Microbiology

Graduate Program Guidelines

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Table of Contents

Responsibilities of Graduate Policy and Advising Committee

The Graduate Policy and Advising Committee is chaired by the Departmental Graduate Program Coordinator and includes one or two additional faculty members. The Committee is responsible for reviewing and updating the graduate curriculum and these guidelines. During the course of a graduate student's career, the Committee provides advice and mentoring concerning prerequisites and coursework, lab rotations, exams, NSF fellowships and NIH training grants, low scholarship issues, and any areas of concern that might arise. The Chair of the Committee will preside over the rotation talks given by the first year students and oversee the annual graduate student review by the training faculty held in June of each year. See the table below for a summary of the advising schedule for each year of graduate school. Additional resources for graduate students can be found at the Graduate School website (http://www.grad.washington.edu/) and on the Microbiology Departmental Website (https://microbiology.washington.edu/)

Summary of Graduate Student Advising Schedule			
First year students	**Second year students**	**Third year students**	**Fourth year +**
Before beginning of Autumn Quarter, group workshops on choosing classes and rotations. In the middle of Autumn Quarter, attend faculty-led workshop to discuss how to prepare an NSF fellowship or NIH training grant application. Individual course and rotation advising as needed.	Beginning of Autumn Quarter, meet as a group with Policy and Advising Committee to discuss procedures for choosing a committee and selecting a topic for the Topic Qualifying Exam to be completed by May 15.	Beginning of Autumn, Quarter, meet as a group with Policy and Advising Committee to discuss the format and procedures for the written proposal and oral exam components of the general exam to be completed by the end of Winter Quarter.	Meet at least annually with Ph.D. thesis committee to review progress and individual development plan (IDP).

Initial Advising and Workshops

In the two weeks before classes start, first year students attend a series of required workshops (Microbiology orientation, Research Assistant (RA) workshop, teaching assistant (TA) orientation, safety seminar, etc.). The group of incoming students will also meet as a group with a faculty/student advising committee to discuss their course options for the upcoming year. See "Graduate Curriculum Requirements for the PhD" for requirements and recommended courses. Prior to this meeting, the students should review the course requirements and prepare a tentative plan. Registration for classes should be completed prior to the first day of classes. Courses may be added or dropped within the first week of the quarter without a financial penalty. Keep in mind the requirements of training grants for specific classes (see "Support" below for more information about training grants).

Laboratory Rotations

Graduate students rotate through three laboratories during their first year (four if they do an early rotation in the summer prior to the first year). It is important to note that participation in a rotation does not guarantee that there will be funding or space within the lab for thesis research. Each rotation lasts one quarter (registered as Microm 500). The primary purpose of the rotations is to acquaint the students with faculty members and their labs in order to provide a basis for choosing an adviser for their Ph.D. thesis research. At

the end of each rotation, the students will give a 15-minute rotation report to the Department in a mini-symposium during finals week. The faculty supervisor will write a brief evaluation of the student's performance during his/her rotation to be placed in the student's file. First year students are encouraged to meet individually with the Graduate Policy and Advising Committee as needed to discuss their academic progress, rotations, and future plans.

Choosing Laboratory Rotations

This is your opportunity to have three different laboratory experiences, and you will be expected to join one of the three laboratories that you rotate in for your thesis research. The first year is your time to explore. Feel free to contact faculty members with whom you are interested in rotating as soon as possible. You do not need to wait for orientation or the beginning of the academic year. There are several ways to help you make informed choices. First, you can read about faculty research interests on the Departmental Website (https://microbiology.washington.edu/faculty/teaching). All of the faculty who are approved to take Microbiology Graduate students are listed under "Graduate Teaching Faculty" on this site. Some of the faculty have indicated specific quarters that are open for rotations here: https://microbiology.washington.edu/grad/lab-rotations. Second, the Department holds a research retreat prior to the beginning of Autumn Quarter. This event is both a forum for faculty and members of their groups to discuss recent research developments and an opportunity for you to interact with faculty in whose labs you are interested in rotating. Third, a series of bi-weekly meetings (Microm 599) will be set up during Autumn Quarter at which the first year students will hear research presentations by faculty members (two per meeting). These meetings are designed to provide an overview of the research projects in each lab and will provide a basis for making rotation decisions for the Winter and Spring Quarters. Fourth, you should contact current students (see https://microbiology.washington.edu/grad/students) who have joined laboratories in which you are interested. Many of our faculty are also part of the MCB program (http://depts.washington.edu/mcb/), and MCB students are another source of perspective.

Choosing an Adviser

The choice of a thesis adviser is obviously an important one and is worthy of considerable care and thought both during and after the rotations. A guide to obtaining good mentoring as a graduate student is available online from the Graduate School (http://grad.uw.edu/for-students-and-post-docs/core-programs/mentoring/mentoring-guides-for-students/). It should be emphasized that the selection of an adviser depends on numerous factors and is not a unilateral decision on either the student's or faculty member's part. The first year students should plan to discuss thesis research opportunities and available funding with those faculty members with whom they rotate and who are doing work in their areas of interest. Students should meet with potential faculty thesis advisers on several occasions to explore the kind of research projects available and to get a sense for the way the faculty member approaches research problems and mentoring. First year students should plan to **choose their thesis adviser in the last three weeks of Spring quarter**. Although the possibility of joining the lab should be discussed during each rotation, no commitments are to be made by either the students or the faculty before this time. In exceptional circumstances, a student might choose to rotate a fourth time in the summer following the first year.

Support

Most graduate students are supported from Departmental funds as Research Assistants (RAs) in their first year. In their first or second year, all eligible students should apply for an NSF fellowship. Note that recent changes to NSF Fellowship rules allow only one application from a graduate student to be submitted in either the first or second year of graduate school. In the Spring Quarter of the second year, eligible students are strongly encouraged to apply for a position on the Cell and Molecular Biology (CMB) training grant (http://depts.washington.edu/mcb/training-grant). Note that first year students are eligible to apply if they are members of an Under-Represented Minority (URM) in the sciences. Additional training grants are listed here (http://blogs.uw.edu/tgrants/graduate-students/) and solicit applications via email to faculty and students, often in the spring. Other opportunities for funding include NIH Individual Graduate Fellowships (F31) and support from foundations. A partial listing of organizations that fund microbiology research is here (https://microbiology.washington.edu/research/resources-researchers).

After the first year, all students are supported either as an RA on their adviser's research grant, as a trainee on a training grant, or as an NSF fellow. If a training grant or fellowship stipend provides a lower salary than the designated Departmental RA rate, the stipend will be supplemented to the standard RA rate from research grants. In some cases, students benefit from fellowship and training grant stipends that exceed the Departmental RA rate.

Subject to the availability of funds and continued satisfactory progress in the program, Ph.D. students can expect financial support from Departmental resources for a period of up to six years. After six years, students may be supported from research grants at their adviser's discretion.

All graduate students are eligible for the Graduate Appointee Insurance Program, which provides medical, dental, and vision coverage. Enrollment is in September (http://hr.uw.edu/benefits/health-insurance/graduate-appointees-health-insurance/).

Teaching

Developing good teaching skills is an important part of graduate training. All students are required to TA two laboratory courses in Microbiology. Generally, students teach in the Spring Quarter of their first year and one quarter in their second year, but other arrangements are possible so long as the two-quarter teaching requirement is met by the end of the second year. The Lecturer or other faculty member responsible for the laboratory course will prepare a written evaluation of the student's teaching performance to be placed in the student's file. Besides the two-quarter laboratory teaching requirement, all students are required to present at least two lectures in an undergraduate course, preferably in their third or fourth years. Arrangements for giving these lectures can be made by contacting individual course directors. For example, this requirement can be fulfilled by presenting lectures in the undergraduate methods course (e.g. Microm 431, see Mark Chandler). See (https://microbiology.washington.edu/undergrad/major-course-requirements) for a list of undergraduate Microbiology courses.

Seminars

All graduate students are required to sign up for and attend Journal Club (Microm 522) and the Departmental seminars on Tuesdays at 4:00 (Microm 520) throughout the entirety of their graduate education. Journal club provides the opportunity to practice oral scientific presentations and get feedback from faculty members. Additionally, journal club helps build critical analytical skills that assist in evaluating written literature. Students at FHCRC or Rosen may choose to attend seminars at either the UW or FHCRC to fulfill the seminar requirement. Graduate students are not scheduled to present papers or data at Journal Club until their second year but should begin attending Journal Club in their first year.

Training in Responsible Conduct of Research

All graduate students are required to be instructed in the responsible conduct of research (bioethics). This requirement can be fulfilled either by taking the "Ethics 101" course administered by the Biochemistry Department in the Winter Quarter of their first or second year (register for BIOC 533) or by attending 5 lectures and 3 small group discussions in the Biomedical Research Integrity (BRI) series offered annually in the summer by the Department of Bioethics and Humanities (http://depts.washington.edu/uwbri/front). For those students who are awarded a position on the CMB training grant, ONLY the BRI series meets the bioethics requirement for the training grant. However, this requirement can be filled if the BRI courses are taken before the student is funded by the training grant. Other training grants may accept either course at the discretion of the PI or steering committee of the grant.

Ph.D. Supervisory Committee

A well-balanced committee is of tremendous benefit to the students and their advisers. By the end of Autumn Quarter of the second year, a five person Ph.D. Supervisory Committee is appointed as follows:

1) Chair (Adviser) must be Microbiology Graduate Teaching Faculty*
2) Member Microbiology Graduate Teaching Faculty*
3) Member Microbiology Graduate Teaching Faculty*
4) Member Microbiology Graduate Teaching Faculty or Faculty member outside of the department
5) Graduate School Representative (GSR) - cannot have a Primary, Joint, or Affiliate appointment in the Microbiology Department but can have an Adjunct Appointment (http://grad.uw.edu/policies-procedures/doctoral-degree-policies/graduate-school-representative-gsr-eligibility/)

*At least one, and preferably two, members of the committee (including the Adviser) must be Primary or Joint members of the Department of Microbiology (see Departmental website for a list of these faculty members).

The composition of the committee, including a recommendation for the GSR, is determined by the student and her/his adviser with final approval by the Graduate Policy and Advising Committee. The student should forward his/her suggestions for the composition of the Supervisory Committee to the chair of the Graduate Policy and Advising Committee by the end of Autumn Quarter of the second year.

Vacation and Leaves of Absence

The Microbiology Department adheres to the policies stated in the UW/UAW Union contract (http://hr.uw.edu/labor/unions/uaw/contract?redirect=contract/preamble.html). Graduate students are entitled to four weeks (20 business days) of vacation during a 12-month academic period. "Vacation time off shall be taken during academic quarter breaks or as otherwise mutually agreed to by the ASE (student) and his/her supervisor" (Article 31 of contract). Importantly, students should discuss their vacation plans with their advisers well in advance of the proposed time off.

Article 16 of the Union contract spells out the policies for leaves resulting from personal illness or disability, or for the care of a family member or childbirth. In brief, students are entitled to paid leave for illnesses of 7 days per 12-month academic year and unpaid leave for up to 12 weeks for illness or childbirth.

Under unusual circumstances, a student who is in good academic standing and making normal progress in research may apply for an unpaid leave of absence from graduate school for up to a year, subject to approval by the student's mentor and the Graduate Program Coordinator. The student may re-enroll in the program at any time during the leave period. It should be understood that during such an absence, other members of the lab may continue the student's research and upon returning, the student will likely have to redefine her/his research project.

Individual Development Plan (IDP)

An IDP is a self-assessment that will help trainees define and pursue their short- and long-term career goals. The Department of Microbiology requires that all students complete an IDP, in consultation with their thesis adviser, and discuss the IDP annually with their Ph.D. Supervisory Committee. This requirement is for two reasons: First, NIH now requires that all graduate students and postdoctoral fellows supported on an NIH grant complete an IDP, which will be a required part of Progress Reports. Second, we want to ensure that our students have thought about their future plans and receive training and have access to resources that will prepare them for diverse career paths. There is no required format for the IDP, although a suggested Long Form and Short Form IDP are attached as guides (see Appendices 5A and 5B). Once the annual IDP has been completed, a copy should be forwarded to the Graduate Student Adviser for inclusion in the student's file. The IDP should also be sent to the Ph.D. Supervisory Committee with other written materials before each meeting.

Guidelines for Ph.D. Thesis Supervisory Committee Meetings

Research by its very nature is not always predictable and cannot be rigidly programmed. In addition, it is not always possible to anticipate potential problems at the outset. Under normal circumstances, a student will complete all of the requirements for the Ph.D. degree in 5-6 years. Below is a general series of guidelines to provide both students and faculty with a set of benchmarks against which student progress can be measured:

Second year

Last Day of Autumn Quarter (mid-December) – deadline for submitting suggestions for the composition of the Ph.D. Supervisory Committee to the chair of the Graduate Policy and Advising Committee

January 31 – deadline for scheduling a date and time for the Topic Exam with the Ph.D. Supervisory Committee. The exam must take place on or before May 15. Doodle (doodle.com) polls or similar services facilitate scheduling. The agreed upon exam date should be communicated to the chair of the Graduate Policy and Advising Committee as soon as it is confirmed.

6 weeks prior to the Topic Exam – deadline to submit Topic Exam proposals to the chair of the Graduate Policy and Advising Committee (see Appendix 1 below).

May 15 – deadline for completion of the Topic Exam. See Appendix 1 for format.

Third Year

Last Day of Autumn Quarter (mid-December) – deadline for scheduling a meeting for the General Exam. Doodle (doodle.com) polls or similar services facilitate scheduling. The student must enter the date, time, and location of the exam on MyGrad (https://grad.uw.edu/for-students-and-post-docs/mygrad-program/) under "Schedule a doctoral general or final exam". Once this is completed, inform the Graduate Program Adviser so that the Department can officially approve the date.

Last Day of Winter Quarter (mid-March) – deadline for completion of the General Exam. See Appendices 2 and 3 for format.

Fourth and Fifth years

At least one meeting with the Ph.D. Supervisory Committee is required in every academic year in graduate school beginning in Year 2. This requirement is fulfilled in Year 2 by the meeting for the Topics Exam and in Year 3 by the meeting for the General Exam. In Year 4 and subsequent years, the time of year in which the meeting occurs is at the discretion of the student and the adviser. The adviser and at least three additional members of the committee should be present. The GSR is not required to attend though should be invited. It is the responsibility of both the student and adviser to see that the annual meetings are scheduled. Note that depending on progress, more than one meeting per year may be suggested by the Ph.D. Supervisory Committee.

One week prior to each meeting, the student will provide the committee with a 2-3 page written progress report and a copy of their most recent IDP. This concise report should include progress since the previous meeting, news of publications or anticipated timelines for publications, and a summary of plans for the next year. Students will receive much better guidance if the committee is aware of what will be presented at the meeting in advance.

The IDP will be discussed briefly at the beginning of each committee meeting. At the end of the meeting, the committee should meet briefly with the student while the adviser is out of the room to provide an opportunity for the student to convey any confidential concerns pertaining to mentoring. Similarly, the committee should meet briefly with the adviser while the student is out of the room to inform the committee of any concerns. Any problems with progress towards completion of the thesis research should be addressed during these annual meetings. If progress is marginal, the committee should spell out what must be accomplished over a defined time frame for the student to avoid probation (possibly followed by final probation) and/or dismissal with a Master's degree.

If the student plans to finish in 3-6 months following a committee meeting, he/she should also provide an outline of the proposed thesis and seek approval from the committee to begin writing the thesis. The timeline for completion of the thesis and for the Final Exam (thesis defense) should be presented. Approval of the committee is required prior to the writing of the thesis. If additional experiments are deemed necessary by the committee, this is the time to inform the student, not at the end of the Final Exam. Although the expectation is that a student's thesis research will be published in 2-3 (or more) peer-reviewed papers, the formal requirement of the Microbiology graduate program is that the student be the first author on at least one paper that is published (or in press) in a refereed journal. See Appendix 6 and below for procedures related to the Final Exam and preparation of the thesis.

After each committee meeting, the adviser will prepare a short report that is distributed to the members of the committee and the student, and a copy is placed in the student's file. It is very important to discuss any problems that have been identified in the report. Unsatisfactory progress may result in the student being placed on probation, which is reported to the Graduate School. If this occurs, the student will receive a letter that clearly defines the expectations of the advisor and the Ph.D. Supervisory Committee. If these expectations are not met after one quarter, probation may be extended, or the student may be placed on final probation. A student on final probation for one quarter who fails to meet the expectations of the advisor and committee will be dismissed.

Sixth year

If the student is still not finished at this point, the Ph.D. Supervisory Committee will consider two alternatives:

a. The student should provide a firm date for the defense and provide a final thesis outline. Unless there are extenuating circumstances, laboratory research should be completed by the end of the summer quarter of the 6th year.
b. In the event that research progress has not been satisfactory, the supervisory committee can place the student on final probation or immediately dismiss the student with a Master's degree (see Appendix 7).

Format for Ph. D. Thesis

As outlined above, a proposed outline of the thesis must be reviewed and approved by the Ph.D. Supervisory Committee prior to the beginning of writing. The typical Ph.D. thesis is organized into the following chapters: Introduction (overview of the field and rationale for the thesis research), Materials and Methods, one or more Results chapters (each with its own brief introduction, results, and discussion sections), and a Future Directions chapter. If any of the thesis research has been published, the papers can be reformatted as is, for inclusion in the thesis. Whether the Materials and Methods for several "papers" are collected into one chapter or left in each "paper" chapter is a matter of personal choice, but often it is desirable to place all of the methodological information in one chapter to avoid excess redundancy. **In the event that a published paper contains work carried out by another researcher, only the experiments done by the student should be included in the thesis.** For continuity, a summary of related work done by others may be included with proper citations.

See Graduate School guidelines and Appendix 6 for the proper format of the Electronic Thesis or Dissertation (http://grad.uw.edu/for-students-and-post-docs/thesisdissertation/). The format of the front matter is specified. The remainder of the thesis should be prepared

with one-inch margins using Arial 11 font. Figures should prepared in the same way as for journal publication and be included in the text near the point where they are cited and with an accompanying figure legend. Figures can be presented singly on a separate page or embedded within the text but if included within the text the size should be adjusted so that the data are clearly visible. During the preparation of the thesis and prior to final submission, the student's adviser should be consulted concerning overall style and presentation. The adviser's signature on the submitted copy affirms that she/he not only approves the content, but also the style of the thesis.

Final Exam

For the Final Exam (thesis defense), the student presents a public seminar on her/his Ph.D. thesis research. The student's adviser, the GSR, and at least two additional members of the Ph.D. Supervisory Committee must be present at the Final Exam. At the end of the seminar, the Ph.D. Supervisory Committee and the public are invited to ask questions. It is the prerogative of the Committee whether or not they continue to question the student in private. After the Final Exam, the student submits the completed thesis to the Graduate School. See Appendix 6 for more information.

Appendix 1: Topic Exam

Purpose

The objectives of the Topic Qualifying Exam are for the student (i) to gain an understanding of a topic area distinct from his or her thesis research, (ii) to present a critical written review of previous work and devise a logical plan for future research directions in the topic area, and (iii) to effectively present the topic and respond to questions in an oral setting. Additional benefits include an introduction to the student of how the Ph.D. Supervisory Committee functions as a group and a chance for the Committee to identify areas of concern that can be improved for the general exam.

Procedures

In preparation for the topic exam in Spring Quarter, second year students should form their Ph.D. Supervisory Committee by the last day of Autumn Quarter. Once the committee composition is approved, the student is encouraged to contact the committee to schedule a date and time for the Topics Exam. **Scheduling must be complete by January 31**, and the agreed upon exam date should be communicated to the chair of the Graduate Policy and Advising Committee as soon as it is confirmed. The exam must take place on or before May 15. Exceptions to this deadline are dependent upon petitioning the Graduate Policy and Advising Committee jointly by the student and adviser no later than January 31 and are at the discretion of the committee. The following deadlines are relative to the actual exam date for each student:

1) **Six weeks prior to the exam date:** Deadline to submit two topic proposals to the chair of the Graduate Policy and Advising Committee. For each proposed topic, provide a title, a one-paragraph statement briefly outlining the focus for the proposed topic, and a brief explanation as to why the topic choice is outside the student's thesis topic area. Also include two recent references that serve as the basis for the topic to be explored. It is not necessary at this point to indicate the proposed future directions of the proposal.

   What constitutes an acceptable Topic? Since one of the goals of this exercise is for you to explore and learn about an “off topic” area outside of the expertise of your lab and the focus of your thesis project, you should consider other areas of microbiology that you find intriguing. But, “off topic” need not be completely far afield. Virology students can still propose papers on viruses, and bacteriology students can still proposes papers on bacteria. However, pick a different organism and a different aspect of the biology of the organism than is the focus of your thesis research. In many cases, this experience will stimulate interest in a field that you may continue to follow or in which you may work in the future. You may also learn about techniques or approaches in another field that will bring a fresh perspective to your thesis work.

   How long should you spend looking for Topics? You can be thinking about ideas for this exercise throughout your rotations and coursework in your first year and in the beginning of your second year. A significant amount of time dedicated exclusively to looking for topics is unwarranted. Although the goal is for you to come up with the proposal topic yourself, seek advice from your thesis adviser and peers when vetting topics to make sure that the area is distinct from your thesis work and that what you learn is likely to be of use to your general knowledge and development as a microbiologist.

2) **Four weeks prior to the exam date:** The Graduate Policy and Advising Committee will either approve both topics (in which case the student can choose) or select one of the two.

   The Committee will evaluate the proposals upon submission. If there is a question about the suitability of the proposed topics, the Committee may request clarifications, modifications, or revisions in time to meet this deadline. If needed, the Committee may confer with the thesis adviser to make this determination.

   In the case that the proposal is significantly outside of the expertise of the Ph.D. Supervisory Committee, the Graduate Policy and Advising Committee may suggest that an additional faculty member who is an expert in the topic area be recruited for the exam. Since the exam date will already be set, an outside expert may not be available. However, a good faith effort on the part of the student to schedule an outside expert from a list of names provided by the Committee is required.

3) **Three days prior to the exam date:** The student will distribute a copy of their most recent IDP and the written component of the exam to all of the Ph.D. Supervisory Committee members. The document must be written in 11 point font or larger, single-spaced, with half inch margins on all sides on standard letter paper. Recommended fonts are Arial, Helvetica, Palatino Linotype, or Georgia. Include page numbers on the bottom and a header with your name and the date of the exam. The document consists of 3 sections totaling no more than 4 pages. A page of references and an (optional) additional page of figures (with figure legends) may be included that do not count against the 4 page limit. The format is:

   Section 1 (1 page): Briefly describe current knowledge about the subject of your proposal and the gap in knowledge that your proposal will address. State the objective of the proposal and how it will address the gap in knowledge. State the central hypothesis and provide a brief description of one or two specific aims to address the hypothesis. End with expected outcomes and how your proposal will impact the field. This is equivalent to the “Specific Aims” page of an NIH grant application. Aim for a scope of work that could be completed in approximately 2 or 3 years. You may refer to online guidance for tips on writing an effective “Specific Aims” page.
   Section 2 (1 page): The current state of the field based on selected results from 2 or 3 key recent papers. Think of this as your preliminary data.
   Section 3 (1-2 pages): A research plan for each Aim. Include a brief rationale, experimental approaches, alternative approaches, and expected outcomes. You should provide sufficient information to convey the logic behind the approach and its feasibility without going into experimental detail.

   How long should you spend on Topics? For the first two weeks after your topic is approved, think about hypotheses and Aims. Read a little bit more and mull over some ideas. At this point, you should still be 100% engaged in lab activities. Devoting almost full time effort to the proposal is only acceptable in the last two weeks before the exam. Inform your adviser of your plans, as he/she may want at least partial effort in the lab even at this point.

4) **The Oral Component of the Exam**: The exam is administered by the student's Ph.D. Supervisory Committee and must take place on or before May 15. The adviser, at least three additional members of the committee, and the outside expert, if required, must be present. The GSR is not required to attend though should be invited. A member of the committee other than the student's adviser will be chosen as the chairperson of the meeting. The adviser does not participate in the exam. The oral presentation should last from 30 to 45 minutes, with allowances for interruptions, followed by questions. It should be an expanded version of the written document, which will allow a more in-depth discussion of key elements of the proposal. Questions from the committee generally originate with the material in the proposal; however, a line of questioning may delve into basic knowledge from course work. The entire exam should not exceed 90 minutes.

Evaluation

The student will be evaluated on the organization of the presentation, critical analysis of the 2-3 papers discussed in depth, clarity of the discussion of experiments, and the effectiveness of the presentation style. While a highly developed and innovative research plan section is desirable, it is recognized that this is still a formative area for a second year student. Feedback to the student will be provided immediately after the exam by the examining committee. If the performance is considered to be unsatisfactory, the committee may require the student to repeat some or all aspects of the examination. Successful completion of the Topic exam is a prerequisite for the General Exam. The chairperson will provide a written evaluation that will be distributed to the student and other members of the committee and placed in the student's file.

Appendix 2: General Exam

Purpose

The objectives of the General Examination are for the student to (i) demonstrate mastery of the field in which they intend to conduct their thesis work, (ii) demonstrate general knowledge of microbiology and other disciplines (e.g., immunology, biochemistry, genetics) relevant to their thesis project, (iii) present a written plan for future research directions in the form of an R21 grant application, and (iv) to effectively present their research proposal and respond to questions in an oral setting.

Scheduling

The oral component of the General Examination must occur by the last day of Winter Quarter (mid-March). Accordingly, the meeting must be scheduled by the last day of Autumn Quarter (mid-December). Doodle (doodle.com) polls or similar services facilitate scheduling. The student's adviser, the GSR, and at least two additional members of the Ph.D. Supervisory Committee must be present. The student must enter the date, time, and location of the exam on MyGrad (https://grad.uw.edu/for-students-and-post-docs/mygrad-program/) under "Schedule a doctoral general or final exam". Once this is completed, inform the Graduate Program Adviser so that the Department can officially approve the date. **The date must be officially approved in advance to obtain official credit for the exam from the Graduate School.** Exceptions to this deadline are dependent upon petitioning the Ph.D. Supervisory Committee jointly by the student and adviser no later than the last day of Autumn Quarter (mid-December) and are at the discretion of the committee.

Format of the Written Research Proposal

The written research proposal on the student's thesis work should follow the format specified for an NIH R21 grant application. There is a single "Specific Aims" page. The "Research Strategy" includes the "Significance, Innovation, and Approach" subsections and can be no more than 6 pages in length**.** References are not included in the 6-page limit; however, unlike for the Topic Exam, figures must be embedded in the text and count towards the page limit. The document must be written in 11 point font or larger, single-spaced, with half inch margins on all sides on standard letter paper. Recommended fonts are Arial, Helvetica, Palatino Linotype, or Georgia. Include page numbers on the bottom and a header with your name and the date of the exam.

This proposal should be prepared in advance of the oral component of the general exam, which will take place in the Winter Quarter of the third year. See Appendix 3 for a set of guidelines for writing the proposal. The student should present a draft of the proposal to her/his adviser at least three weeks prior to the oral exam. The adviser will critique the draft proposal with the student and indicate any sections that need rewriting. However, the adviser will not participate in a substantive way in the writing process. One week prior to the oral exam, the final version of the proposal will be given to each member of the student's Ph.D. Supervisory Committee.

Format for the oral exam

1. Prior to beginning the oral exam and in the absence of the student, the adviser will review the student's academic record and give the Supervisory Committee members a written evaluation of the student's research performance and potential (see attached form, Appendix 4). The adviser should have discussed the evaluation with the student prior to the exam. The evaluation should include an overall assessment that includes

the student's effort level, creativity, independence, lab techniques, ability to design and execute experiments, and ability to communicate.

2. The oral exam is chaired by a member of the Ph.D. Supervisory Committee other than the adviser or the GSR. The adviser will not examine the student but will be present and available for comment or clarification when needed.
3. The exam begins with a 30-minute oral presentation of the research proposal by the student summarizing his/her research progress and indicating future directions of the research in relation to the proposed Specific Aims. Although the length of the presentation is limited to a maximum of 30 minutes, an allowance will be made for interruptions by committee members who ask clarification-type questions. Following the oral presentation, members of the Ph.D. Supervisory Committee other than the adviser will examine the student. Although the research proposal will provide the starting point for the oral exam, the questioning can extend into related topics, including experimental techniques. The meeting may last up to three hours total.

Final evaluation

At the end of the oral exam, both the student and the student's adviser will leave the room. This allows the committee to discuss the performance of the student in the absence of the adviser. The outcome of the general exam will be determined solely by the committee members in the absence of the adviser. At the end of the deliberations, the student's adviser is apprised of the outcome in the absence of the student. Finally the student will be called back into the room and members of the committee will provide feedback to the student on his/her performance.

The decision made at the end of the oral exam is a cumulative one, taking into account the student's performance in all areas since entering graduate school. These include, in the order of relative importance: (1) the performance on the oral exam in the area of the student's research, (2) the quality of the written research proposal, (3) the adviser's written evaluation of research progress and potential, (4) the performance on the Topic Exam, and (5) the performance in course work.

The final decision must be one of the following: Pass, Fail, or Re-examine. If the committee feels deficiencies exist that need to be corrected, the “Re-examine” option must be chosen rather than awarding a “Pass” with stipulations concerning the deficiencies. A "Fail" means the student must leave the Ph.D. program, generally with a Non-thesis Master's degree. A written summary of the Committee’s decision prepared by the member of the committee who chairs the exam will be placed in the student’s file.

Appendix 3: Suggestions for Preparation of Research Proposals for General Exam (excerpts from NIH Guidelines with modifications)

Developing the Hypotheses

- A good grant application is driven by a strong hypothesis (or hypotheses). The hypothesis is the foundation of your application. Make sure it's solid. It must be important to the field, and you must have a means of testing it.
- Provide a rationale for the hypothesis. Make sure it's based on current scientific literature. Consider alternative hypotheses.
- State your hypothesis in both the specific aims section of the research plan and the abstract.

Specific Aims

- Your specific aims are the objectives of your research project, what you want to accomplish. The project aims should be driven by the hypothesis you set out to test or the questions you are asking. Make sure they are highly focused.
- Begin this section by stating the general purpose or major objectives of your research. Be sure all objectives relate directly to the hypothesis you are setting out to test. If you have more than one hypothesis, state specific aims for each one (or a specific aim may address how you would distinguish two alternative hypotheses). Keep in mind your research methods will relate directly to the aims you have described.
- State alternatives to your hypothesis and explain why you chose the one (or more) you selected or how you will distinguish between alternative hypotheses.
- Choose objectives that can be easily assessed by the reviewers. Do not confuse specific aims with long-term goals.

Research Strategy

- **Significance.** Does the project address an important problem or a critical barrier to progress in the field? Is there a strong scientific premise for the project? If the aims of the project are achieved, how will scientific knowledge, technical capability, and/or clinical practice be improved? How will successful completion of the aims change the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field? When you describe your project's significance, put it in the context of 1) the state of your field, 2) your long-term research plans, and 3) your preliminary data.
- **Innovation.** Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense? Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?

- **Preliminary Studies.**
  - ⇒ You can either include this information as a subsection of Approach or integrate it into any or all of the three main sections. If you do the latter, be sure to mark the information clearly, for example, with a bold subhead.
  - ⇒ By providing preliminary data, this extremely important section helps build reviewers' confidence that you can handle the technologies, understand the methods, and interpret results.
  - ⇒ Preliminary data should support the hypothesis to be tested and the feasibility of the project.
  - ⇒ Explain how the preliminary results are valid and how early studies will be expanded in scope or size.
  - ⇒ Make sure you interpret results critically. Showing alternative meanings indicates that you've thought the problem through and will be able to meet future challenges.
  - ⇒ Preliminary data may consist of your own publications, publications of others, unpublished data from your own laboratory or from others, or some combination of these.
  - ⇒ Include manuscripts submitted for publication. Make sure it's clear which data are yours and which are reported by others.
- **Approach**
  - ⇒ Organize this section so each experiment or set of experiments corresponds to one of your specific aims and is stated in the same order. Even holding to this structure, the experiments still must follow a logical sequence. They must have a clear direction or priority, i.e., the experiments should follow from one another and have a clear starting or finishing point.
  - ⇒ You need enough detail to convince reviewers that you understand what you are undertaking and can handle the method.
  - ⇒ Cite a publication that shows you can handle the method where you can, but give more details if you and your team don't have a proven record using the method—and state explicitly why you think you will succeed.
  - ⇒ If space is short, you could also focus on experiments that highlight your expertise or are especially interesting. For experiments that are pedestrian or contracted out, just list the method.
  - ⇒ Consider the possible different outcomes from your experiments and how the results will be interpreted. Be sure to lay out a plan for alternative experiments and approaches in case you get negative or surprising results. Discuss potential pitfalls and how they will be addressed.

Appendix 4: Adviser Evaluation Form for Oral Exam

Evaluate the student in the following areas using an absolute scale of 1 to 5 where the various levels are defined as follows:

1. Truly exceptional (used only rarely)
2. Good to very good
3. Satisfactory, solid, no obvious problems
4. Need for improvement
5. Poor, area needs serious attention

Since a numerical rating system is not likely to be applied uniformly by the entire faculty, it is essential that the adviser provide a one or two sentence explanation for each rating, using the space provided below each category.

1. Ability to design feasible experiments, interpret results, and plan new experiments.	1	2	3	4	5
2. Ability to think and work independently.	1	2	3	4	5
3. Quality of laboratory work and attention to detail.	1	2	3	4	5
4. Level and range of laboratory skills.	1	2	3	4	5
5. Time spent on scientific pursuits	1	2	3	4	5
6. Overall productivity.	1	2	3	4	5

7. Effort and motivation.	1	2	3	4	5
8. Knowledge of current literature.	1	2	3	4	5
9. Writing skills.	1	2	3	4	5
10. Verbal communication skills.	1	2	3	4	5
11. Contribution to overall atmosphere of the laboratory, including helping others with their projects.	1	2	3	4	5
12. Ability to contribute intellectually to to laboratory discussions and group meetings.	1	2	3	4	5

Appendix 5A: CREATING AN INDIVIDUAL DEVELOPMENT PLAN (SHORT FORM)

Making the most of your graduate or postdoctoral experience[1]

Setting goals can help you be more intentional about the experiences you have in your training, and can provide key steps to head you in the right direction. The best goals are **SMART**: **specific, measurable, achievable (actionable), relevant, and timely**. They should also be aspirational, and move beyond merely a "to-do" list that becomes burdensome. Do you have role models? How did they get to where they are? Who do you want to become? Where do you see yourself heading? What experiences will help you get there?

1. **Perform a self-assessment:** What are your current skills, knowledge areas, talents, strengths, and passions and what do you see as your future direction? Think about what kind of contribution you want to make and what kinds of problems you want to solve. The AAAS has an on-line tools to help with self-assessment: http://myidp.sciencecareers.org[2]

2. **Identify areas for growth:** In what areas do you want to grow or develop further over the next year? What are your areas of weakness and what do you need to do to strengthen them? Focus on areas that will help you get where you want to be in the longer term.

3. **Define SMART goals:** In setting goals, consider what is possible, and even what is audacious. What aligns with your vision, values and commitments? If you are searching for areas in which to focus your energies, reflect on your various activities, role models and heroes. What do you wish you knew more about, had the capacity for, or aspire to? What concrete actions and experiences will help you get there? What would you do if you were 10% braver? Where do you get energy and satisfaction in your work and in your life? How can you cultivate more of that?

4. **Choose a mentor:** Choose someone to talk with about your goals and progress on a regular basis. It could be your mentor/supervisor, another faculty member, department chair, or a peer at a more advanced stage. Set up a schedule for these conversations. Being accountable to others can help you stay focused on your goals when new tasks and opportunities arise.

5. **Decide on an assessment timeline:** Identify points in time (once a month? every three months?) to assess your progress on achieving your goals. How will you measure progress? What new goals do you need to set? If you are not making sufficient progress on your goals, why not? Is something getting in the way, or is it the wrong goal for right now? Re-commit to your goal, adjust your strategy, or release your goal and start again if it is not working for you.

6. **Keep your goals visible:** How you manage your goals will be personal. Map out your goals and intentions for the year and post them where you can see them regularly. Keep your goals in your notebook or calendar to check on a weekly basis. Tape them above your desk or lab bench. Send yourself electronic reminders. The important thing is to choose a method that works for you that will motivate you and feel satisfying, and not just be another task on the to-do list.

It may be helpful to consider goals in the three areas below: (each illustrated with examples of goals)

A) Career advancement goals: Choose your graduate committee; schedule your qualifying exam; update your CV; attend a career workshop; explore potential funding sources; join a professional association; get training in the ethical conduct of research.

B) Skill and educational goals: Learn a new lab technique; take a course; mentor a student; prepare an oral presentation (ask to give a lecture for a class, a journal club talk or an extra lab

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[1] Adapted from the UW Graduate School Individual Development Plan.

[2] The AAAS has developed an exceptional and vetted tool for IDPs in the sciences (myIDP). You may want to use this tool for your entire IDP plan. The self-assessment section is excellent and provides a print out of skills and interests that can be used to plan or share with others.

meeting); get feedback; volunteer in a science class at a local school; review a manuscript or grant application.

C) Project goals: Complete a specific set of experiments or analyses; present your work as a poster or talk at a conference; write an abstract, manuscript, or grant; establish a collaboration.

INDIVIDUAL DEVELOPMENT PLAN for Trainee _____ Year _____

Goals:	Why is this goal important to you?	What help do you need to accomplish this goal?[3]	What is your timeline for reaching this goal?[4]
A. Career Advancement Goals			
1.			
2.			
3.			
B. Skill/Educational Goals			
1.			
2.			
3.			
C. Project Goals			
1.			
2.			
3.			

Discussed with Adviser or Mentor: _____ Date: _____

[3] Consider what resources, experiences, and/or activities you will need to help you accomplish your goal.
[4] How will you know when you are have reached this goal or how will you assess your progress toward this goal? If you find it difficult to answer this question, you may need to reframe the goal to be more concrete, specific and/or actionable.

Plan to revisit with Adviser (date or time frame):_____

Signature of Trainee:

Date:

Signature of Mentor:

Date:

APPENDIX 5B: CREATING AN INDIVIDUAL DEVELOPMENT PLAN (LONG FORM)

Making the most of your graduate and postdoctoral experience

An Individual Development Plan (IDP) is required for all graduate students and postdoctoral trainees in the School of Medicine. This requirement complies with recent policies adopted by NIH.

The purpose of the IDP is for each post-doc and graduate student to think about the specific career in science that s/he is preparing for. That career, for instance, might be at a

- research university (similar to the University of Washington, for example),
- a private research institute (similar, perhaps, to the Fred Hutchinson Cancer Research Center),
- a biotechnology or pharmaceutical company
- a federal or state laboratory (perhaps the NIH, CDC, or state public health lab)
- a teaching position at a 2 or 4-year university or college
- a federal regulatory agency (for example, the FDA)

While your individual program is designed to prepare you as a scientist or physician scientist, it is important that you think carefully about your individual career goals and the preparation that would assist you in being successful in that career. It is quite likely that your career success will require more than the ability to design and perform research. Your mentor and other resources at UW and affiliated institutions will be helpful, but you must take primary responsibility for your career preparation.

The most effective way to begin this process is to define your career interest(s) in terms of your desired future occupation, based upon the roles that you might play in the types of institutions listed above. If you find it difficult to answer specifically, you will find workshops and seminars offered at UW and affiliated institutions that can inform you about these occupations. See, for example, the Bioscience Careers website [http://courses.washington.edu/phd/] and the Future Faculty website [http://www.uwmedicine.org/research/resources-for-researchers/events/future-faculty]. Make use of many sources of information, such as the AAAS, your individual scientific association, and the National Postdoctoral Association with information for graduate students and postdocs [http://www.nationalpostdoc.org/].

Once you have an idea of your specific career goals, you will need to consider what it will take to be successful in that career and how you will develop those skills and gain needed experience. You should involve your mentor in helping you define what you need and to help you address those needs. This template includes 1) Acquiring discipline specific knowledge and research skills; 2) Gaining skills in written and oral communications, including teaching; 3) Training in responsible conduct of research; 4) Training in protection of human and animal subjects, laboratory safety; 5) Development of professionalism, management, and leadership skills.

For each goal, identify how you will accomplish the goal and the time by which the goal will be accomplished. No plan exists until the individual steps are defined and a time line is attached. If you can't decide on your preferred career path now, define what you need to know to make the choice and how you will obtain that information and over what period of time. Execute that plan and then develop the actual IDP as your specific career goals become better defined.

Once you have drafted your IDP, meet with your mentor(s) to discuss the draft, and schedule regular meetings to review and assess your progress. Make use of as many mentors as you find helpful – you will find that most people are very willing to help to guide you in understanding your goals and defining what you need to receive from the mentoring relationship.

Your IDP should be considered a living document that will evolve over time as you move through your career training, and perhaps after quarterly or semi-annual meetings with your mentor(s). You may use this template directly or modify it to address your own career development and training needs.

UW School of Medicine Individual Development Plan Template

1. General Information

Mentee:

Primary Mentor:

Training or Degree Program:

Research focus area(s):

Date of Completion of IDP:

Planned schedule for meetings with mentor to evaluate progress:
(e.g. monthly, quarterly, annually)

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2. Career Goals

Identify your existing strengths and the gaps in your knowledge or experience, then think of ways to fill those gaps during your training period.

I. Overall career goal:

II. What do you want to be doing in 10 years? (long-term objectives)

III. What do you want to be doing in 5 years? (medium-term objectives)

IV. What do you want to accomplish in the next year? (short-term goals; be specific)

---

3. Acquiring of Discipline-Specific Knowledge and Research Skills

I. Briefly describe your primary research project (1 paragraph)

II. What specific knowledge do you need to gain to accomplish this project? For each one, describe how you will learn this material (e.g. specific courses, tutorial with mentor, etc)

1.
2.
3.

III. What specific research skills (methods, techniques) do you need to learn to accomplish this project? (For each one, describe how you will learn these skills (e.g.

graduate school or laboratory courses, from other students or postdocs in the research group, collaboration with another lab, etc)

1.
2.
3.

---

4. Gaining skills in oral and written presentation of research findings (talks, posters, writing manuscripts and grant applications).

I. Anticipated oral or poster presentations (list frequency and dates of presentations if possible)

1. Lab meetings/ research team meetings

a.
b.
c.

2. Work in Progress (e.g. presentations to dissertation committees, division/department retreats)

a.
b.
c.

3. National or international meetings (list and provide dates of specific meetings)

a.
b.
c.

II. Anticipated publications (describe anticipated titles/topics of manuscripts and anticipated dates of submission; include both first author and collaborative publications)

1. Anticipated first-author manuscripts

a.
b.
c.

2. Anticipated publications as a collaborator

a.
b.
c.

III. Timeline for submitting applications for funding for predoctoral, postdoctoral, or other training/career development awards (list specific source of potential funding and type of award, with expected submission dates.

1. NIH applications

a.
b.
c.

2. Applications to foundations and other sources

a.
b.
c.

IV. Gaining experience in teaching (list specific teaching opportunities, formal or informal training in didactics)

a.
b.

V. Timeline for planning to move to the next step (e.g. postdoc position or other position for current graduate students; faculty or other position for current postdocs)

1. Key contacts to make

a.
b.
c.

2. Potential sources for letters of reference (cultivate these relationships early).

a.
b.
c.

3. Other actions to facilitate the move to your next position (e.g. job opportunities, introductory letters from mentor)

a.
b.
c.

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5. Training in responsible conduct of research

(Briefly describe plan for training in specific topic areas to include: 1) conflict of interest; 2) data acquisition and ownership; 3) peer review; 4) responsible authorship; 5) research misconduct; 6) researcher/trainee responsibilities; 7) collaborative science)

1. Participation in the UW Biomedical Research Integrity Series (5 lectures; 3 discussion groups annually)

2. Individualized instruction from primary mentor (to include format, subject matter, duration and frequency):

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6. Training in protection of human and animal subjects, and laboratory safety

1. Formal training

2. Training from mentor or other lab members

7. Development of professionalism, leadership, management, and mentorship skills

(Briefly describe how you will learn these skills)

8. Ongoing Mentoring Meetings

1. Frequency of meetings with primary mentor

2. Plan for scheduling these meetings

3. Composition of your mentoring/dissertation committee

4. Frequency of meetings with mentoring/dissertation committee

5. Plan for scheduling these meetings

9. Formal Evaluation

I. Evaluation of Trainee Progress

Review of mentee's progress toward each of the above outlined milestones will occur semi-annually at the trainee's advisery committee meetings; written evaluation will be prepared by mentor and shared with trainee, advisery committee members, and Training Program director on at least an annual basis

II. Evaluation of Mentor

Each trainee will fill out an anonymous evaluation of his/her mentor annually and send to the Training Program Director. This information will be shared with the Program's advisery committee and general concepts for improvement will be shared with all training faculty, to protect trainee anonymity.

Signature of Trainee:

Date:

Signature of Mentor:

Date:

Appendix 6: Guidelines for Preparing the Thesis and Final Exam

We strongly recommend that the Final Exam (thesis defense) occur **no later than two weeks before the end of the quarter**.

1) Establish a 3 member reading committee **five weeks prior to the Final Exam**. Please send the names to the Graduate Program Adviser, who will forward them to the Graduate School for approval.

2) Submit your thesis to the reading committee **four weeks prior to the Final Exam**.

3) Confirm with your committee the day and time that you would like to defend your thesis. Let the Graduate Program Adviser know, and he or she will reserve a room for you. Once the room has been reserved, please schedule a doctoral final exam at the following website: http://www.grad.washington.edu/mygrad/student.htm. This is done at least **three weeks prior to the Final Exam**.

4) Send a picture to the Microbiology Administrative Coordinator, who will use it for your dissertation notice.

5) Information and instructions for the Electronic Thesis or Dissertation submission with checklists, deadlines, forms, and instructions are at: http://grad.uw.edu/for-students-and-post-docs/thesisdissertation/

6) Warrant for the Final Exam: The Graduate Program Adviser will print the Warrant before the exam, and place it in the student's file. The adviser or student can pick up the file a couple of days in advance of the defense. The Warrant must be signed by the Ph.D. Supervisory Committee members who attend the defense. The Committee Chair, GSR, and two other committee members are required to attend. Please return the Warrant to the Graduate Program Adviser promptly after the defense so that it can be submitted to the Graduate School by the last day the quarter.

7) Doctoral Dissertation Reading Committee Approval Form: You must print this form, and it must be signed by your reading committee. You will need to upload a scanned copy of the signed form when you submit your thesis electronically to the Graduate School. Note the when you submit your thesis there is the option to embargo it. This may be wise if the thesis contains unpublished data that you plan to submit for publication.

8) Thesis Copies: The Microbiology Department will pay to have three copies bound. The Budget/Fiscal Operations Supervisor can help students fill out the form to have this done. The copies are distributed in the following manner: 1) student, 2) adviser, 3) department. Students can pay to have extra copies bound.

Appendix 7: General Guidelines for a Non-thesis Master's Degree

Although the Microbiology Department does not admit students specifically into a Master's degree program, occasionally a student will leave the Ph.D. program with a Non-thesis Master's degree. The specific requirements for the Master's degree are determined by a three-person Master's committee composed of the student's research adviser and two additional members of the Microbiology faculty. The student should have fulfilled the course requirements for the Ph.D. degree and will generally have done the usual rotations required of a first year student. Typically the student will carry out research for a minimum of 3 additional quarters and present a 2-3 page written report (or manuscript for publication) to the committee one week prior to an oral presentation of his/her work. A student who does not pass the General Exam will generally have satisfied these requirements and will be granted a Non-thesis Master's degree.