcoming year