Graduate Student Handbook

2022-2023

Edited December 2022

University of Washington

PATHOBIOLOGY

INTRODUCTION

The faculty and staff would like to take this opportunity to welcome all incoming students to the Interdisciplinary Pathobiology Graduate Program. We hope you are looking forward to a year of exciting opportunities to learn and experience the challenges associated with research. This Handbook has been made available to assist you in answering some of the basic questions regarding the graduate program and administrative services. It is not intended as a substitute for official University publications such as the *University of Washington Handbook* and Graduate School *Memoranda*.

As a discipline, Pathobiology ties together the fundamental concepts of biology, medicine, and public health, particularly as applied to global health issues. The program applies a multidisciplinary approach as well as the latest research technologies to the study of global health problems such as viral, bacterial, and parasitic diseases, as well as other conditions such as cancer. Investigating the mechanisms underlying multifactorial diseases emphasizes the preventive as well as the curative, and a broader view of disease etiology.

The Pathobiology Graduate Program offers research and training programs leading to the Doctor of Philosophy degree. Coursework includes core courses in Pathobiology, with additional courses required in epidemiology, biostatistics, and immunology. Students may also choose electives from other basic medical sciences, such as microbiology, biochemistry, pathology, and genetics. The Program places equal emphasis on research and training for both graduate students and postdoctoral fellows.

The graduate program is geographically dispersed. The business office is located on the 7th Floor of the Hans Rosling Center for Population Health, Room 761B. Faculty offices are at a number of locations around the Seattle area and the UW campus. Faculty are located in the Health Sciences Building, Harborview Medical Center (Research and Training Building and Ninth and Jefferson Building), UW at South Lake Union, Seattle Children's Research Institute, Fred Hutchinson Cancer Center, PAI Life Sciences, Institute for Systems Biology, and Western Fisheries Research Center. Please see the list of faculty research interests in Appendix P.

The administrative home of the Interdisciplinary Program in Pathobiology is the Department of Global Health. The Interim Chair of the Department of Global Health is Dr. Carey Farquhar. The Program is guided by a Steering committee, chaired by Dr. Jennifer Lund, director of the graduate program. Other members include Drs. Rhea Coler, Michael Gale, Tom Hawn, and Donald Sodora. Dr. Farquhar serves *ex officio* on the committee, and Ernie Lefler, the Pathobiology Program Manager, staffs the committee.

Please read and use this book!

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1.0 Course Work

1.1 The PhD Program

Time to completion: ~ 5 years
TOTAL CREDIT REQUIREMENT: 90 CREDITS
MINIMUM: 18 GRADED CREDITS

The Pathobiology Graduate Program has established learning objectives for its doctoral program. Upon completion of the program, the student will be able to:

- Explain and apply a fundamental understanding of basic cellular and molecular processes and techniques important in the application of basic biomedical research to diseases of global public health interest. Specifically, this includes the ability critically analyze the paradigms for control, prevention, and treatment of diseases of global health importance, an understanding of the epidemiology and processes of diseases of national and international importance, an understanding of how biomedical research can approach such diseases, and basic methodologies used in this type of research, including relevant areas of immunology, molecular biology, epidemiology, and biostatistics. Students are also expected to develop familiarity with the major classes of pathogens.
- Conduct independent research leading to the expansion of knowledge of Pathobiology. This includes having the skills to approach an unfamiliar experimental system, and to identify and explore important questions concerning pathogenesis and infection.
- Collect, analyze, interpret, and use data for solving problems in Pathobiology.
- Utilize advanced research approaches and expertise in the area of their research concentration.
- Communicate research findings to scientific audiences through publications and oral presentations.

The course of study outlined below will fulfill University of Washington regulations. In this handbook, those requirements will not be covered exhaustively. Students should consult the Graduate School website and other memoranda concerning those requirements. Ultimately, it is the student's responsibility to ensure that s/he meets the UW and program requirements and proceeds through the program in a timely fashion.

REQUIRED COURSES		CREDITS	GRADED OR C/NC
PABIO 550	Diseases and Issues in Global Health	2	Graded
PABIO 551	Biochemistry and Genetics of Pathogens and Their Hosts	4	Graded
PABIO 552	Cell Biology of Human Pathogens and Disease	4	Graded
PABIO 553	Survival Skills for Scientific Research	2	C/NC
PABIO 580[1]	Pathobiology Seminar	1	C/NC
PABIO 581[2]	Current Literature in Pathobiology	1	C/NC
PABIO 582[2]	Critical Thinking and Research Design in Pathobiology	1.5	C/NC
PABIO 591[2]	Pathobiology Minicourse Series	1	C/NC
PABIO 598	Didactic Pathobiology (teaching)	2-3	C/NC
PABIO 500	Rotation	3	C/NC
PABIO 600	Research	Variable	C/NC
PABIO 800	Doctoral Dissertation	Variable	C/NC
EPI 511[3]	Introduction to Epidemiology	4	Graded
EPI 527[3]	Vaccines	3	Graded
IMMUN 441[4]	Introduction to Immunology	4	Graded
UCONJ 510[5]	Introductory Laboratory Based Biostatistics	2	
HSERV 579[6]	Structural Racism and Public Health	1	C/NC

Notes on Courses for Degree Progress

[1] Students are required to attend Seminar (PABIO 580) every Winter Quarter, and to attend the presentations of dissertation research in the Final Exam of students completing the Pathobiology PhD program. Students in the writing stage of their dissertation are exempted from PABIO 580 for that quarter.

[2] Students are required to enroll in Lit Review (PABIO 581) every Autumn Quarter for the first three years, Critical Thinking (PABIO 582) every Spring Quarter for the first two years, and 3 different minicourses (PABIO 591; offered every Spring Quarter).

[3]Pathobiology students are required to take either Epi 511 or Epi 527 to fullfill the Pathobiology PhD program's epidemiology requirement (or obtain permission from the head of the Pathobiology program to get credit for an epidemiology course elsewhere). Epi 511 is a 4-credit graduate level introductory course that fulfills this requirement. Alternatively, Epi 527 (Vaccine Epidemiology) is a 3-credit graduate level option that focusses on vaccines and can also be used to fulfill this option. However, students who opt to take Epi 527 should be aware that they may need to do remedial introductory work on their own to succeed in this class and that Epi 511 may be a better choice for students who have not gained familiarity with basic concepts in epidemiology in other settings.

[4]Pathobiology students are required to take Immun 441 (Introduction to Immunology) even if they have a strong immunology background. This course is very challenging, broad, and well taught. It is unlikely that even a student with a strong immunology background from another school will find this course too basic. If a student has a very good reason for not taking this course (e.g. they actually took this identical course), they should talk to the Pathobiology Program Director about taking IMMUN 532 (Advanced Immunology) instead. We do not encourage IMMUN 532 (Advanced Immunology) as a routine substitute for IMMUN 441 because of feedback from our students who found that IMMUN 532 typically has a very narrow focus and assumes that a student has already taken IMMUN 537 (Immunological Methods). Note that taking IMMUN 537 along with Pabio 551, Pabio 550, and Pabio 581 will make Autumn Quarter of first year very challenging, but all of the courses provide a strong foundation that helps students succeed with subsequent rotations and courses

[5]Biostatistics Competency: Given the importance of understanding biostatistics, the Pathobiology Program requires students to have formal coursework in biostatistics. To allow for maximum flexibility, this requirement can be fulfilled in a number of ways. Doctoral students must complete one of the items below by the end of the third year to demonstrate competency.

1. UCONJ 510: Introductory Laboratory Based Biostatistics (2 credits, offered in Summer Quarter)*
2. Either BIOST 508: Biostatistical Reasoning in the Health Sciences (4 credits) or BIOST 511: Medical Biometry (4 credits) or BIOST 517: Applied Biostatistics (4 credits)
3. Previous coursework in Biostatistics or Statistics – must be approved by Program Director
4. Alternate approach to be discussed with the Program Director

*If taking UCONJ 510 in summer, students should register for no more than 2 credits total

[6]This course is offered AUT/WIN/SPR quarters – recommended to be taken in the First year of Program. It is best for 1st Year Cohort to **take this course during their Spring Quarter**; however, it can be taken in Winter Quarter if it works with your schedule.

PhD Electives

You must take at least two electives of your choice. Recommended options for elective courses is listed below, however you are not limited to the listed options. Note that PABIO 536 (Bioinformatics) is strongly recommended as an elective for all students. Please consult with your advisor and your committee regarding your selection and schedule of electives. Your Doctoral Supervisory Committee may advise you to take

additional electives. If the latter occurs, this should be documented in your file in the program office. Some electives are more suitable for students with advanced backgrounds. Students should consult a current catalog to verify course offerings. See list of electives on page 10.

Please see below table for a summary of Pathobiology PhD program coursework:

Coursework for the 2022 Incoming Pathology PhD Students

First Year (2022-2023)			
Autumn 2022	**Winter 2023**	**Spring 2023**	**Summer 2023**
PABIO 550: Disease and Issues in Global Health - O. Soge (core course, 2 cr)	PABIO552: Cell Biology of Human Pathogens and Disease, Kevin Hybiske and Steve Polyak (core course, 4 cr)	PABIO 536: Bioinformatics and Gene Sequence Analysis, Shuyi Ma (recommended, 3 cr) [offered every year]	UCONJ 510: Introductory Lab Based Biostatistics (required, 2 cr)
PABIO 551: Biochem and Genetics of Pathogens & Their Hosts - Noah Sather and Andrew McGuire (core course, 4 cr)	PABIO 553: Survival Skills for Scientific Research, Don Sodora (core course, 2 cr)	PABIO 582: Critical Thinking and Research Design, Lorenzo Giacani (take in years 1-2, 1.5 cr)	
PABIO 581: Current Literrature in Pathobiology, Jennifer Lund, (take each year in years 1-3, 1 cr)	PABIO 580: Pabio Seminar, Noah Sather (take until writing your dissertation, 1 cr)	PABIO 591: Mini-courses (take one each year in years 1-3, 1 cr), Mini-courses for 2023: Grant writing (Jairam Lingappa), Dysregulation of innate immune responses to pathogens (Adrian Piloponsky)	
Immun 441: Intro to Immunology (4 cr)*		*HSERV 579 (Structural Racism and Public Health, 1 cr) - Required course, offered AUT/WIN/SPR Quarters - recommended to be taken in your first year of the Program. Plan on registering for this course either Winter or Spring Quarter, it is not recommended to be taken during your first quarter in the program	
Second Year (2023-2024)			
Autumn 2023	**Winter 2024**	**Spring 2024**	**Summer 2024**
EPI 511: Principles of Epidemiology (4 cr) **or** EPI 527: Vaccines (3 credits)	PABIO 580: Pabio seminar (take until writing your dissertation, 1 cr)	PABIO 591: Mini-courses (take one each year in years 1-3, 1 cr)	
PABIO 581: Current Literrature in Pathobiology (take each year in years 1-3, 1 cr)		PABIO 582: Critical Thinking and Research Design (take in years 1-2, 1.5 cr)	
Third Year (2024-2025)			
General Exam with your PhD committee should be taken before the end of year 3			

Notes: two electives are required (PABIO 536: bioinformatics can count towards this) - these can be any courses, not necessarily what is on our elective list
The courses outlined above along with research credits (Rotations and Doctoral Dissertation) should give you the credits that you need (90 total and 18 graded)
* Or Immun 532 (Advance Immunology, 4 credits), seek permission with instructor before taking

Didactic Teaching Requirement

Teaching experience is an essential part of the education for a doctoral degree. Therefore, it is a requirement for doctoral Pathobiology students to obtain training in teaching at the University level through enrollment and participation in one quarter of PABIO 598: “Didactic Pathobiology”.

This type of teaching experience is a learning opportunity for university credit and not a paid Teaching Assistantship. It does not have a service expectancy, and therefore does not receive DGH funding. The didactic teaching requirement should be completed by the end of the fourth year.

Note that Teaching Assistantships (offered by other departments) cannot substitute for the Pathobiology Didactic Teaching requirement.

Didactic Pathobiology Learning Objectives –

At the completion of Didactic Pathobiology, students are expected to:

1. Understand and design key elements of a college or graduate level course
2. Prepare and present lectures and active learning sessions
3. Design appropriate evaluations to measure student learning

To ensure fairness in assignments, the Program Manager will distribute an expectations form prepared by the instructor(s) of each course eligible for didactic training and request a list of the top two to three choices from each student at the end of their second year of classes. The Program Director will then allocate didactic teaching assignments for the next year.

The courses that offer opportunities for didactic training include:

- PABIO 551: Biochemistry and Genetics of Pathogens and Their Hosts
- PABIO 552: Cell Biology of Human Pathogens and Disease
- PABIO 536: Bioinformatics and Gene Sequence Analysis
- G H 210: Confronting Global Diseases – Introductory Biologic Principles and Context
- G H 410: Advanced Biologic Principles of Global Diseases

1.2 Electives (for PhD)

You must take at least two electives of your choice. Recommended options for elective courses is listed below, however you are not limited to the listed options. Note that PABIO 536 (Bioinformatics) is strongly recommended as an elective for all students. Please consult with your advisor and your committee regarding your selection and schedule of electives. Your Doctoral Supervisory Committee may advise you to take additional electives. If the latter occurs, this should be documented in your file in the program office. Some electives are more suitable for students with advanced backgrounds. Students should consult a current catalog to verify course offerings.

List of recommended electives:

- IMMUN 532: Advanced Immunology
- IMMUN 537: Immunological Methods
- IMMUN 538: Immunological Based Diseases and Treatments
- EPI 520: Epidemiology of Infectious Diseases
- EPI 524: Epidemiology of Cancer
- EPI 529: Emerging Infections of International Public Health Importance
- EPI 530: AIDS: A Multidisciplinary Approach
- EPI 532: Epidemiology of Infectious Diseases of Third World Importance
- MICROM 444: Medical Mycology and Parasitology
- MICROM 540: Graduate Virology
- MICROM 553: Molecular Mechanisms of Bacterial Pathogenesis
- MICROM 555: Advanced Clinical Microbiology
- CONJ 531-549, 557: Select Modules from the Molecular Conjoint Series (varies)
- GENOME 576: Genetic and Genomic Analysis of Bacteria
- MCB 532: Human Pathogenic Viruses

1.3 MSTP Coursework

The curriculum for Pathobiology PhD Students in the MSTP Program is identical to the PhD program described above except that:

1. The rotation requirements have been waived since these are fulfilled during the first years in Medical School.
2. The Didactic Teaching requirement may be waived if they have served as a TA during Medical School prior to joining the Pathobiology Program. In that case, they are exempted from taking PABIO 598.
3. Immunology 441 or 522 are recommended but not required.

1.4 The MS Program

Time to completion: 2 years
TOTAL CREDIT REQUIREMENT: 60 CREDITS
MINIMUM: 18 GRADED CREDITS

Policy for conversion to the MS degree and admittance into the PhD program

PhD students may, if they wish, switch to the MS program. In so doing, they in effect resign from the PhD program. If they later wish to continue to a PhD, they must re-apply for that program. Students wishing to pursue this option should consult with the Program Director.

The Pathobiology Graduate Program is not currently accepting students directly into the MS Program. However, the MS Program remains an option under specific circumstances, such as failure to pass the General Exam or changes to academic goals.

The following learning objectives are the basis for the Master's degree in Pathobiology. The student will be able to:

- Discuss and apply fundamental aspects of basic biomedical research to diseases of public health interest.
- Collect, analyze, interpret, and use data for solving problems in Pathobiology.
- Demonstrate competency in basic research skills and understanding of the scientific method.
- Communicate research findings through oral and written presentations.

The course of study outlined below will fulfill University of Washington regulations. In this handbook, those requirements will not be covered exhaustively. Students should consult the Graduate School website and other memoranda concerning those requirements. Ultimately, it is the student's responsibility to ensure that s/he meets the UW and program requirements and proceeds through the program in a timely fashion.

REQUIRED COURSES		**CREDITS**	**GRADED OR C/NC**
PABIO 550	Diseases and Issues in Global Health	2	Graded
PABIO 551	Biochemistry and Genetics of Pathogens and Their Hosts	4	Graded
PABIO 552	Cell Biology of Human Pathogens, Disease, and Public Health	4	Graded
PABIO 553	Survival Skills for Scientific Research	2	C/NC
PABIO 580[1]	Pathobiology Seminar	1	C/NC
PABIO 581[2]	Current Literature in Pathobiology	1	C/NC
PABIO 582[2]	Critical Thinking and Research Design in Pathobiology	1.5	C/NC
PABIO 591[2]	Pathobiology Minicourse Series	1	C/NC
PABIO 500	Rotation	3	C/NC
PABIO 600	Research	Variable	C/NC
PABIO 700	Master's Thesis	Variable	C/NC
EPI 511[3]	Introduction to Epidemiology	4	Graded
EPI 527[3]	Vaccines	3	Graded
IMMUN 441[4]	Introduction to Immunology	3	Graded
HSERV 579[5]	Structural Racism and Public Health	1	C/NC

MS Electives

Additional courses in Pathobiology or the biomedical sciences may be taken to fulfill the graded course requirement, to encompass the interests of the student, or to fulfill any additional requirements set forth by the student's committee.

Notes for Degree Progress

[1] MS students are required to attend Seminar (PABIO 580) every Winter Quarter and to attend the presentations of dissertation research in the Final Exam of students completing the Pathobiology doctoral program.

[2] MS students are required to enroll in Lit Review (PABIO 581) every Autumn Quarter, Critical Thinking (PABIO 582) every Spring Quarter, and a minicourse (PABIO 591) every Spring Quarter in each of the first two years in the MS program. Three credits each of Seminar and Lit Review (PABIO 581) may each be counted towards your degree. If a master's student decides to continue studies in the Pathobiology PhD program, additional years of PABIO 581/582/591 will be required commiserate with the PhD requirements.

[3] Pathobiology students are required to take either EPI 511 or EPI 527 to fulfill the Pathobiology MS program's epidemiology requirement (or obtain permission from the head of the Pathobiology program to get credit for an epidemiology course elsewhere). EPI 511 is a 4-credit graduate level introductory course that fulfills this requirement. Alternatively, EPI 527 (Vaccine Epidemiology) is a 3-credit graduate level option that focusses on vaccines and can also be used to fulfill this option. However, students who opt to take EPI 527 should be aware that they may need to do remedial introductory work on their own to succeed in this class and that EPI 511 may be a better choice for students who have not gained familiarity with basic concepts in epidemiology in other settings.

[4] Pathobiology students are required to take Immun 441 (Introduction to Immunology) even if they have a strong immunology background. This course is very challenging, broad, and well taught. It is unlikely that even a student with a strong immunology background from another school will find this course too basic. If a student has a very good reason for not taking this course (e.g. they actually took this identical course), they should talk to the Pathobiology program director about taking IMMUN 532 (Advanced Immunology) instead. We do not encourage IMMUN 532 (Advanced Immunology) as a routine substitute for IMMUN 441 because of feedback from our students who found that IMMUN 532 typically has a very narrow focus and assumes that a student has already taken IMMUN 537 (Immunological Methods). Note that taking IMMUN 537 along with Pabio 551, Pabio 550, and Pabio 581 will make Autumn Quarter of first year very challenging, but all of the courses provide a strong foundation that helps students succeed with subsequent rotations and courses

[5] This course is offered AUT/WIN/SPR quarters – recommended to be taken in the First year of Program. It is best for 1st Year Cohort to **take this course during their Spring Quarter**; however, it can be taken in Winter Quarter if it works with your schedule.

Schedule for Coursework

To progress in a timely manner, students should anticipate taking 1-2 graded courses a quarter, plus Seminar, Lit Review, and research (PABIO 600) or thesis (PABIO 700) credits for a total of 10 credits per quarter. Students are required to complete 9 credits of PABIO 700 for the MS degree. Students desiring to enroll in more than 10 credits per quarter need approval from the Program Director. All formal coursework should be completed by the end of the second year. Please consult with your advisor or a member of the Graduate Student Advisory Committee (GSAC) regarding your specific program. Individual students are likely to need different sets of electives and may want to take required courses at different times.

For offerings of other Pathobiology courses, see the listing under the PhD program. Please check with your GSAC advisor or a member of the Curriculum Committee, as well as a current catalog, to verify course offerings.

MS Advisory Committees

Your progress in the MS program will be followed by several individuals. Among these are your advisor, members of the Graduate Student Advisory Committee (GSAC), and your MS Advisory Committee. In the event that you perceive you are having problems with your academic or research program, please discuss this with a faculty member on one of these committees.

The GSAC will monitor your progress until your Advisor is identified. Once you choose an advisor, you must submit the Advisor Confirmation Form to the Program Manager to be placed in your permanent file. A copy of this form may be found in Appendix M. Please bring questions concerning course offerings and curriculum to them. Current members of the GSAC are Drs. Lund (chair), Leslie Goo, and Olusegun Soge. One of the faculty members will be assigned as your GSAC advisor.

The MS Advisory Committee consists of three members including your research advisor. At least one of the two other members of the committee should be from the Pathobiology Graduate Program. The MS Advisory Committee meets every six months. For each committee meeting, the student should prepare a brief oral presentation documenting their progress. The committee will complete a brief report regarding your progress after each meeting (Appendix N). You, your advisor, and the GSAC will receive a copy of that report. If you do not receive a copy, please contact the Program Manager.

The MS Thesis

The thesis must be provided to the MS Advisory Committee two weeks prior to the oral presentation. Corrections should be made following their review before submission of the document to the Graduate School.

The thesis is to be an original study of such quality as to be accepted by a reputable journal. The requirement for a thesis of publishable quality implies a substantial research commitment by the student. It is expected that the thesis work will be promptly submitted for publication, if that has not been done already.

The thesis should be written in the format suggested by the Graduate School. The format is specified at: https://grad.uw.edu/for-students-and-post-docs/thesisdissertation/.

MS Oral Presentation and Defense

All students are required to give a formal seminar prior to the completion of the MS program. The research presentation given during the Graduate Research Symposium is not a substitute. The actual thesis presentation will consist of a concise verbal summary of the background, results, conclusions, and significance of the thesis project. Following this presentation, each committee member will question the student on any aspect of his or her research endeavors. The Oral Presentation and Defense is advertised campus wide and other Pathobiology students are encouraged to attend.

2.0 Pathobiology Rotation Program

2.1 Rotation Program Guidelines

First year students in the PhD program participate in the laboratory rotation program. This program is designed to provide research experience in various projects and experimental systems that are being investigated in the program. It will give students the opportunity to interact with faculty, students, postdoctoral scientists, and staff in different research groups and facilities, and assist students in deciding in which laboratory they wish to conduct their dissertation research. Students rotate through three labs, one quarter each for their first three quarters.

Laboratory assignments will be the responsibility of the Graduate Program Director, Dr. Jennifer Lund, in consultation with first year advisors. Prior to the start of Autumn Quarter, students will be provided with information concerning laboratories who will be accepting rotation students. **Students are strongly encouraged to contact faculty members with whom they are interested in rotating** in Autumn (and other quarters, if desired) to discuss research opportunities and solidify a rotation for Autumn Quarter. Rotation plans for Winter and Spring Quarters should be solidified no later than the end of Autumn and Winter Quarter, respectively. If any difficulties arise in identifying a laboratory rotation for any of the quarters, the Program Director will assign a laboratory rotation. Assignment of laboratory rotations is based on 1) the preferences of the student and 2) the ability of labs to support the student's research (financial, space, and mentor time considerations) both in the short term and if possible in the longer term. The students will work on experiments related to the goals of funded projects within the labs. The Program Director will attempt to match students and labs according to interest but may need to make rotation assignments other than those listed by the student for reasons such as space, funding, and reasonably equitable distribution of students. It is strongly encouraged that students do rotations at more than one site. Students will not be allowed to remain in one lab for more than one quarter or to do more than three rotations. All rotations must be approved by the Program Director (Appendix K).

Students are expected to identify a faculty mentor who agrees to provide funding support for their doctoral research no later than the tenth week of the third quarter (Spring), or by the date specified by the Graduate Program Manager. In the fourth quarter (Summer), if the student enters a laboratory in which they have not rotated, funding is provided by the faculty mentor and formalization of continuous support for the Student's doctoral research is contingent on sufficient research progress during this quarter. The inability to identify a laboratory that accepts the Student for their dissertation research by the end of the fourth quarter will lead to dismissal from the Interdisciplinary Doctoral Program in Pathobiology (see Academic Progress, page 25).

Students will enroll in PABIO 500 for three credits for each rotation and list the corresponding faculty member as the professor. This faculty member will be responsible for providing a credit/no credit grade for the student. In general, students are expected to work approximately 20 hours per week on their project and are expected to attend lab meetings. To receive credit for the rotation, all students are expected to give a presentation to the host lab on their work, write a written report on their rotation (1-2 pages single spaced), and receive a written evaluation from the professor using the form in Appendix L. A copy of this evaluation and the student report will be provided to the Program Manager to be placed in the student's file.

Students are expected to complete all three rotations. However, rotations may be waived at the discretion of the Program Director if the following conditions are met: 1) the student has rotated with a faculty member who would agree to be their mentor, and 2) the Program Director deems additional rotations unlikely to provide an additional option for permanent mentor selection.

On rare occasions, students may petition to be exempted from the rotation program. The written request should state the basis for the request and should be accompanied by a letter of support from the potential advisor. Comparable experience or compelling reasons of funding is generally required for exemption. The petitions will be submitted to the Program Director, and the decision to approve or not approve will rest with the Graduate Student Advisory Committee (GSAC). Students will receive a written confirmation of the exemption.

3.0 Yearly Program Events

3.1 Annual Retreat

The annual Pathobiology retreat occurs at either Pack Forest, a casual location near Mount Rainier, or at the Center for Urban Horticulture in Seattle each October or November. A subset of faculty members summarize their research in 10-15 minute presentations, with priority to faculty who are accepting rotation students that year. This assists the first-year graduate students in selecting a research laboratory and fosters collaborations between laboratories. Each graduate student (except for new first year students) and postdoctoral fellow is expected to present a poster at the retreat. In addition, time is allocated for a discussion of significant issues important for faculty and graduate students/postdocs. Separate discussions of programmatic and training issues by the faculty and by the students and postdocs are followed by a combined discussion with everyone in attendance. The retreat also provides the opportunity for an evening social gathering. The Program also uses social functions throughout the year to foster interactions between students and faculty at different sites, including a summer potlock picnic, a September gathering to meet the new students, and receptions following the Research Symposia.

3.2 Seminar Series

All Pathobiology seminars are at 4 p.m. on Thursdays during Winter Quarter and open to the public. For room locations see individual seminar dates.

*Please note, in order to receive credit for Pathobiology Seminar (PABIO 580), students are also required to attend Winter Quarter Center for AIDS Research (CFAR) Seminars.

3.3 Winter and Spring Student Research Symposia

A Graduate Research Symposium is held Winter and Spring Quarters. The purpose of the symposium is to provide an opportunity for students to practice giving formal research presentations and to familiarize the faculty, as well as other students, with the research areas and progress of individual students. The Program Manager will solicit written abstracts from students in advance which will be made available to everyone attending the symposium. All students are expected to attend the symposium. All students, except first year students and students who will be presenting their MS or PhD seminar within one quarter, are required to present talks. General Exams should not be scheduled at a time that would compromise a student's ability to participate in the symposium.

The presentations are 10 (second and third year) or 15 minutes (fourth year students onward) and are followed by a five-minute discussion period. It is critical to stay within the time period allotted. The quality of these talks is similar to those given at national meetings. Therefore, the preferred format is a Power Point presentation. As with most scientific talks, the talk should include a brief introduction that explains the significance of the research problem to the audience, as well as the approach taken. We encourage students to discuss their presentation with their research advisor, both before (for planning purposes) and after the symposium (to obtain feedback). Written feedback will also be provided by several other assigned faculty members. It is helpful to practice the talk before other members of the lab, to gain their input prior to formal presentation. See Appendix O for a copy of the evaluation form.

In late spring quarter, first year students will present research talks that focus on work done in one of the rotations of their choice. The presentations are approximately 10 minutes and are followed by a five-minute discussion period. The presentation should follow the format outlined above.

Unless otherwise noted, the Winter Symposium will take place the second Friday of February, the Spring Symposium will take place on the last Friday of April, and the first-year rotation talks will take place on the first Friday of June.

4.0 Program Policies/Guidelines for Success

4.1 Mentoring

One of the main objectives of any PhD program is to train individuals to go from assimilating information to creating new knowledge through research methods. One of the traditional and proven ways to make this transition is through a strong network of mentors.

There are many opportunities for students to find mentors in the Pathobiology Program. You can consider all Pathobiology faculty potential mentors. It is not necessary to limit your mentoring experience to your principal investigator. The program encourages students to approach any of the Pathobiology faculty regarding their research and progress through the program.

For additional resources on how to form mentoring relationships with faculty and others on campus there is a suggested list of resources in Appendix Q. It is by no means an exhaustive list of all resources but meant to get you started on the right foot in forming contacts with faculty.

The Program does require one formal mentoring relationship to ensure success in the program. You are required to find a Principal Investigator to advise you on your dissertation research and thesis. You can also expect to carry out your dissertation research in their lab.

The Pathobiology Program is driven by your experience in the lab. Beginning with your three rotations during your first year of the program, you can expect to be exposed to several different styles of leadership from each Principal Investigator (our Pathobiology faculty) who runs their lab. By the tenth week of Spring Quarter in your first year of the program, you are expected to have identified a mentor for your dissertation research and thesis.

Role of Rotations

The first-year rotation experience is meant to give students an opportunity to see a variety of labs and give you exposure to different Pathobiology faculty prior to choosing where you will complete your dissertation research. It is suggested you treat each rotation as a networking opportunity to make an impression on a possible future employer and eventual colleague. The Graduate School has a series of mentoring memos which includes one on "how to get started in a lab". The link to this memo is http://grad.uw.edu/for-students-and-post-docs/core-programs/mentoring/mentor-memos/getting-started-in-a-lab.

The rotation experience is also a time for you to see if you work well with a specific faculty member. It is an audition for a possible slot to complete your dissertation research. It is suggested you treat all rotations in a professional manner to meet this goal.

Selection of the Dissertation Advisor

The Program Director will request first year students to identify their dissertation advisor no later than the tenth week of the the third quarter. Thus, first year students should begin discussions with potential advisors in late April of their Spring Quarter. The selection of the dissertation advisor is a joint decision of the student and the faculty member, who should discuss the options together. Once a student has identified their dissertation advisor, they must submit the Advisor Confirmation Form to the Program Manager to be placed in their permanent file. A copy of this form may be found in Appendix M.

Changing Advisors

A student who already has a permanent advisor and wishes to change the advisor because of personal or research reasons should first discuss the matter with the Program Director or another member of the Graduate Student Advisory Committee (GSAC). If the issues cannot be resolved, that GSAC member will then serve as a neutral party to obtain an understanding between the student and the new and old advisors and facilitate a smooth transition. After a faculty member is identified as the student's new advisor, the steps below are to be followed.

1. The student will inform the old advisor in writing of their plan to leave the lab at least one month prior to the end of the quarter and provide a copy of the letter to the Program Director and the GSAC.
2. As soon as possible after the student informs the old advisor of the change, and at least two weeks before the end of the quarter, the student, old advisor, and the GSAC member will meet to discuss and agree upon items that need to be completed in the old lab before the switch is made at the end of the term.
3. The student will consult the Program Manager who will work with DGH Academic Human Resources to provide a written letter regarding the requirements of their specific funding vehicle and appointment.
4. The change must be approved by the Program Director who will officially notify all parties regarding the effective date of the change. If the student resigns from the research assistantship before the end of the quarter, the student will be liable for the full amount of tuition for that quarter.

Changes are made effective at the end of that quarter. Requests for deviation from this timeline must be presented in writing to the Program Director for approval.

4.2 Doctoral Supervisory Committee

Your progress in the PhD program will be followed by several individuals. The Graduate Student Advisory Committee (GSAC) will monitor your progress until you select an advisor and your Doctoral Supervisory Committee is formed. Please bring questions concerning course offerings and curriculum to them. Current members of the GSAC are Drs. Lund (chair), Leslie Goo, and Olusegun Soge. One of these individuals will serve as your primary GSAC advisor. In the event that you perceive you are having problems with your academic or research program before you have a formal mentor, please discuss this with your GSAC advisor or Dr. Lund.

Formation of the Doctoral Supervisory Committee

The Doctoral Supervisory Committee, which should be formed by the end of the Autumn Quarter, second year, will consist of your research advisor (usually serving as chair), at least two other faculty members (two must be from the Pathobiology Program), and the Graduate School Representative (GSR). This last individual is selected by the student and research advisor and is formally appointed by the Dean of the Graduate School. Please refer to http://grad.uw.edu/policies-procedures/doctoral-degree-policies/graduate-school-representative-gsr-eligibility for information concerning GSR eligibility. In brief, the GSR must meet the following conditions:

1. The GSR cannot have a conflict of interest with the student and/or dissertation committee chair (Budgetary relationships, personal relationships, or research and/or publication relationships between the GSR and either the student or the committee chair are examples of possible conflicts of interest.)
2. The GSR cannot have a primary, joint, or affiliate appointment in the dissertation committee chair's department.
3. The GSR cannot have endorsement to chair from the same department as the dissertation committee chair.

The Doctoral Supervisory Committee can also include **one** member who has not been appointed to the graduate faculty. All members have voting privileges. For both the General Examination and the Final Examination (Dissertation Defense), at least four members of the committee (including the Chair, GSR, and one additional Graduate Faculty member) must be present. The composition of the committee should be sent to the Program Director for approval via email. Once the Doctoral Supervisory Committee is approved, the Program Manager will enter the committee into MyGrad. The committee should be formed at least four months prior to the oral part of the General Examination.

Committee Meetings

This committee meets with the student at least once a year (the committee may request to meet more often). It is the responsibility of the student to arrange these meetings. For each committee meeting, the student should

prepare a brief oral presentation documenting his/her progress. The committee will complete a brief report (Appendix N) regarding your progress after each meeting. The student should bring this form to the meeting to ensure documentation of progress and to indicate issues for amelioration. Once the form is filled out, please return the form to the Program Manager. You, your advisor, and the GSAC will all receive copies of this report. If you do not receive a copy, please contact the Program Manager.

The program expects the following with regards to committee meetings:

1. Students are expected to have formal committee meetings at least once a year. While we encourage you to meet with any member of your committee or any faculty member at any time to discuss research, this does not substitute for or replace a committee meeting. The intent of these meetings is for you to update your research progress and receive critical evaluation of your work, help in problem solving, and advice on current and future research directions. This forum should also provide a consensus of the committee on your progress and expectations so that everyone is on the same page and there is no ambiguity.

2. When the decision is made to defend your dissertation, there should be a formal committee meeting where committee members agree that the student is ready to do so. This agreement should be documented in the Report of Graduate Student Committee Meeting (Appendix N), which all committee members should sign.

3. Annually during a committee meeting, the student should present a completed Individual Development Plan (IDP). The IDP should be discussed with Mentor and Committee. The IDP should be submitted to the Program Manager after discussion so it may be filed in the student's academic file.

4.3 Program Committees

The Pathobiology Graduate Program has five committees that deal with various student-related activities and issues. They are the Steering Committee, the Graduate Student Advisory Committee, the Program Event Support Committee, the Curriculum Committee, and the Admissions Committee. The latter three committees have student members. The process to choose students for these positions varies with the committee. For both the Curriculum and Admissions Committees, the committee nominates individuals and gets approval from the Program Director. Subsequently, an invitation is extended to the student to join the committee. For the Program Event Support Committee, all second-year students serve for the duration of one year.

Student Committee Members

There are three opportunities to serve on program committees for students. The purpose of these appointments is to give students a professional development experience. Committee work is part of working for a university and/or many other organizations. The expectations for students who serve on these committees are the same as what is expected of faculty who are appointed to a committee.

The Program Event Support Committee includes all second-year students. The students serve a one-year term.

The Admissions and Curriculum Committees each have one slot for a student member. The individual committees determine their student member. Interested students should direct their inquiries to the chair of each committee for consideration.

In addition, there is a Student Diversity and Inclusion Representative. The representative is appointed directly by the students in the Pathobiology Program.

4.4 General Examination

The General Exam should be completed by the end of autumn quarter of the third year, or winter quarter at the latest, and is administered by the Doctoral Supervisory Committee. The Doctoral Supervisory Committee should be formed at least four months prior to the oral examination. The student will reserve a room for the exam for a

period of three hours. Once the room and Doctoral Supervisory Committee member's attendance is confirmed, the student will enter a request for the General Exam date, time, and location into the MyGrad system. Please email the Program Manager after you enter this request. The Program Manager will then approve the request, which conveys this information to the Graduate School. The student and their mentor will receive an electronic copy of the exam Committee Signature Form via email once the exam is approved. All committee members will also receive an email confirmation regarding the exam once the information has been conveyed to the Graduate School. The examination should not be scheduled at a time that would compromise the student's participation in the annual Graduate Research Symposium.

Content of the Oral Examination

The oral exam will cover the following areas:

- The student's research area. In depth knowledge, including familiarity with both background literature and current research is required. This would include knowledge of specifics as well as generalizations. It would encompass an understanding of research findings and their importance, as well as critical questions that are unresolved. The student should be able to critically evaluate this body of work. **The student's Dissertation Research Proposal will form the basis of the General Exam and must be submitted to the committee members at least two weeks prior to the examination.**
- Areas related to the student's research. A moderate level of knowledge regarding this body of work is required. Familiarity with literature, current research and important questions is expected, but the depth of specific knowledge is not expected to be as complete as for the directly related areas.
- Areas not directly related to the student's research but covered in Pathobiology coursework.

The students are encouraged to meet with committee members to gain input on general emphasis areas for the oral exam. However, by Program policy, students are not to be provided with questions or the definition of specific areas of questioning in advance. Committee members may wish to suggest certain readings, although the examination is not restricted to those readings.

Dissertation Proposal

Prior to the oral examination, the student must provide (at least two weeks before their exam) a copy of their dissertation proposal to their committee members. This proposal should be focused on the student's thesis research.

It is written in a similar format used for NIH grant proposals (e.g. R21 or F31). See Appendix T for an outline of the format.

Format of the General Examination

In order for the General Exam to proceed, the advisor and Graduate School Representative (GSR) must be present with at least two other committee members. If a committee member fails to appear for the exam, please follow the following procedures as outlined by the Graduate School:

1. If the Chair is not present, wait 15 minutes (or longer if appropriate) then adjourn the exam and reschedule to a later time/date.

2. If the GSR is not present, wait 15 minutes then notify the Graduate School at 206-685-2630 or 206-543-5900. *The student's department may ask a member of the graduate faculty outside its department and the Chair's department to serve as a replacement. Once the replacement GSR is present, the exam may proceed.*

3. If a general member is not present and the quorum of four members (as stated above) is not intact, the exam should be adjourned and rescheduled to a later time/date, **OR**, the exam may adjourn momentarily until another field-specific faculty member can be found as a replacement.

4. If a general member is not present but the quorum of four members is intact, the exam may proceed.

In all cases, an attempt must be made to contact the absent member before taking any action.

5. The exam cannot proceed unless a Committee Signature Form has been obtained and brought to the oral examination.

6. Prior to the start of the oral examination, the student's advisor will meet with the committee to give an evaluation of the student's academic performance, research performance, and potential. The evaluation should include an assessment of the student's motivation, creativity, independence, laboratory skills, knowledge of the literature, ability to design and execute experiments, and oral and written communication skills.

7. A member of the Supervisory committee other than the advisor or the GSR will chair the oral exam. The Chairperson will be responsible for maintaining objectivity in the conduct of the examination. The advisor will refrain from volunteering information (or answering questions) but may provide comment or clarification, if this is requested by the committee. The advisor may be requested by the chairman of the committee to ask one or more questions of the student. The advisor is a voting member on the oral exam. The advisor is the chair of the student's doctoral supervisory committee and signs the Committee Signature Form as such.

8. At the beginning of the oral examination, the student should give a brief presentation (30-40 min) on the thesis research project including background, experimental results and projected future experiments. Sufficient time will be provided for each committee member to pursue a line of inquiry that may focus on the student's specific research area or general knowledge of Pathobiology. It is expected that the entire exam will entail up to three hours.

9. At the end of the exam, both the student and the advisor will leave the room. This allows the committee to discuss the exam performance in the absence of the advisor. The committee will vote on the outcome of the exam in the absence of the advisor.

10. The final decision must be one of the following: Pass, Re-examine, or Fail. If the committee feels that there are deficiencies that need to be corrected, the Re-examine option is appropriate.

11. Following the decision, the Committee will recall the advisor to discuss the outcome, including soliciting the advisor's evaluation and vote on the student's performance. At this point, the student will be recalled to be informed of the committee's decision. Regardless of the outcome, the advisor and the committee members should provide specific feedback to the student; this may be done partly at the meeting and, if detailed input is appropriate, partly in later individual meetings. This may include suggestions for additional coursework or reading. If the student needs to be re-examined, the committee will outline those areas that require attention and provide recommendations to enable the student to address the perceived deficiencies.

12. If a student fails the exam a second time, it can only be retaken with approval of the Dean of the Graduate School.

13. Successful completion of both components of the General Exam results in the admission of the student to candidacy for the doctoral degree.

4.5 Dissertation/Thesis

Format: Writing and defending the doctoral dissertation is the final requirement for a PhD. Your Supervisory Committee determines if you have completed a body of work meeting the standards of the program. Students should follow the Graduate School's Fomatting Guidelines at: https://grad.uw.edu/for-students-and-post-docs/thesisdissertation/etd-formatting-guidelines/.

Dissertation: The dissertation must be of such quality that at least one published article (with the student as the first author) results. At least one first author article must have been submitted for publication before the Final Examination.

Appointment of the Reading Committee: When the Doctoral Supervisory Committee determines at a formal committee meeting that the student is ready for the Final Examination and documents this decision with each committee member signing the Committee report (Appendix N), the Reading Committee should be appointed. To setup the Reading Committee, the student or their advisor must email the Program Director and Program Manager to obtain approval for the members. Upon approval from the Director, the Program Manager will enter the Reading Committee information in MyGrad. This will generate a confirmation email to all Reading Committee members. The student will then be able to request their Dissertation Defense/Final Examination in MyGrad.

4.6 Dissertation Defense

After the Reading Committee is officially established, a request for approval to conduct the Final Examination will be submitted to MyGrad. This request should be submitted at least three weeks prior to the Final Examination date. The dissertation presentation will be advertised and is open to the public. Following this presentation, the PhD candidate will meet with the Doctoral Supervisory Committee. Each member will question the student on any aspect of the dissertation. If the Final Exam is passed, the Committee Signature Form is signed and returned to the Program Manager who will convey the result to the Graduate School. The student has until the end of the quarter in which they defend to submit their written dissertation Students are required to submit an Electronic Thesis/Dissertation and the Committee Approval Form to the Graduate school through the UW ETD Administrator Site.

4.7 Academic Progress

Required Progress in Year 1 for Program Continuation: In the first year of the Program, the student must formalize an agreement with a mentor, who will guide and financially support their doctoral research studies. Failure to achieve this agreement by the end of the fourth quarter in the Program will result in dismissal from the Program (see page 15 under Pathobiology Rotation Program).

Academic Progress in all other Programmatic Requirements: The procedure follows the University's general guidelines. The judgment will take into consideration an individual student's situation and magnitude of deficiency. Evaluation of student performance includes: 1) maintenance of a minimum GPA of 3.0, cumulatively and for each quarter of coursework, 2) satisfactory progress in fulfillment of program requirements and expectations, and 3) satisfactory research progress and performance.

Unsatisfactory progress in any of these areas may result in the following actions:

First time	Warning
Second time	Probation
Third time	Final probation
Deficiency not corrected after final probation	Drop

It should be noted that a warning is documented by the Program but is neither reported to the Graduate School nor appears on the student's transcript. All other recommended actions are transmitted to the Graduate School.

1. Unsatisfactory grades

Grades will be monitored on a quarterly basis by the Graduate Student Advisory Committee (GSAC).

2. Failure to demonstrate mastery of core competency. Students must demonstrate competency in four subject areas (molecular biology/biochemistry, cell biology, immunology, and public health).

This is done in one of three ways,

1) Obtaining a 3.0 or better in the core courses (PABIO 550, PABIO 551, PABIO 552, PABIO 553, and IMMUN 441 or IMMUN 532);

2) Successful completion of a competency exam and;

3) Fulfillment of requirements stipulated by the first-year student committee if the competency exam is not passed.

Failure to demonstrate competency in one of these ways is considered a demonstration of unsatisfactory academic progress.

If a student is unable to demonstrate mastery of a core course through meeting the grade requirement and/or passing a competency exam, a special committee is assembled which includes members of the GSAC, core curriculum instructors, and the newly assigned faculty advisors for the students. Their role is to identify areas of weakness early and get support for remediation of these areas. They will provide the student with a list of items to accomplish to demonstrate mastery of the core area.

3. Unsatisfactory research progress

It is the responsibility of the thesis, research, or dissertation Supervisory Committee to evaluate research progress of students under their supervision and take proper action accordingly, e.g., failing General or Final Examination. Failure to progress will be recorded in the Report of Graduate Student Committee Meeting and the report kept in the student's file.

4. Unsatisfactory progress on the PhD General Examination

It is the responsibility of the Dissertation Supervisory Committee of each student to evaluate the performance of the student on the General Examination. The Committee has three options that it may utilize in grading the General Examination:

1. The Committee may pass the student in which case the student confers PhD candidacy and progresses toward conferring the PhD degree.
2. The Committee may decide to re-examine the student after a further period of study. The Dean of the Graduate School will approve at most two re-examinations.
3. The Committee may decide not to recommend the student for further work toward the PhD degree. The effect of this recommendation is termination of the student's enrollment in the doctoral program. If this occurs, a Pathobiology student may choose to establish a Master's Thesis Committee, write a thesis, and give an oral presentation on the thesis. If the Committee approves the thesis and all Graduate School requirements are met, the MS degree will be conferred.

Examples of scenarios of unsatisfactory progress

1) Core competency example one

First Time - Warning	Student earns a 2.7 in PABIO 551, a core competency class, during Autumn Quarter.
Second Time - Probation	Student has a GPA less than 3.0 Winter Quarter.
Third Time - Final Probation	Student has a GPA less than 3.0 Spring Quarter.
Fourth Time - Dismissal	Student fails competency exam.

2) Core competency example two

First Time - Warning	Student earns a 2.9 in PABIO 552.
Second Time - Probation	Student has a GPA that falls below 3.0 the next quarter.
Third Time - Final Probation	Student takes core competency exam and fails. First year committee meets with the student and a specific list of tasks for remediation by the student to meet core competency requirement is outlined.
Fourth Time - Dismissal	Student fails to meet these requirements.

3) Academic/ Research competency example

First Time - Warning	Student has GPA less than 3.0 in Spring Quarter of Year 1.
Second Time - Probation	Student has a GPA less than 3.0 in Winter Quarter of Year 2.
Third Time - Final Probation	Student meets with Doctoral Supervisory Committee who determines that research progress is unsatisfactory and sets specific goals that must be met within six months.
Fourth Time - Dismissal	Student meets with Doctoral Supervisory Committee in six months and has not met the goals outlined by the Committee.

Procedure for Dismissal from the Doctoral Program Prior to Formation of Committee

Students who enter into the Pathobiology Graduate Program to pursue doctoral studies, but demonstrate unsatisfactory progress (e.g. poor progress in courses) may be required to address deficiencies by specific actions (e.g., take additional coursework, write a research paper), may be required to switch to the MS Program, or may be dismissed from the Pathobiology Graduate Program. In deciding among these options, the Program Director and members of the Graduate Student Advisory Committee (GSAC) will gather input from faculty involved in coursework, the rotation and current mentors, and from the student. The input will be considered by an ad hoc committee (comprised of the Program Director, the GSAC, and one additional faculty member with direct knowledge of the student and core course instructors) in their assessment of the student's past performance and potential for future performance. The goal is to determine the best option for the student and program, considering that poor early progress may indicate that this career track is not optimal for the student.

4.8 Grievance Procedure

Occasionally major difficulties arise during a student's tenure at the University. We recommend that the student first talk with members of their advisory committee and/or with the GSAC. If the situation cannot be resolved, specific grievance procedures are outlined in the Graduate School Memo 33: http://grad.uw.edu/policies-procedures/graduate-school-memoranda/memo-33-academic-grievance-procedure. The School of Public Health Student Concern Policy also provides procedures for reporting concerns and other resources available at the UW to assist in resolving concerns (https://sph.washington.edu/students/student-concern-policy).

4.9 Scientific Ethics and Appropriate Behavior

Scientific integrity is a vital issue involving all participants in scientific endeavors. A number of concerns are included within this area. Most importantly, falsification or misrepresentation of data and plagiarism, whether of written documents or ideas, in class or in publications, are extremely serious offenses against the entire scientific community. Accuracy in record keeping and appropriate citation of others' work are crucial. Appropriate personal interactions are also important. An air of mutual respect among members of your lab and with other colleagues will produce both a more pleasant and a more productive atmosphere. Compliance with rules governing safety and health issues will benefit both you and those who work around you. Compliance with human subjects and animal welfare regulations is similarly important. Failure to follow health and safety regulations or human subject and animal regulations has serious legal, as well as ethical, consequences. The National Institute of Health regulations state that original laboratory notebooks should stay in the lab. Students may take photocopies with them.

Deliberate ethical misconduct in science appears to be rare, but ethical questions sometimes do not have simple answers. You are encouraged to consider and discuss ethical issues. There are a number of formats for this. PABIO 553 includes case-based discussions of a number of ethical issues, and ethical issues are discussed within several other required courses. The School of Public Health presents seminars on ethics in science, which you are strongly encouraged to attend. The School of Medicine also presents a biomedical research integrity series on this subject (http://depts.washington.edu/uwbri), and all students are strongly encouraged to attend these lectures and discussions. Informal discussions with faculty, staff, and other students also provide a forum for investigating these ideas. Students are required to follow the guidelines for appropriate behavior specified by the University (http://apps.leg.wa.gov/WAC/default.aspx?cite=478-120) and by the site at which they conduct their graduate research.

4.10 Mandatory Training

All Pathobiology students must receive safety training relevant to their laboratory research. Such training may be obtained through Environmental Health & Safety (EH&S), and lists of available training opportunities are on their website: http://www.ehs.washington.edu. A two-day series of training programs are held each Autumn; these are ideal for incoming students. Many of the required trainings are also available online and can be completed prior to the start of the Pathobiology Program.

Persons working with human tissues or blood products must take training in Bloodborne Pathogens.

All students who work with radioactive materials must have radiation safety training. In addition, Pathobiology students must attend a chemical safety class. They must read, understand and comply with the chemical hygiene plan in their laboratory.

Students who will be working with animals must attend the appropriate classes given by the Department of Comparative Medicine. These classes are given at regular intervals throughout the year.

Similarly, all students whose research involves human subjects (or samples derived from human subjects) must attend training provided by the Human Subjects Division.

Each off-campus program site has specific training requirements that students must follow. Consult with your advisor or safety officer at that site for details.

4.11 General Information for Pathobiology Students

Mailing Address
Pathobiology Graduate Program Office
Box 351620
Hans Rosling Center
3980 15th Ave NE, Office 761B
Seattle, WA 98195

Phone: (206) 543-4338

Student Mailboxes
Most students have a mailbox at their lab location. Please ask your rotation advisor or permanent advisory regarding policies for obtaining access to a mailbox/mail delivery box number.

Telephones and Copying
Personal phone calls should be kept to a minimum to facilitate research use of phones. Personal long-distance calls cannot be made from laboratory phones. If you need to make a long-distance call pertinent to an order or your research, check with your faculty advisor. Copy machine codes may be required depending on your location. Check with your faculty advisor.

Supplies and Equipment
It is important that all students recognize that the state budget for Pathobiology does not provide for the purchase of supplies and equipment for student research. Instead, faculty members provide such funds from their individual research grants for their students. Please ask your rotation advisor or permanent advisor for the appropriate budget number when ordering supplies.

Ordering Procedures
Orders are placed by different procedures at each institution, and always require approval from either the faculty advisor or their designee. Complete the required forms fully to avoid delays.

Lab Coats
Please ask your rotation advisor or permanent advisory regarding policies for lab coat maintenance.

Department Computer and Study Space/UW Library System
Students may utilize student spaces located in the Hans Rosling Center for Population Health on the 7th floor. Desks are available to students on a first-come-first-serve basis in the 750 desk bank. Room 742 is dedicated to student group study. Students also have access to computers and study rooms in the UW Library System.

UW Email and Communication
All students should promptly establish an email account by visiting MyUW. Please inform the Program Manager of your email address and check your email frequently, as all official program and UW communication occurs via e-mail. The Graduate School has established the MyGrad Website at http://grad.uw.edu/for-students-and-post-docs/mygrad-program. Students can also consult the Pathobiology Program web page at http://globalhealth.washington.edu/education-training/phd-pathobiology for information and links to procedures and program requirements.

Student Representatives
Students select a Senator, Student Representative, Student Seminar Representative, and Student Diversity and Inclusion Representative during the Summer Quarter each year for the upcoming academic year.

The Senator represents student issues and concerns at the Graduate and Professional Student Senate (GPSS) meetings which occur on a semi-monthly basis. The Senator is also responsible for appropriation of the annual GPSS allocation of funds to the Pathobiology Program. The Senator for 2022-2023 is Lakshmi Warrier.

The Student Representative is a member of the School of Public Health Student Affairs Committee. The Student Representative also represents student interests and concerns at Pathobiology faculty meetings. The Student Representative for 2022-2023 is Nicole Potchen.

The Student Seminar Representative provides the seminar organizer with input on the seminar series and also organizes a handful of lunches/happy hours on seminar days. This student also helps the speakers get from campus to other institutes he/she may be visiting while here in Seattle and helps as needed to make the seminars run smoothly. The Student Seminar Representative for 2022-2023 is Kristina Edwards.

The Student Diversity and Inclusion Representative attends the DGH and Hutch United meetings at FHCC. Hutch United hosts seminars, workshops, and mentoring groups surrounding this mission with a focus on how issues of diversity and representation affect bench scientists. The Student Diversity and Inclusion Representative for 2022-2023 is Nolawit Mulugeta.

Student Public Health Association
The Student Public Health Association (SPHA) was formed in the spring of 1996 to promote a positive Graduate School experience for all the students with public health interest. As a part of its function, SPHA will host brown bag lunches to foster interdisciplinary learning, work to represent students' voices in various committee meetings, provide educational opportunities through conferences and tours of various facilities, arrange networks with future mentors and colleagues, and organize social activities. If you are interested in finding out more about SPHA, please e-mail the organization at spha@uw.edu.

Health Care
Hall Health Primary Care Center (https://wellbeing.uw.edu/unit/hall-health/) provides routine health care for students. Graduate students with Research Assistant or Teaching Assistant appointments are eligible for Graduate Appointee Insurance Program (GAIP) insurance coverage, and should consult the GAIP website: http://www.washington.edu/admin/hr/benefits/insure/gaip/index.html. Students should consult with individual personnel or business office for benefits at their specific site. Your GAIP insurance terminates on the last day of the month of your last quarter in our program. If your last quarter is Spring or Summer Quarter, your GAIP insurance terminates on September 30th.

Student Services

Information regarding Student Union, UW Recreation facilities and a myriad of other Student Services are available directly from this link: https://www.washington.edu/students/servicesforstudents/.

Research Assistant, Stipend, and Fellowships

Students are funded on a yearly basis contingent on academic progress and funding availability. It is the student's responsibility to understand how they are funded. Each student's package consists of one or a combination of a Research Assistantship, stipend, and/or fellowship. Depending on your source of funding, taxes may or may not be withheld. It is possible to owe taxes at the end of the year on some of your funding. While the University of Washington cannot advise on taxes we can provide some resources to assist students.

Tax information from UW Payroll can be found here: https://finance.uw.edu/tax/ee-ic/employees/payroll. In addition, Student Fiscal Services offers informational sessions on taxes for students each year. You can visit their website for further information at http://f2.washington.edu/fm/sfs.

You can also consult a tax accountant.

Travel Funds

Occasionally funds are allocated for Pathobiology graduate students who are going to give research presentations at scientific meetings. Contact the Program Manager regarding travel fund opportunities.

Appendices

Appendix A

New Student Checklist

☐ **Set up a UW NetID and email**
Admitted students receive their student number and PAC (personal access code) after accepting the offer of admission. With a student number and PAC, a UW NetID can be set up: https://admit.washington.edu/uw-netid/. A student's UW NetID will precede @uw.edu and become the student's UW email address. Information regarding establishing your UW email can be found here: http://www.washington.edu/itconnect/connect/email/.

☐ **Communicate with your student host**
Incoming students are paired with a continuing student during the admissions process. Student hosts can assist with the transition of moving to Seattle, entering graduate school, and the identification of social and cultural resources.

☐ **Register for courses**
In order to register for courses, students must first have established a UW NetID. International students must also complete an online check-in. Students should reference the UW Academic Calendar for dates of instruction, registration deadlines, school holidays, and more.
Faculty Add codes: Some PABIO courses (PABIO 500,600,700,800) are restricted by faculty codes. Your Program Manager will communicate with you regarding obtaining your PABIO 500 (Rotation) Faculty Add Code prior to the start of the quarter, in addition to your other Autumn quarter required course registration.

☐ **Find housing:** The majority of our students live off-campus in shared housing. Campus housing information can be found through UW Housing and Food Services. They offer housing options for single students and students with families. For off-campus housing, Craigslist is more often used. The UW School of Law has a list of neighborhood descriptions to assist with identifying housing: http://www.law.washington.edu/Admissions/Admits/Housing/. In addition, the current Pathobiology Students hold online information session to assist you with finding housing and other logistical questions regarding living in the Seattle area. Information regarding this session will be sent to incoming students during the Summer prior to your first Autumn Quarter.

☐ **Research transportaton options**
Most students utilize the U-PASS linked to your Husky Card to travel by Metro bus, Seattle Street Car, and Link light rail around town. Students automatically have access to the pass each quarter they are registered. Extensive bike and walking trails are found around Seattle as well. The closest airport to Seattle is SeaTac International Airport. For new residents, referring to a map of the Seattle area is strongly recommended; with so many bodies of water and hills it can be a confusing city to navigate.

☐ **Set up your first rotation lab**
The Program Manager will send out a list of faculty looking for students for rotations by July. You are encouraged to contact faculty directly to discuss. Plan to have your rotation set up by the beginning of September at the latest.

☐ **Get your Husky Card**
The Husky Card is the official identification card for members of the University of Washington community. The U-PASS is electronically embedded into the Husky Card (you'll scan it when you get on the bus or other transportation that is covered). A Husky Card should be obtained as soon as a student arrives on campus. The Husky Card Account & ID Center is located on the ground floor of the Odegaard Undergraduate Library: https://hfs.uw.edu/Husky-Card-Services/Husky-Card/ID-Center-Locations

☐ **Apply for Washington state identification**
New Washington state residents are legally required to get a Washington state driver's license or ID card within 30 days of moving to the state. Check out the Washington State Department of Licensing website (http://www.dol.wa.gov/officelocations.html) to find office locations and information on what type of identification is needed when applying for an ID or driver's license. If eligible, you can also register to vote when getting an ID.

☐ **Explore UW resources**
The UW Student Guide (http://www.washington.edu/students) is a comprehensive reference for UW students and includes information on Academics, Finances, Student Life, University Policies, and much more. The University Bookstore (http://www.bookstore.washington.edu/home/home.taf) is where you can purchase Husky products and books for class.

☐ **Prepare for the first day of class**
Helpful maps include a campus map (http://www.washington.edu/maps) and a Health Sciences Building (HSB) map (http://depts.washington.edu/disteche/images/healthsciencesmap.pdf). The Health Sciences Building is where many of your classes will be held. It is a very confusing building! You are highly encouraged to locate your classrooms in advance of the first day of class.

☐ **Attend school and departmental orientations**
Attendance at the Pathobiology Program Orientation is required for all entering students. Typically, it is held the week prior to the beginning of Autumn Quarter.

☐ **Attend the TA/RA Conference sessions that are relevant to you**
The conference schedule is at the Center for Teaching and Learning website: https://www.washington.edu/teaching/programs/ta-conference/.

Appendix B

First Year Student Checklist

To do:

- ☐ Pathobiology Program Orientation
- ☐ Complete three lab rotations
- ☐ Take Pabio core courses
- ☐ Select dissertation lab by June
- ☐ IDP – Complete and submit to Program Manager

Coursework:

Autumn
- ☐ PABIO 500
- ☐ PABIO 550
- ☐ PABIO 551
- ☐ PABIO 581
- ☐ IMMUN 441

Winter
- ☐ PABIO 500
- ☐ PABIO 552
- ☐ PABIO 580
- ☐ PABIO 553

Spring
- ☐ PABIO 500
- ☐ PABIO 536
- ☐ PABIO 582
- ☐ PABIO 591

Autumn, Winter or Spring
- ☐ HSERV 579*

Summer
- ☐ UCONJ 510 (2 credits)

* This course is offered AUT/WIN/SPR quarters – recommended to be taken in the First year of Program. It is best for 1st Year Cohort to **take this course during their Spring Quarter**; however, it can be taken in Winter Quarter if it works with your schedule.

Appendix C

Second Year Student Checklist

To do:

- ☐ Carry out research in dissertation lab
- ☐ Complete Pabio core and elective class work
- ☐ Select Supervisory Committee during Autumn Quarter
- ☐ Hold committee meeting(s)
- ☐ Update IDP – Discuss with Mentor, Committee and submit to Program Manager

Coursework:

Autumn
- ☐ PABIO 581
- ☐ EPI 511
- ☐ PABIO 600

Winter
- ☐ PABIO 580
- ☐ PABIO 600

Spring
- ☐ PABIO 582
- ☐ PABIO 591
- ☐ PABIO 600

Summer
- ☐ PABIO 600 (2 credits)

Appendix D

Third Year Student Checklist

To do:

- ☐ Carry out research in dissertation lab
- ☐ Complete General Exam by Autumn Quarter
- ☐ Hold committee meeting(s)
- ☐ Update IDP – Discuss with Mentor, Committee and submit to Program Manager

Coursework:

During the Third Year Any Quarter
- ☐ PABIO 598

Autumn
- ☐ PABIO 581
- ☐ PABIO 600

Winter
- ☐ PABIO 580
- ☐ PABIO 600 (if General Exam not completed) or Pabio 800 (if General Exam passed)

Spring
- ☐ PABIO 591
- ☐ PABIO 600 or 800

Summer
- ☐ PABIO 600 or 800 (2 credits)

Appendix E

Fourth Year and Beyond Student Checklist

To do:

- ☐ Carry out research in dissertation lab
- ☐ Complete didactic teaching requirement
- ☐ Hold committee meeting(s)
- ☐ Complete dissertation and final exam
- ☐ Update IDP – Discuss with Mentor, Committee and submit to Program Manager

Coursework:

Autumn/ Winter/ Spring/ Summer

- ☐ PABIO 800
- ☐ Finish any outstanding electives
- ☐ PABIO 580

Appendix F

General Exam Checklist

Before beginning the General Exam process, please be sure to familiarize yourself with the UW Graduate School's Doctoral Degree Policies (http://grad.uw.edu/policies-procedures/doctoral-degree-policies). You are responsible for knowing this information.

DURING AUTUMN QUARTER OF YOUR SECOND YEAR

☐ **Form your Doctoral Supervisory Committee.**
The committee must have a minimum of four members, including:

- Faculty advisor (Chair)
- Two members (two committee members must be Pathobiology faculty)
- Graduate School Representative (GSR)
    - Please note that only one of the committee members is permitted to not be appointed as Graduate School Faculty.

To set up your Doctoral Supervisory Committee, email the Program Director and Program Manager the following:

- The name(s) of your faculty advisor or co-advisors.
- The names of at least two faculty who have agreed to be on your committee.
- The name of the GSR who has agreed to be on your committee.
    - See the Graduate School's GSR Eligibility Information (http://grad.uw.edu/policies-procedures/doctoral-degree-policies/graduate-school-representative-gsr-eligibility) if you have questions concerning who can serve as your GSR.

AT LEAST THREE MONTHS BEFORE YOUR GENERAL EXAM

☐ **Set the General Exam date with your Supervisory Committee.**
At least four members of your committee must be present at the exam. These members must include the Chair, GSR, and at least two additional Graduate Faculty members. However, it is recommended you have a committee of five total members.

AT LEAST THREE WEEKS BEFORE YOUR GENERAL EXAM

☐ **Schedule your General Exam online via MyGrad.**
If your exam will not be held on the UW main campus, Fred Hutch, or at Seattle Children's Research Insitute, you will need to include the full address and room number of the venue. When the exam is approved, you will be notified that your Committee Signature Form is available. The Committee Signature Form is sent electronically to both you and your advisor. Please remember to print it out and bring to your General Exam.

AT LEAST TWO WEEKS BEFORE YOUR GENERAL EXAM

☐ **Submit your dissertation research proposal to exam committee members and the Program Manager.**

AT LEAST ONE DAY BEFORE YOUR GENERAL EXAM

☐ **Print out the Committee Signature Form for your exam.**
Make sure to bring it with you to your exam.

AFTER YOUR GENERAL EXAM

☐ **Return the signed Committee Signature Form to the Program Manager.**
Within three days or no later than the last day of the quarter, whichever is first. The Program Manager will officially report the outcome of your exam to the Graduate School. Upon successful completion of your General Exam, the Program Manager will also send an announcement to the Pabio listserv unless a special request is made.

Appendix G

Dissertation Defense Checklist

Before beginning the Final Exam process, please be sure to familiarize yourself with the UW Graduate School's Doctoral Degree Policies (http://grad.uw.edu/policies-procedures/doctoral-degree-policies). You are responsible for knowing this information.

SHOULD ALREADY BE DONE

☐ **Complete requirements for degree.**

☐ **3.0 minimum cumulative GPA.**

☐ **Set up your Doctoral Supervisory Committee.**
The committee must have a minimum of four members, including:

- Faculty advisor (Chair)
- Two members (two committee members must be Pathobiology faculty)
- Graduate School Representative (GSR)

If your committee membership has changed since it was set up, please make sure to inform the Program Manager.

☐ **Have a formal committee meeting.**
Each member must be in agreement that you should proceed with writing your dissertation. The full Supervisory Committee must then formally agree to the date and time of your exam before your schedule your Final Exam online.

☐ **Committee report signed by all members.**
The report must detail in writing that the members are in agreement about the timing of the dissertation defense.

AT LEAST THREE MONTHS BEFORE YOUR FINAL EXAM

☐ **Set the Final Exam date with your Supervisory Committee.**
At least four members must be present at your Final Exam. These include the Chair, Graduate School Representative, and one additional Graduate Faculty member.

☐ **Establish the Reading Committee.**
The Reading Committee must have a minimum of three members, consisting of:

- Faculty advisor (Chair)
- Two other Supervisory Committee members

Email this information to the Program Manager to get this set up.

AT LEAST FIVE WEEKS BEFORE YOUR FINAL EXAM

☐ **Present your Reading Committee with your dissertation.**

Your Reading Committee must agree that the work described in the dissertation is appropriate for fulfillment of the doctoral degree and that the dissertation is in good enough shape that you will be able to make the necessary changes prior to the end of the quarter.

☐ **Schedule your Final Exam.**
This includes finding a room, confirming with your committee they are available, and submitting a request for your Final Exam in MyGrad (http://grad.uw.edu/for-students-and-post-docs/mygrad-program).

AT LEAST ONE DAY BEFORE YOUR FINAL EXAM

☐ **Print out the exam Committee Signature Form and bring it to your Final Exam.**
Once the Program Manager has received confirmation of your Supervisory Committee approval, they will approve the request for your Final Exam online (a system generated email will be sent to the student and all members of the committee) and email the Committee Signature Form to the student and their advisor.

WITHIN THREE DAYS OF COMPLETING THE EXAM

☐ **Return the signed Committee Signature Form to the Program Manager within three days or by the end of the quarter, whichever is first.**
The Program Manager will officially report the outcome of your exam to the Graduate School. Your Committee Signature Form must be returned to the Program Manager. You will also submit via email attachments, the abstract of your Dissertation Defense and publications. Upon successful completion of your Dissertation Defense, the Program Manager will also send an announcement to the Pabio listserv unless a special request has been made.

Appendix H

Doctoral Dissertation Checklist

Review the Graduate School dissertation submission policies carefully before preparing your final dissertation document: https://grad.uw.edu/for-students-and-post-docs/thesisdissertation/.

☐ **Doctoral Dissertation Reading Committee Approval Process.**
All Reading Committee members can approve the dissertation after the student's final exam has been scheduled by logging into https://grad.uw.edu/for-faculty-and-staff/mygrad-faculty-view/,

☐ **Complete the Survey of Earned Doctorates (SED)**
Upload the SED Certificate of Completion to the Administrative documents section of the UW ETD Administrator Site.

☐ **Submit your final dissertation electronically to the UW ETD Administrator Site.**
Deadline is the last day of the quarter of graduation.

Appendix I

Graduation Checklist

☐ **Department of Global Health Graduation Reception**
The Department of Global Health holds a special reception during finals week each Spring Quarter to individually recognize graduates. Highlights include student speakers and hooding ceremony for PhD recipients.

☐ **School of Public Health Graduation**
The School of Public Health Graduation Celebration (https://sph.washington.edu/graduation) is held during finals week each Spring Quarter and recognizes undergraduate and graduate degree recipients.

☐ **University of Washington Commencement**
The annual UW Commencement Ceremony (http://www.washington.edu/graduation) is held the Saturday following finals week of Spring Quarter. The event includes bachelor, master, doctoral, and professional degree students. An estimated 5,000 graduates and 40,000 guests participate. Graduates who earned their degrees the Summer, Autumn, and Winter prior to the Commencement are eligible to participate. Candidates who have a reasonable expectation of graduating the Spring or Summer Quarter directly preceding and following the Commencement Ceremony are also eligible to participate.

Appendix J

Student Progress Checklist

	Quarter	Events	Date Accomplished
Year 1	Autumn	Arrange rotations	
		Complete rotation one	
	Winter	Complete rotation two	
	Spring	Complete rotation three	
		Select dissertation lab	
		Rotation research presentation at first year symposium	
	Summer	Begin dissertation research	
Year 2	Autumn	Establish Doctoral Supervisory Committee	
		Present poster at Retreat	
	Winter or Spring	Research presentation at Graduate Research Symposium	
	Summer	Formal coursework should be finished	
	Spring/Summer	Committee meeting(s)	
Year 3	Autumn	Present poster at Retreat	
		Schedule oral part of General Exam; Dissertation Research Proposal must be given to committee members at least two weeks prior to oral examination.	
	Winter or Spring	Research presentation at Graduate Research Symposium	
	Variable	Committee meeting(s)	
		Complete General Exam by end of Winter Quarter	
		Complete didactic requirements (TA for a Pabio course)	
Year 4	Autumn	Present poster at Retreat	
	Winter or Spring	Research Presentation at Graduate Research Symposium	
	Variable	Committee meeting(s)	
Year 4 and on	Prior to submitting dissertation and scheduling defense	Meet with Committee	
	Variable	Complete dissertation research	
		Write dissertation	
		Give defense	

Appendix K

Pathobiology Graduate Program Rotation Confirmation

Date: _____

During the _____ quarter, I will do a rotation in the laboratory of

Dr. _____. We have met, discussed, and agreed to this arrangement.

_____
Student Name (printed)

_____ _____
Student (signature) Date

_____ _____
Rotation Supervisor (signature) Date

IT HAS BEEN APPROVED BY:

_____ _____
Graduate Program Director (signature) Date

Appendix L

Student Rotation Evaluation

PABIO 500
Student Performance Appraisal

Student Name_____

Rotation Supervisor_____

Quarter, Year_____

Number of credits registered_____

	Excellent	Adequate	Unsatisfactory
Attendance			
Lab notebook			
Participation			
Lab presentation			
Written report			
Experimental progress			

Additional Comments:

Grade (circle one): CREDIT NO CREDIT

_____ _____
(Rotation Supervisor's signature) Date

_____ _____
(Student's signature) Date

Appendix M

Advisor Confirmation

Interdisciplinary Program in Pathobiology
Department of Global Health
University of Washington

Date: _____

Beginning _____ quarter, Dr. _____ will be acting as my permanent advisor. We have met and discussed this arrangement. I am aware that this arrangement is not a guarantee of funding.

_____
Student Name (printed)

_____ _____
Student (signature) Date

_____ _____
Advisor (signature) Date

_____ _____
Graduate Program Director (signature) Date

_____ _____
Human Resources Delegate (signature) Date

Appendix N

Report of Graduate Student Committee Meeting

Interdisciplinary Program in Pathobiology

Date: _____

Student name: _____

Committee members present: _____

_____ IDP was reviewed and discussed by the committee with suggestions made

Research Progress report submitted was:

_____ Satisfactory

_____ Unsatisfactory *

* If checked, this constitutes formal warning that adequate research progress has not been made to date.

_____ Provisional**

Comments/Recommendations:

** For provisional report: Specific expectations to be met in the next three months:

1.

2.

3.

4.

_____ Chairperson

_____ Member

_____ Member

_____ Member

_____ Member

_____ Member

I agree/do not agree that this report reflects the conclusions reached at the committee meeting.

_____
Student (signature)

Next Committee Meeting Scheduled for: _____

Appendix O

Pathobiology PhD Program – Student Research Symposium Evaluation Form

Student Name: _____ Reviewer Name: _____

Did it appear that student had practiced the presentation? __ Yes __ No
Was the talk on time? __ Yes __ No

1=Needs Improvement; 2=Sufficient; 3=Good; 4= Very good; 5=Excellent	**(Circle one per section)**				
Introduction	1	2	3	4	5
Clarity of hypothesis	1	2	3	4	5
Use of appropriate scientific methods	1	2	3	4	5
Summary/Conclusion	1	2	3	4	5
Answers to questions	1	2	3	4	5
General comments on all aspects of the presentation:					

Appendix P

Faculty Research Interests

Members of the Graduate School Faculty are denoted by an asterisk (*). Graduate faculty membership with endorsement to chair enables professors to serve as the chair of graduate student supervisory committees. Please be advised that not all Pathobiology faculty accept graduate students in their laboratories. We encourage you to contact those faculty with whom you are interested in working.

***Kristina Adams Waldorf, MD**
Dr. Adams Waldorf's research focus is on pregnancy infections, preterm birth and fetal injury related to Group B Streptococcus, *E. coli* and Zika virus. Her lab is focuses on the following: 1) virulence and host factors that contribute to pathogen trafficking into the amniotic cavity and fetus; 2) how activation of innate immune respes by pathogen within the placent and fetus contributes to pregnancy; and how disruption of maternal-fetal tolerance by pathogen contributes to preterm birth. She is also investigating the rol of novel therapeutics to prevent preterm burht and injury due to pathogens.Dr. Adams Waldorf has collaborations with Dr. Rajagopal on Group B streptococcus and with Dr. Gale on the innate immune response to Zika virus infection and mechanisms of immune evasion.

***John Aitchison, PhD**
Dr. Aitchison's research focuses on systems-based approaches to reveal and understand complex biological phenomena focusing on yeast as a model for developing systems biology approaches to infectious disease research. Understanding cellular function from this perspective is essential to developing strategies for intervention when these functions go awry, causing diseases (such as neuropathologies or cancer) or are usurped in the cases of infection by pathogens. The lab also studies the molecular mechanisms responsible for sorting proteins to peroxisomes – an organelle in the cytoplasm of cells that is responsible for metabolizing fatty acids. Defects in peroxisomal functions have been associated with neuropathologies, diabetes, obesity, metabolic syndrome, cancer and aging. Another research interest of the lab is the development of innovative and dramatically new approaches for the detection, isolation, and analysis of macromolecular complexes that will enable scientists to realize the full potential of the revolution brought about by genomics, interdisciplinary research, and proteomics technologies.

***Daphne Avgousti, PhD**
Dr. Avgousti's research focus is on how viruses manipulate cellular chromatin for viral benefit. Specific interests include how the Adenovirus encoded histone-like protein (Protein VII) manipulates host chromatin and how DNA viruses use histones or histone-like proteins to both compact their own genomes and control host genomes.

Daniel Blanco Melo, PhD
Dr. Daniel Blanco-Melo studies the biological mechanisms that animals have deployed throughout evolution to combat viral infections. He explores how changes in our antiviral strategies are driven by the constant struggle with past and current viral infections. The Blanco-Melo Lab's research is focused on the many complex biochemical processes that are activated within cells upon infection. His group studies important human viruses, such as influenza A and SARS-CoV-2, as well as ancient viral pathogens and the impact of those past agents on the evolution of animal immunity. Dr. Blanco-Melo's lab uses a combination of molecular biology, genetics and advanced computational techniques to better define and exploit our highly evolved antiviral responses, which can help in the design of drugs against both current and emerging viral threats.

***Lee Ann Campbell, PhD**
Dr. Campbell's overall research emphasis is the elucidation of molecular mechanisms of chlamydial pathogenesis. *Chlamydia pneumoniae,* a human respiratory pathogen, has been associated with cardiovascular disease and found in atherosclerotic lesions. A major focus is on elucidating the role of *C. pneumoniae* in atherogenesis through the use of animal models of *C. pneumoniae* infection and atherosclerosis and *in vitro* models. Efforts are also focused on host/pathogen interactions to elucidate the mechanisms by which *Chlamydia* enters the host and the host receptors involved. Animal models are also being used to investigate therapeutic interventions and develop preventive strategies. Dr Campbell is a Professor Emeritus.

***Gerard Cangelosi, PhD**
Dr. Cangelosi works on infectious diseases, most notably in the areas of molecular diagnostics, pathogen detection, and exposure/transmission issues. His work in the public and private sectors has addressed tuberculosis and related diseases, waterborne pathogens, enteric disease, and hospital acquired infections. Recent accomplishments include the development of a novel, oral swab-based tuberculosis case finding approach, new molecular viability testing methods, and new semi-synthetic affinity reagents for molecular diagnostic testing.

***Darrick Carter, PhD**
Dr. Carter's research focuses on adjuvants, immune therapies, neglected tropical disease vaccines, and global immune oncology. A major emphasis is on translating new vaccines and therapeutics into clinical development. They currently have a late stage vaccines to be tested for schistosomiasis and two others in the pipeline for onchocerciasis and lymphatic filariasis. His new spinout is developing human cancer therapeutics under the tag line immune therapy for all.

***Helen Chu, MD**
Dr. Chu's research is focused on maternal immunization, in particular vaccines against influenza and respiratory syncytial virus (RSV). She studies the virologic and immunologic correlates of protection from respiratory viral infections in pregnant women, infants, and older adults, and performs clinical trials of vaccine candidates in both domestic and international sites, including Nepal and Bangladesh. She has developed immunologic assays to study transplacental transfer and decay kinetics of RSV antibody, and nosocomial and household transmission of respiratory viruses by genotypic analysis and molecular sequencing.

Lillian Cohn, PhD
Dr. Lillian Cohn is an immunologist who studies latent HIV infection. Her work analyzes the biology of reservoirs of HIV-infected CD4+ T cells that quietly persist despite continuous antiretroviral therapy. Because these cells proliferate and can start producing new virus in the absence of such drugs, there is no cure yet for HIV. Dr. Cohn uses advanced techniques to understand the various mechanisms that cause populations of latently infected cells to expand and reactivate, in hopes of finding ways to stop that process permanently and effectively cure the disease.

***Rhea Coler, PhD**
The overall research emphasis is to rationally design vaccines for infectious diseases that require humoral and cellular immunity. Efforts are focused on understanding the factors affecting innate and adaptive immune responses to infectious diseases using in vivo model systems and human clinical trial samples. Host/pathogen interactions and next generation adjuvant formulations and delivery systems are also studied to elucidate the mechanisms by which effective B and T cell immune responses are conferred in experimental animal models of *Mycobacterium tuberculosis*, *Leishmania* sp., West Nile Virus, non-tuberculous mycobacteria, Chikungunya, Zika virus and influenza.

***Ian N. Crispe, MD, PhD**
The Crispe lab studies innate immunity and T cell immunity with emphasis on the liver. The liver is the preferred site of several important infections that exploit a loophole in T cell immunity, but in so doing activate strong innate immunity. The goal of the lab is to understand how T cells and innate immune cells interact in the

unique liver environment. Dr. Crise's address these issues in animal models, and in human liver tissue in organ culture.

Malcolm Duthie, PhD
Dr. Duthie's main research interest lies in determining and examining the host/pathogen interactions that initiate and control immune responses, how these interactions can be beneficially manipulated, and ultimately, their practical application within disease control programs. An emphasis is placed on emerging infections and neglected tropical diseases. This research uses preclinical models of immunization and infection to determine mode-of-action of early stage vaccine candidates. It also capitalizes on an extensive collaborative network across several countries to identify vaccine candidates and develop new diagnostic tools to improve the control of influenza, leprosy, leishmaniasis and Chagas disease.

***Michael Emerman, PhD**
The Emerman lab studies host-cell interactions of the human immunodeficiency virus (HIV) and related viruses. They wish to understand the molecular and evolutionary basis of virus replication and pathogenesis. Dr. Emerman's lab studies the evolution and function of host antiviral genes in order to determine how HIV adapted to humans, and how ancient viral infections influenced the susceptibility or resistance of humans to modern lentiviruses.

***Ferric C. Fang, MD**
Core research programs in the Fang laboratory include the pathogenesis of Salmonella and staphylococcal infections, transcriptional regulation by xenogeneic silencing, reactive oxygen and nitrogen species in host-pathogen interactions, extracytoplasmic stress responses, and host and microbial iron metabolism. He also conducts translational research to develop novel molecular diagnostic methods.

Christopher Fox, PhD
Dr. Fox's research focuses on developing stable, biocompatible vaccine adjuvant formulations, including physicochemical characterization and cGMP production. Vaccine adjuvants are a critical component of modern vaccine development. Dr. Fox's work involves the major classes of clinical adjuvant formulations including aluminum salts, oil-in-water emulsions, and liposomes. Furthermore, Dr. Fox's research has investigated the interactions of Toll-like receptor ligands with various formulation platforms and the resulting biological effects in a variety of disease models, including tuberculosis, malaria, leishmaniasis, pandemic influenza, and amebiasis.

***Lisa Frenkel, MD**
Dr. Frenkel's laboratory studies the establishment of drug resistant HIV reservoirs, persistence of mutations that lead to virologic failure and work to develop inexpensive assays to help manage treatment in low-resource setting. In addition, we study the mechanisms allowing HIV infection to persist during effective ART. These projects examine modulations in gene expression and immune function from persisting HIV and how these may lead to persistence of infection, allow viral co-infections such as human papilloma viruses to transform cells and contribute to persistent inflammation

***Michael Gale, Jr., PhD**
Dr. Gale's research is focused on understanding the molecular mechanisms of innate immune response and immune programming against infection by RNA viruses, including HIV and emerging flaviviruses. His group also examines the virus/host interactions that impart immune evasion and disease. The group leverages this information to build improved vaccines, vaccine adjuvants, and antiviral therapeutics.

***Denise Galloway, PhD**
The Galloway laboratory focuses on small DNA tumor viruses, namely human papillomaviruses (HPVs) and human polyomaviruses (HPyVs), in order to better prevent, diagnose and treat the diseases they cause. We have taken a broad-based approach to studying these viruses employing state of the art molecular and immunologic

tools, and collaborating with clinicians, epidemiologists and biostatisticians to answer highly significant questions.

***Lorenzo Giacani, PhD**
Dr. Giacani's work focuses on the pathogenesis of syphilis and how the causative agent of this infection, *Treponema pallidum* subsp. *pallidum* (*T. pallidum*), can successfully evade the host immune response and establish persistent infection in spite of a vigorous host immune response. Research topics in the Giacani's lab focuses mainly on vaccine development against syphilis, genomics and transcriptomics of the syphilis agent, discovery of diagnostics markers, and testing of new drugs for syphilis.

***Leslie Goo, PhD**
Dr. Goo's research is focused on immune responses to flaviviruses, which are transmitted to humans by mosiquitos and tics This group of viruses include dengue virus, West Nile virus, Zika virus, Japanese encephalitis virus, and uello fever virus. The overall goal is to dissect the role of antibodies in flavivirus immunity in order to inform vaccine design and drug discovery.

Sean Gray, PhD
Dr. Gray's research focuses on advancing a diverse project portfolio in areas including vaccines for neglected tropical diseases (NTDs), adjuvants, drugs to treat XDR and MDR *Mycobacterium tuberculosis*, and cancer immunotherapies. Current activities include a first clinical trial for a vaccine against human schistosomiasis as well as pre- clinical development of a human lymphatic filariasis (River Blindness) vaccine and a canine vaccine against *Dirofilarial* heartworms.

***Alex Greninger, MD, PhD**
In addition to clinical and clinical trial responsibilities, Dr. Greninger focuses on genomic and proteomic characterization of a variety of human viruses and bacteria, with a focus on respiratory viruses and human herpesviruses. He has discovered a number of new human and animal viruses. His basic science lab uses genomically informed approaches to understand human and animal infectious diseases.

***Christoph Grundner, PhD**
Mycobacterium tuberculosis (Mtb) remains the most deadly bacterial pathogen, and rampant drug resistance is requiring renewed efforts to find new and better therapies. The Grundner lab seeks to map the signaling pathways that underlie Mtb's adaptability and pathogenesis. These studies provide fundamental insight into Mtb biology and identify new targets for therapeutic interference. A major bottleneck in Mtb research on every level is the large number of genes with unknown function in the Mtb genome. The lab uses chemical proteomics approaches towards high-throughput identification of functions for these unknown proteins. These new tools allow probing of even the most divergent enzyme space.

***John Hansen, PhD**
Research in Dr. Hansen's laboratory focuses on mediators of inflammation, the development of immune-related tools for salmonids, host-pathogen interactions and the combined effect of environmental stressors and disease on fish and wildlife health in the US. Current projects involve using zebrafish to assess virulence factors of Francisella noatunensis (fish specific pathogen), pattern recognition receptors and the role of environmental contaminants for mediating transgenerational inheritance of immune dysfunction. These research efforts have translational value for both human and fish health.

***Whitney Harrington, MD, PhD**
Dr. Harrington's research is focused on the intersection of infection, pregnancy, and pediatrics. She is interested in the effect of infection in pregnancy on the development of the fetal and infant immune system and subsequent susceptibility to infection in the offspring. Her lab focuses on the role of maternal microchimerism in fetal and infant immunity to malaria, HIV, and early vaccination.

***Thomas Hawn, MD, PhD**
The Hawn lab investigates host mechanisms of disease pathogenesis with an emphasis on genetic, cellular, and molecular studies of the innate immune response. His laboratory examines why individuals have different susceptibility to infections and whether these insights can lead to novel treatment and vaccine strategies. Several approaches are used to understand this question. Ex vivo and in vitro immunologic, cellular and molecular assays are used to understand how innate immunity genes and their variants mediate cellular immune responses to pathogens. Case-control human genetic studies are then used to find associations of polymorphisms in innate immune response genes with immune responses and disease susceptibility. These methods are used to study the innate immune response to *Mycobacterium tuberculosis*, *M. leprae*, and *Legionella pneumophila*. The primary focus is on *M. tuberculosis* and understanding mechanisms of resistance to Mtb infection, susceptibility to TB disease, and mechanisms of BCG-induced vaccine responses.

***Kevin Hybiske, PhD**
Dr. Hybiske's laboratory investigates *Chlamydia*–host interactions on three distinct fronts: (1) functional genomics in *Chlamydia* through transposon mutagenesis and lateral interspecies gene transfer; (2) molecular mechanisms of *Chlamydia* exit from host cells and strategies of dissemination; and, (3) the application of proteomic systems to identify and characterize the networks of host proteins recruited by secreted effector proteins during infection.

***Jennifer Hyde, PhD**
The interferon (IFN) response is a major determinant of pathogenesis for many viruses. Not surprisingly, these viruses have evolved many and diverse mechanisms to inhibit the IFN response and its downstream effector molecules (IFN stimulated genes; ISGs). The goal of Dr. Hyde's research is to identify and characterize interactions between viruses and host immune molecules that contribute to the development of pathogenesis. In particular, Dr. Hyde's research is focused on understanding the role of viral RNA structure in virus-host interaction, and how viruses use RNA structure to manipulate cellular pathways.

***Keith Jerome, MD, PhD**
Dr. Jerome's research interests focus on chronic and latent viral infections, and potential approaches to their eradication. His main research effort involves novel gene therapy approaches, especially gene editing, for the potential cure of these infections. Dr. Jerome has active projects focused on potential cure of HIV, herpes simplex virus, and hepatitis B virus. The long-term goal is to develop curative therapies for each of these infections. Clinically, Dr. Jerome serves as Director of the University of Washington molecular virology laboratory.

Christopher Johnston, PhD
Research in the Johnston lab centers on microbial epigenetics, specifically DNA methylation –the addition of a CH3 group to specific nucleotides in DNA – and how this alters protein-DNA binding interactions. We focus on how this relatively simple modification influences the spread of information between bacteria during horizontal gene transfer, the alteration of global transcriptional or virulence patterns within a population of cells, and also how it relates to barriers to genetic engineering in the lab. In the latter, funded by an NIH transformative research award, we are overturning the restrictive paradigm of genetic intractability in microbiology by creating broadly applicable technologies and methodologies to permit genetic engineering of any cultivable bacterial species; massively expediting fundamental examinations of microbes relevant to health and disease. The long-term goal of our research is to generate a deeper functional understanding of '*what bacteria are capable of doing*', to figure out '*how they are doing it*', and subsequently use that information to engineer novel therapeutics and the next generation of microbe-based technologies for application in human medicine and bioengineering.

***Stefan Kappe, PhD**
Dr. Kappe research is focused on understanding the complex biology of the malaria parasite and the immune responses to infection, using this information to design transformational interventions that will help win the fight against malaria. Dr. Kappe has made major contributions to the field of pre-erythrocytic malaria infection

biology, immunology and vaccine development using rodent malaria parasite/mouse models as well as human malaria parasites. He has been at the forefront of development of technologies that enabled and enhanced the study of malaria parasite pre-erythrocytic stages, which are extremely challenging to study, particularly for human malaria parasites. Dr. Kappe leads one of the few groups in the world that can conduct research on sporozoite infection and liver stages of the human malaria parasites *Plasmodium falciparum* and *Plasmodium vivax.*

***Alexis Kaushansky, PhD**
Dr. Kaushansky's research emphasis is how host cells respond to intracellular pathogens. One major focus within the lab is the basic question of how the malaria parasite is able to modify its human liver environment in order to counteract host defenses and ensure for its own survival. Historically, investigating this question has been slowed by technical hurdles and as such we adapt and develop a range of technological approaches to address this line of inquiry. Her lab is also extremely interested in identifying common underlining requirements that diverse pathogens have of their host cells and translating these insights into interventional approaches that slow or stop the infection of infection.

***Megan Koch, PhD**
Dr. Koch's research focuses on maternal-fetal interactions with an emphasis on immunity, metabolism and the microbiota. Specific areas of interest are how the neonate avoids inflammatory responses against the microbiota, elucidating the mechanisms by which maternal antibodies function in vivo to limit neonatal immune responses, and elucidating the impact of how the lack of maternal antibodies in early life impact immune and metabolic health long term.

***David Koelle, MD**
The Koelle lab has several funded research projects unified by an interest in the acquired, antigen-specific human T cell response and mostly centering on infectious disease pathogens. For alphaherpesviruses such as HSV and VZV preferentially that infect skin and ganglia and show lifelong latency with reactivations, the lab group studie tissue resident memory T cell responses, and also performs immune monitoring for studies of both licensed and investigational vaccines. In collaboration with oncologists and dermatologists, the Koelle lab is trying to optimize immunotherapy for Merkel cell carcinoma caused by a polyomavirus, with an emphasis on virus-specific T cells. A newer project focuses on the human T cell response to *Treponema pallidum*, the microbial agent of syphilis. Modern molecular immunology techniques such as single cell TCR sequencing, TCR functional reconstruction, tetramers (HLA class I and II), and efficient library-based methods for T cell antigen/epitope discovery are applied across projects.

***James Kublin, MD**
The development of a safe and effective vaccine to prevent HIV infection is key to ending the global epidemic of this disease. As Executive Director of the HIV Vaccine Trials Network, Dr. Kublin oversees day-to-day activities of the scientific and administration functions of this Network, and has a keen interest in the biomedical and social and behavioral research that will enable them to accomplish their mission of developing a globally effective HIV vaccine. Dr. Kublin also has a long interest in malaria, and is fascinated by the application of human infection studies to understand the pathobiology of Plasmodium as well as to develop effective antimalaria drugs and vaccines. More recently he is also focused on the role of the microbiome in training the immune system, particularly during early life, that predisposes individuals to immune mediated diseases later in life and that results in vaccine response heterogeneity.

***Gael Kurath, PhD**
Dr. Kurath conducts a research program investigating the epidemiology and evolution of rhabdoviral pathogens in fish hosts. The lab group conducts ongoing genetic surveillance of field isolates throughout the Pacific Northwest, where molecular epidemiology and phylogenetics have revealed viral emergence, displacement, and host jump events, and recently evolution of a generalist viral lineage from a specialist ancestor. They then use controlled in vivo infection studies with statistically significant numbers of animals to test predictions of

generalist-specialist and virulence evolution theory, with the ultimate goal of understanding how human actions may drive virus evolution.

***Paul Lampe, PhD**
Dr. Lampe's laboratory investigates the control of cell growth both at the cell biological/mechanistic level and through cancer biomarker discovery. The cell biology work focuses on the regulation of intercellular communication. For cancer biomarker discovery, the advent of new high data content methodologies has expanded the lab efforts into broad screens using high density antibody array technologies to discover proteomic, autoantibody and glycomic biomarkers of colon, lung, breast and pancreas cancer and the cell biological properties of cancer.

***Kelly Lee, PhD**
The Lee lab uses biophysical and structural techniques including cryo-electron microscopy (cryoEM), structural mass spectrometry (for example hydrogen/deuterium-exchange mass spectrometry), and fluorescence microscopy to understand the structure, dynamic responses, and function of virus and pathogen machinery. The viruses studied primarily are influenza A virus, HIV, and a number of novel emerging pathogens to understand virus structure, entry and inhibition. Dr. Lee has also recently expanded his studies to include the parasite responsible for malaria. We are applying our structural and biophysical approaches to understand the ultrastructure of this parasite, particularly at the earliest stages of invasion of the human host, and to determine how antibodies are able to prevent infection. These studies may help inform development of more effective vaccines against these important human pathogens.

***Dara Lehman, PhD**
Dr. Lehman's interests include viral dynamics, viral reservoirs, viral transmission and drug resistance. Her current projects involve cohorts of HIV infected women and their infants in Kenya to study the reservoir of infected cells that persist despite suppressive treatment with antiretroviral therapy, as well as a study of mother to child transmission of the virome (population of all viruses).

***Jairam Lingappa, MD, PhD**
For the last 10 years, Dr. Jairam Lingappa has focused his research efforts on identifying host factors mediating natural host resistance to and disease progression from HIV-1 infection. He has done this using samples and data prospectively collected in cohorts of African HIV-1 serodiscordant heterosexual couples (one partner HIV-1 infected and the other HIV-1 uninfected). In the context of these collaborative studies, he has coordinated integration of prospective clinical, epidemiological and behavioral data with laboratory analysis for genomic, transcriptomic, proteomic, virologic and microbiome factors. Currently, his team is primarily focused on analysis of whole human genome sequence data to identify rare genetic factors mediating altered risk of sexual HIV-1 acquisition.

***Jaisri Lingappa, MD, PhD**
Dr. Lingappa's laboratory studies viral-host interactions critical for virus assembly, with a focus on assembly of human immunodeficiency virus (HIV) and other retroviruses. Their studies demonstrate that HIV-1 assembly and genome packaging occur in host ribonucleoprotein complexes that contain enzymes that facilitate these processes. Currently, they are studying a novel small molecule that targets these complexes and blocks virus production in primary human cells at nanomolar concentrations. These studies confirm the importance of these co-opted host complexes and also pave the way for advancement of a new first-in-class antiretroviral inhibitor. Dr. Lingappa is a Professor Emeritus.

Maxine Linial, PhD
The Linial laboratory is interested in the natural and zoonotic transmission of simian foamy viruses (SFV). Foamy viruses (FV) are complex retroviruses that are prevalent in most primate species, and in some accidentally infected humans, as well as in cats, horses, and cows. These viruses are cytopathic to some but not all cells in tissue culture. However, in vivo there is no indication that any of these viruses are pathogenic. There is much interest in the use of FVs as gene therapy vectors since they have large genomes, broad host range and are non-pathogenic. In the past, our lab has worked on the molecular biology of foamy viruses, retroviruses that

cause cancers in birds, and also on HIV.

***Sheila Lukehart, PhD**
The Lukehart laboratory studies the pathogenesis of syphilis and the immune response to *Treponema pallidum* in humans and in animal models. A major focus of research is the 12-membered *tpr* gene family of *T. pallidum*, which is hypothesized to encode surface-exposed antigens that are major targets of the protective immune response, may be involved in immune evasion, and are promising vaccine candidates. We have demonstrated that one member of the Tpr family, TprK, undergoes antigenic variation, and variants are implicated in the development the secondary stage of syphilis. The laboratory is also working to identify surface molecules that are targets of opsonization and to define the kinetics of and requirements for bactericidal activity by macrophages. Many of the projects described above involve collaboration with Dr. Lorenzo Giacani. In collaboration with Dr. Caroline Cameron (University of Victoria), we are testing several antigen cocktails for efficacy as a syphilis vaccine in the rabbit model.

Additionally, our laboratory is involved in studies of clinical aspects of syphilis and other treponematoses. With Dr. Christina Marra (Neurology), the laboratory is exploring the molecular basis for neuroinvasion, the immunologic response to *T. pallidum* within the CNS, and the efficacy of recommended therapy for CNS syphilis in immunocompetent and HIV-infected patients. Other ongoing studies involve the investigation of emerging macrolide resistance in *T. pallidum*, application of a molecular typing method for *T. pallidum* to epidemiological studies of syphilis, studies of mass treatment for yaws control in Papua New Guinea (Dr. Oriol Mitja), and the role of treponemal infection in Tanzanian wild baboons as a potential reservoir for human infection (Dr. Sascha Knauf). Dr. Lukehart is a Professor Emeritus.

***Jennifer Lund, PhD**
Our focus is on elucidating the basic mechanisms of immunity in the context of virus infection. Specifically, we use mouse models to study T cell responses to genital HSV-2, Zika virus, and West Nile virus. Additionally, we are investigating the immune correlates of protection from HIV infection using a cohort of exposed seronegative individuals, as well as the potential immune modulatory effects of using pre-exposure prophylaxis in protection from HIV acquisition. Overall, we hope that our studies will lead to improved clinical interventions for virus infections of public health importance.

Shuyi Ma, PhD
Dr. Ma combines computational and experimental network biology approaches to understand the molecular interactions that determine infection and treatment fate in tuberculosis.

***M. Juliana McElrath, MD, PhD**
Dr. McElrath's laboratory seeks to identify the components of immunity that are important in preventing and controlling HIV-1 infection, with studies encompassing a broad range of translational research investigations in persons who experience unusual control of HIV-1. The McElrath Lab's research is focused on obtaining a better understanding of the role HIV-1-specific memory T cells play in protecting against mucosal HIV-1 transmission and determining optimal strategies to accomplish protection by vaccination.

***Andy McGuire, PhD**
Dr. McGuire and his lab study the antibody response to natural infection with viral pathogens of public health importance. They seek to obtain a high-level understanding of protective antibody responses to viral antigens and to use this information to design and test safe and effective vaccines. Current work focuses on HIV-1, Epstein-Barr virus, and the closely related coronaviruses that cause SARS and MERS.

***Patrick Mitchell, PhD**
Research in the Mitchell lab is focused on understanding basic principles that govern host-pathogen interactions that influence host immunity and pathogenesis. We are particularly interested in molecular innovations born from host-pathogen evolutionary 'arms races.' We combine approaches from evolution, genetics, biochemistry,

immunology and microbiology to decipher mechanisms that govern innate immune recognition and other host-pathogen interactions.

***Sean Murphy, PhD**
Dr. Murphy's research focuses on the immune response to *Plasmodium* infections, vaccine development, and malaria diagnostics. Specific areas of interest are focused on protective liver specific CD8+ T cell responses, identification of new protective T cell antigens for *Plasmodium,* and vaccine design.

***Peter Myler, PhD**
Dr. Myler's laboratory has been at the forefront of applying genome-scale technologies (next-generation sequencing, mRNA profiling and proteomics) and systems approaches to increase understanding of the molecular mechanisms underlying transcription *in Leishmania* and other trypanosomatid parasites, as well as regulation of gene expression during differentiation. Dr. Myler is also PI and director of the Seattle Structural Genomics Center for Infectious Disease (SSGCID), which is funded under a contract from the National Institute of Allergy and Infectious Diseases (NIAID), with the mission using X-ray crystallography, NMR spectroscopy and cryo-electron microscopy to solve the structure of proteins from emerging and re-emerging infectious disease organisms (bacteria, viruses and eukaryotic parasites). This data is made freely available to the scientific community in order to understand molecular function of these targets and to facilitate development of new therapeutics by using structure-guided drug and vaccine design.

***Evan Newell, PhD**
Dr. Evan Newell is an immunologist who develops and employs new technologies for accurately identifying specific biological signatures of human health and disease, including cancer and infectious diseases. He and his team work with blood and tissue samples, using mass cytometry and other single-cell analysis methods to better understand how the specificities of immune T cells influence their roles in clinically productive responses against pathogens or cancers.

***Molly Ohainle, PhD**
Dr. Ohainle's research focuses restriction factors, which are host antiviral proteins expressed in response to viruses and triggered by the interferon response. She recently developed a novel method, using a virus-packageable CrispR Screen that assisted in the identification of IFN-induced HIV restriction factors as well as HIV dependency factors. Her specific research emphases are on elucidating the function of TRIM 34, a novel HIV Capsid-targeting restriction factor, determining how host cells resist HIV infection, and mechanisms by which HIV avoids these host responses.

***Alexander Paredez, PhD**
The Paredez Lab studies *Giardia lamblia*, a neglected protozoan parasite. *Giardia* infects more than 100 million people each year worldwide and is also the most prevalent intestinal parasite in the United States. *Giardia* belongs to an early branching group of eukaryotes known as Excavates. Notably, *Giardia* lacks several conventional organelles and has a minimalistic genome without many well studied proteins and pathways that are essential for its mammalian host. The focus of the Paredez lab is identification of essential yet divergent cellular processes in *Giardia* that can be leveraged against the parasite for novel therapeutic interventions. Our interest in *Giardia* also extends to the power of its minimalism in revealing broadly interesting fundamental principles of cell and developmental biology.

***Tanya Parish, PhD**
The Parish laboratory focuses on the discovery of new drugs that are effective at curing drug-sensitive and drug-resistant tuberculosis with the added goal of shortening the time it takes to cure disease. This encompasses a range of early stage drug discovery including drug target identification and validation, high throughput screening and medicinal chemistry. In addition, her group works to understand the pathogenic mechanisms and basic biology of the global pathogen Mycobacterium tuberculosis and using this information to inform drug discovery.

***Marilyn Parsons, PhD**
Among different disease agents, parasites are the most similar to their human host, which has made the search for drugs and vaccines highly challenging. A major focus of Dr. Parsons' laboratory is identifying differences in cell structure and function between parasites and humans. Her long-term goal is to identify differences between host and parasite that would be appropriate targets for drug development. Current work examines *Trypanosoma brucei* (African trypanosomes) and *Toxoplasma gondii*, with a focus on protein kinases. Dr. Parsons is a Professor Emeritus.

***Adrian Piliponsky, PhD**
Dr. Piliponsky's research interests focus on how basophils and mast cells regulate inflammation during bacterial infections. Dr. Piliponsky and Dr. Rajagopal are currently collaborating to investigate the role of mast cells in the host response to Group B Streptococcus. Another research focus is on the mechanisms by which basophils enhance the innate immune response during sepsis.

***Stephen J. Polyak, PhD**
Dr. Polyak's research focuses on the interactions between cells and viruses, with historical emphasis on hepatitis C virus (HCV). More recently, he has been working on filoviruses (Ebola, Marburg), arenaviruses (Lassa, Junin), and other flaviviruses (Zika). One focus of his molecular virology and cell biology laboratory involves characterizing innate antiviral and inflammatory responses to virus infection. More recently, research on the synthetic antiviral compound known as Arbidol (a.k.a. Umifenovir) has shown that the drug is a broad-spectrum antiviral compound. He also has a program focusing on how natural products combat chronic inflammation. The long-term goal of the natural product work is to understand how complex botanical mixtures engage human cells to suppress inflammation.

***Martin Prlic, PhD**
As an overarching lab goal and strategy, Dr. Prlic's group strives to define the cues that guide lymphocyte activation, differentiation and maintenance in the context of human mucosal tissue-based immune responses. Rather than focusing on one specific disease, the Prlic lab is studying healthy tissues (including blood and lymph) and a wide range of diseases in an effort to understand the entire spectrum of lymphocyte function and dysfunction in human tissues. They are particularly interested in how inflammatory signals in tissues regulate the functional properties of conventional and innate-like T cells. Through a close collaboration with Dr. Raphael Gottardo (FHCRC) Dr. Prlic has started to apply different single-cell analysis strategies including high parameter flow cytometry, single-cell RNAseq and Ab-seq (linking protein biomarker expression and transcriptome data on the single-cell level) to understand how antigen-presenting cell and T cell functions are altered in the context of infections and inflammation. The overall goal is to take advantage of newly available -omics technologies to define the mechanisms that regulate human immune cell fate and identify how these cell fate decisions can be manipulated for therapeutic purposes.

***Lakshmi Rajagopal, PhD**
Dr. Rajagopal's research interest is to understand virulence mechanisms of human pathogens and their interactions with the host. Her laboratory focuses on understanding how virulence factors of Group B Streptococcus (GBS) contribute to stillbirth, preterm birth and neonatal infections. Recently, Dr. Rajagopal is also involved in efforts to understand how the Zika virus causes fetal injury during pregnancy. The goal of the research in the Rajagopal laboratory is to ultimately translate the research findings into therapeutic measures that can prevent infections during pregnancy.

***Pradipsinh K. Rathod, PhD**
Malaria causes 500 million global infections and at least 500,000 deaths per year. The Rathod laboratory identifies key molecular determinants of successful drug targeting against malaria parasites and evolutionary strategies of parasites to rapidly acquire drug resistance. The parasites can change where needed without extensive damage to its genome. This has been called the Accelerated Resistance to Multiple Drugs (ARMD) phenotype. In the last ten years, the team has extended malaria cell biology and epidemiology investigations to field settings in India. The hope is to further understand how parasites use ARMD strategies to gain other

evolutionary advantages beyond drug resistance. The Malaria Evolution in South Asia (MESA) program project is supported by a US NIH International Centers of Excellence for Malaria Research (ICEMR) initiative.

***Steven Reed, PhD**

The Reed laboratories focus on vaccine and diagnostic development, with an emphasis on adjuvants and antigen discovery. The emphasis is on specific immune responses to infection with macrophage pathogens, including tuberculosis, leishmaniasis, and leprosy. Other applications of the adjuvant technology is towards host directed therapy to stimulate innate immune responses. The basic laboratory studies are complemented by a strong emphasis on clinical studies, with clinical trials and training ongoing in several developing countries.

***Michelle Reniere, PhD**

The Reniere Lab is exploring the fundamentals of how bacterial pathogens regulate virulence genes in response to host signals. Using a combination of molecular genetics, biochemistry, microscopy, bioinformatics, and infection models, we seek to gain a deeper understanding of the stressors that are encountered by bacteria during pathogenesis and the regulatory pathways that are activated.

Timothy Rose, PhD

The Rose lab is focused on herpesviruses implicated in cellular transformation and tumor induction and on host and viral proteins and cytokines which mediate these effects. A specific emphasis is on studying the viral etiology of Kaposi's sarcoma (KS) and other AIDS-related malignancies with regards to the interactions between viruses (retroviruses and herpesviruses) and cytokines in virus activation and tumor induction.Research projects include the identification and characterization of cellular receptors mediating KSHV infection; cell-cell transmission of KSHV infections; the comparative analysis of KSHV and its simian homologs and their role in tumor induction associated with HIV-induced immunosuppression; the characterization of latency and the activating switch to herpesvirus replication; and the development of diagnostic tests for known and emerging viruses of global health importance. Dr. Rose is a Professor Emeritus.

***Nina Salama, PhD**

In the mid 1990's, a bacterium, *Helicobacter pylori*, was linked to gastric cancer, the third leading cancer killer worldwide. *H. pylori*, establishes lifelong infection in the stomach of half the human population worldwide. The Salama lab is interested in the mechanisms by which this bacterium can establish and maintain a chronic infection in the unusual environment of the human stomach and the molecular cross talk between the host and the bacteria during the decades long infection. The activation of host cell processes, either through direct action of bacterial products or as part of the host's attempt to contain the infection presumably causes the different diseases associated with *H. pylori* infection. To approach this complex problem, we are using both global and molecular approaches in both cell culture and murine models of infection.

***Noah Sather, PhD**

The focus of my work is the development of a vaccine discovery pipeline for the design, production and pre-clinical testing of vaccine candidates to elicit protective B cell responses against disease-causing pathogens, as well as understanding the interactions between host immunity and invading pathogens. A major guiding principle of my laboratory’s research is that we can learn to make better vaccines by understanding natural prototypes of immunity against pathogens, or by deciphering critical host-pathogen interactions that can be targeted. Currently, my research involves two major pathogens: Human Immunodeficiency Virus 1 (HIV-1), the causative agent of the Acquired Immunodeficiency Syndrome (AIDS), and Plasmodium species, the causative agents of malaria.

***Chetan Seshadri, MD**

Dr. Seshadri’s lab is focused on advancing knowledge of the immune factors required for protection against M. tuberculosis in humans. Specifically, this includes elucidation of the functions and phenotypes of M.tb-specific T cell populations (classical and non-classical) using immunologic and computational approaches in collaborative human cohort studies. Additionally, the lab collaborates on other immune cell subsets or animal models if such studies extend the results of human studies.

***David Sherman, PhD**
With about 30% of the world's population infected and 1.4 million deaths caused each year, tuberculosis is the world's deadliest infectious disease. The Sherman laboratory studies the bacterial and host strategies that underpin this success. They use tools of systems biology such as transcriptomics, ChIP-seq and mutant analysis to define the TB gene regulatory network under physiologically relevant conditions, and then use modeling to produce testable hypotheses about novel regulatory circuits, genes and proteins of TB. This iterative approach allows them to test and refine our understanding of TB pathogenesis. In addition, the lab is always looking to mine systems-level insights to identify and validate novel TB drug targets and to advance new drug candidates.

***Jason Smith, PhD**
The Smith lab is primarily focused on understanding the role of defensins in viral pathogenesis and evolution. Defensins are a class of antimicrobial peptides with broad antibacterial, antiviral, and antifungal activity. Their effects on viral infection, immunity, pathogenesis, and evolution, particularly for nonenveloped viruses, are incompletely understood. Using a variety of approaches from virology, cell biology, biochemistry, structural biology, and genetics, our work is focused on understanding the interaction of defensins with non-enveloped viruses in molecular detail to determine general principals of defensin-mediated neutralization of viral infection. We are also interested in using animal models of enteric viral diseases to understand the role of defensins in antiviral immunity in vivo. Finally, we use 3D intestinal enteroid culture methodology to examine the interaction of viruses and bacteria with host cells and to study the cell biology of epithelial cell types that were previously unculturable.

***Joseph Smith, PhD**
The lab of Dr. Joseph Smith is focused on understanding pathogenic mechanisms in severe malaria. We study cytoadhesion of *Plasmodium falciparum*-infected red blood cells to endothelial cells and mechanisms leading to endothelial dysfunction in malaria. They utilize a broad combination of experimental and computational approaches integrating novel 3D microvessel models and field research in Africa and India.

***Donald Sodora, PhD**
Work in the Sodora Laboratory primarily focuses on two areas of research: HIV transmission and immune/environmental factors that influence HIV-associated disease progression. One project we are undertaking focuses on immune inflammation/dysfunction that occurs in the liver during HIV/SIV infection. A second project seeks evaluate the differential disease outcomes observed in SIV infected infants by comparing rapid to typical progressing animals. And a third project utilizes our knowledge of the oral route of transmission to devise innovative approaches to deliver HIV vaccines via the oral mucosa. Collectively, these research strategies are designed to produce novel vaccine approaches and immune therapies that will decrease the spread of HIV and/or prevent disease progression in HIV-infected people.

***Olugesun Soge, PhD**
Dr. Soge's research focuses on characterization of genetic mechanisms of antimicrobial resistance (AMR) in *Neisseria gonorrhoeae*, in vitro evaluation of novel antimicrobial compounds and plant extracts against multidrug-resistant *Neisseria gonorrhoeae*, molecular diagnostics for sexually transmitted infections (STI), and non-human primate modeling of gonococcal infection. The overall goal of his laboratory is to contribute to the development of novel antimicrobial compounds for gonorrhea treatment, improve diagnostics of STI and AMR detection, and through long-standing collaboration with clinical and public health institutions, develop sustainable molecular strategies for combating gonococcal AMR.

***Leonidas Stamatatos, PhD**
Dr. Stamatatos's Lab investigates B cell responses to infection and vaccination. They are particularly interested in monitoring the activation, survival, and maturation of B cell clonal lineages that produce protective antibodies against infectious agents. New immunogens and immunization regiments are developed to target these B cell lineages in vivo. The Lab employs diverse experimental approaches, including structure-based immunogen-design, X-ray crystallography, next generation deep sequencing, and immunological, molecular, and cellular

techniques. The Lab's work encompasses the entire space between pre-clinical and clinical evaluation of candidate vaccines.

***Kenneth Stuart, PhD**
Research in Dr. Stuart's lab is focused on protozoan pathogens and the diseases that they cause. These include malaria, which is caused by Plasmodium parasites and Human African Trypanosomiasis (sleeping sickness), Chagas disease and Leishmaniasis that are caused by three Trypanosomatid parasites. The lab investigates molecular and cellular processes of the parasites and immune responses to infection and vaccines in order to develop drugs, vaccines and diagnostics that are needed. One program is focused on immune profiling and systems biology approaches in immunology to study the human immune responses to *Plasmodium falciparum* infection and subunit and attenuated malaria vaccines. Another program focuses on RNA editing; a type of RNA processing that is unique to these African Trypanosomess and hence, presents several promising drug targets. The laboratory also uses a cell-wide systems biology approach to elucidate critical cellular processes in Trypanosomatid parasites that can be exploited for drug development.

***Naeha Subramanian, PhD**
Research in the Subramanian lab focusses on understanding innate immune responses mediated by a class of intracellular sensors of pathogens and danger called the NOD-like receptors (NLRs) and their impact on immune disease. A key aspect is using unbiased systems biology approaches for combining information from multiple levels such as genes, proteins and whole cells to identify NLR signaling pathways and their regulation. Another major focus is on investigating the activation of inflammasomes, which are signaling complexes formed by some NLRs, and the role of sub-cellular structures such as mitochondria in regulation of inflammasome function. Overall, the lab seeks to discern novel functions and regulatory mechanisms of NLRs and inflammasomes and investigate how they influence the pathogenesis of bacterial and viral infections, autoimmunity and cancers.

Jhimmy Talbot, PhD
Dr. Jhimmy Talbot studies how interactions between neurons and immune cells in the gut can help the body balance its immune and metabolic trade-offs. The gut balances two competing needs: bringing nutrients in and keeping pathogens out. Talbot showed that in the presence of food, certain gut neurons can increase nutrient absorption by reining in the activity of a specialized subset of immune cells that act to increase the gut wall's barrier function by decreasing its permeability. His work reveals how changes in the diet or in the intestinal microbiota may lead to metabolic dysfunction and how neuroimmune interactions could be hijacked by microbes to enable infection.

***Justin Taylor, PhD**
The Taylor lab has undertaken two approaches to help protect people from infection. In one approach, they aim to inform vaccine design by gaining a deeper understanding about the mechanisms limiting the generation of a protective B cell response. To do this, they study B cell responses in humans and murine models beginning with the rare pathogen-specific "naïve" B cells present prior to the vaccination using an enrichment method they recently developed. Their second approach is to bypass vaccination and use genetic engineering to generate B cells that produce the types of protective antibodies that vaccination aims to generate.

***Kevin Urdahl, MD, PhD**
Dr. Urdahl studies T cell-mediated immunity against Mycobacterium tuberculosis (Mtb) infection, including the factors that restrict the host's ability to eradicate the bacteria. He uses cutting edge approaches in the tractable mouse tuberculosis (TB) model of tuberculosis to gain mechanistic insights, and performs human studies to validate the findings and to generate further questions. The ultimate goal is to generate knowledge that will help drive the rational design of an effective vaccine to prevent TB.

***Wesley Van Voorhis, MD, PhD**
Dr. Van Voorhis has a long-term focus on pre-clinical drug development, particularly in target-based drug development and, where possible, employed iterative structure-based drug development (SBDD). His group is

currently characterizing a new preclinical drug candidate for the treatment of cryptosporidiosis, toxoplasmosis, and several animal diseases; the same compound shows promise for blocking malaria transmission. A compound from the same series shows great promise in treating prostate cancer.

Ana Weil, MD
Dr. Ana Weil studies the relationship between the gut microbiome and immune responses to enteric diseases. Using molecular, genomic and immunologic methods, she investigates how the gut microbiome influences susceptibility to enteric infections, modulation of immune responses by the gut microbiome, and pathogen-gut microbe interactions at the mucosal surface.

***Joshua Woodward, PhD**
Research in the Woodward laboratory is focused on elucidating the interactions of bacterial pathogens with their hosts. We utilize the gram-positive intracellular bacterium *Listeria monocytogenes* as a genetically tractable model to define (i) the molecular features that allow access and adaptation of bacteria to the host intracellular niche and (ii) the host response to bacteria on the outcome of infection. The novel bacterial nucleotide cyclic di-AMP is recognized by the infected host during *L. monocytogenes* entry into the host cell cytosol. C-di-AMP is a recently discovered bacterial signaling molecule that is highly conserved among many bacteria that interact with eukaryotic hosts, although its function in these microbes generally remains unknown. We utilize a diverse array of techniques including bacterial genetics, biochemistry, mass spectrometry, proteomics, cell culture and *in vivo* models of infection to further interrogate the mechanisms of cytosolic immuno-surveillance as well as the roles of c-di-AMP in bacterial physiology.

Appendix Q

Mentor Resources and Tips

Compact between Biomedical Graduate Students and Their Research Advisors: This is a good document to use for a discussion about expectations between you and your mentor.

https://www.aamc.org/initiatives/research/gradcompact/

Mentoring Guide for Students and Faculty: Two guides written by the Graduate School to use in setting up a mentoring relationship.

http://grad.uw.edu/for-students-and-post-docs/core-programs/mentoring

Mentor memos from the Graduate School: There are some memos about approaching new mentors and how to set up successful mentoring relationships.

http://grad.uw.edu/for-students-and-post-docs/core-programs/mentoring/mentor-memos

***Nature*'s guide for mentors:** This is a great article about mentoring.

http://www.nature.com/nature/journal/v447/n7146/full/447791a.html

Appendix R

Pathobiology Standing Committees

Steering Committee

Charge:
The Pathobiology Steering Committee is charged with oversight of the Interdisciplinary Program in Pathobiology and its governance

Membership:
The Committee consists of five members and is headed by the Director of the Graduate Program. Current membership: Jennifer Lund (Director), Rhea Coler, Michael Gale, Tom Hawn, and Don Sodora.

Responsibilities:
Coordination of all aspects of the Graduate Program.
Development and implementation of Program Policies.

Admissions Committee

Charge:
The Pathobiology Admissions Committee is charged with oversight of admission and entry of applicants into the graduate program. Responsibilities include review of program admission requirements, program advertisement, application procedures, recommending funding strategies, the review process, establishing entry into the program.

Membership:
The Admissions Committee will consist of five faculty members, including a committee chair, and a graduate student representative who is selected in consultation with the Admissions Committee chair. Faculty will serve staggered three-year terms, while the student representative is appointed annually. The Graduate Program Director is an ex *officio* member and, in addition to the Program Manager, attends committee meetings. Current membership: Kevin Hybiske (Chair), Whitney Harrington (Associate Chair), Daniel Blano Melo, Tanya Parish, Olusegun Soge, and Irene Cruz Talavera (Student).

Responsibilities:
The Committee has the following responsibilities:
1. Review and recommendation of revisions of the requirements for admission into the PhD and MS programs including out-of-cycle applications and those for transfer from other programs and from the MS to the PhD program.
2. The development and distribution of informational materials to advertise the graduate program.
3. Oversight of the application process including revision of application packet materials.
4. Operation of the process of reviewing applications for admission.
5. Operation of the process of offering admission including follow-up.
6. Development of guidelines and recommendations for funding accepted students for their first year.

Curriculum Committee

Charge:
The Curriculum Committee is charged with oversight for the teaching program in Pathobiology including the detection of curriculum gaps, course duplication and overall quality control. Responsibilities include programmatic development, proposal of teaching assignments to the chair, and supervision of peer and student evaluation.

Membership:
The Committee will consist of four faculty members and an elected student representative. Faculty will serve staggered three-year terms, while the student representative is elected annually. The chair also serves on the GH Curriculum Committee, and on the SPH Curriculum and Educational Policy Committee. The Program Manager also attends committee meetings which occur at least twice per year. Current membership: Joseph Smith (Chair), Lillian Cohn, Martin Prlic, Olusegun Soge, and Nicole Potchen (Student).

Responsibilities:
The Committee is responsible for the development and oversight of the teaching program. This includes the proposal of teaching assignments and timing of course offerings. The Committee will administer the Peer Evaluation of Teaching program and is responsible for providing course instructors information on the UW Student Evaluation program. The Committee will make course peer review assignments and will review both peer and student evaluation results.

The Committee advises instructors in preparing new courses, reviews all new course proposals and course changes, and makes recommendations to the director regarding approval of those submissions. Periodically the Committee will review the curriculum to determine if there is any duplication or if there are any gaps in the curriculum.

The Committee is also responsible for reviewing and proposing any changes to other curriculum-related aspects of the graduate program, such as the procedure for the General Exam.

Significant proposed policy or procedural changes are brought to the faculty for discussion and vote before implementation.

Graduate Student Advisory Committee

Charge:
The Pathobiology Graduate Student Advisory Committee is charged with monitoring the academic progress of Pathobiology graduate students.

Membership:
The Graduate Advisory Committee will consist of two faculty members and the Graduate Program Director, who chairs the committee. The Program Manager also attends the committee meetings. Current membership: Jennifer Lund (Chair), Leslie Goo, and Olusegun Soge.

Responsibilities:
The Committee members serve as temporary advisors for new students until a final advisor is chosen and provide advice to students on course work. The Committee meets at least once every quarter to review the progress of each student. If a student is not processing satisfactorily through the program, or is doing poorly in course work or research, the student and the student's major advisor are notified.

The committee members will serve as a neutral body to aid in the resolution of problems between students and instructors or advisors. Student requests for major advisor transfers will be reviewed by the committee.

The Graduate Student Advisory Committee also monitors thesis and dissertation committee activities to ensure they are meeting as required and providing documentation of those meetings.

The committee supervises the operation of the laboratory rotation program.

Program Event Support Committee (PESC)

Charge:
The Pathobiology Program Event Support Committee (PESC) provides support for our annual program events, including the retreat, the winter and spring research symposia, and the first-year rotation talks.

Membership:
The committee consists of three faculty members and the 2nd year Pathobiology students. The faculty members are appointed by the Graduate Program Director. The Program Manager is the primary lead of this committee. Current membership: Andy McGuire, Tom Hawn, and Meghan Koch, plus the 2nd year students.

Responsibilities:
For students: help to line up faculty to speak at the retreat, moderate sessions and help the program manager to plan and organize refreshments and social events.
For faculty, help to line up faculty to speak at the retreat, be present at the events as representatives of the program and provide opening and closing remarks at the research symposia, and help organize poster judging at the annual retreat.

Diversity and Inclusion Representative (1)

This Representative will help to connect Pathobiology students with local opportunities for discussing diversity, race, privilege, and inclusion as they relate to our work in life sciences research. Specifically, this student will attend Hutch United meetings at Fred Hutchinson Cancer Center as a representative of the Pathobiology Program and will keep Pathobiology students informed about Hutch United seminars and workshops. The Representative may also choose to join ad hoc committees to help organize Hutch United events or other diversity related activities for the Pathobiology program. In addition, the student will communicate in concert with the current Pathobiology representative on the Department of Global Health "Diversity, Equity, and Inclusion Committee" to ensure that relevant information is made available to the Pathobiology Program. Collectively, these interactions seek to provide a multi-faceted perspective of these core principles critical to our Program's mission of training our future scientific leaders.

DEI Coalition

To be defined throughout 2022-2023 academic year.

Appendix S

Graduate School Resources

Summary of University Requirements for the MS Degree

http://grad.uw.edu/policies-procedures/masters-degree-policies/masters-degree-requirements

Summary of University Requirements for PhD Program

http://grad.uw.edu/policies-procedures/doctoral-degree-policies/doctoral-degree-requirements

Graduate School Memoranda Index

http://grad.uw.edu/policies-procedures/graduate-school-memoranda

Appendix T

General Exam Research Proposal Format

Prior to the oral examination, the student must provide (at least two weeks before their exam) a copy of their written dissertation proposal to their committee members. This proposal should be focused on the student's dissertation research. It is written in a format similar to an NIH research proposal (e.g. R21 or F31 Fellowship). The application should be written in Arial 11-point font. Please note that the page limits include figures.

The format should include the following:

1. **Abstract**
   - Include succinct explanation of the hypothesis to be tested and the objectives and methods to be used.
   - No more than 30 lines of text.
2. **Specific Aims**
   - What are the specific goals of your proposed research?
   - Briefly summarize how each aim will be accomplished.
   - No more than 1 page
3. **Research Strategy - Include:**
   - The significance of your research, including background/literature review.
   - Prelimininary results.
   - The approach you will take to explore each aim, expected outcome, and alternative approaches.
   - No more than 6 pages
4. **Literature Cited**

Appendix U

Required Courses for Pathobiology Graduate Students

PABIO 550 Diseases and Issues in Global Health (2)
Provides a broad perspective on global health issues; the biology and strategies for control of diseases of global importance; the global health landscape; and factors that influence global health.

PABIO 551 Biochemistry and Genetics of Pathogens and Their Hosts (4)
Provides a strong foundation in biochemistry, molecular biology, and genetics for students interested in disease. Principles will be illustrated through examples focusing on pathogens, and infectious and non-infectious disease. Prerequisite: Undergraduate level course work in molecular biology or biochemistry or permission of instructor.

PABIO 552 Cell Biology of Human Pathogens, Disease, and Public Health (4)
Cell biology and immunology explored through diseases of public health importance with examples of pathogen interaction with host cell biology and immune systems, unique aspects of the cell biology of pathogens, perturbations of these systems in non-infectious diseases and design of therapeutics and vaccines to combat diseases of public health importance. Prerequisite: Undergraduate level coursework in biology or molecular biology or permission of instructor.

PABIO 553 Survival Skills for Scientific Research (2)
Focuses on skills needed for scientific career: writing abstracts, curriculum vitae, research proposals; preparing for oral presentations; lab management skills; discussion of mentorship/trainee relationships; case-based discussions of various topics in ethics and scientific misconduct.

PABIO 580 Pathobiology Seminar (1, max. 21)
Research from students, faculty members, and invited speakers is presented and discussed. Topics include immunochemistry, viruses, membranes, infectious diseases, immune response and other related topics. Note: students are also required to attend the presentations of dissertation research in the Final Exam of students completing the Pathobiology doctoral program.

PABIO 581 Current Literature in Pathobiology (1, max. 15)
Develop skills in analyzing data and assessing conclusions through an analysis of current literature in Pathobiology. Focuses on breadth and analytical skills. Prerequisite: enrollment in the Pathobiology graduate program.

PABIO 582 Critical Thinking and Research Design in Pathobiology (1.5)
Analysis of issues, hypothesis and experimental design and testing. Credit/no credit only. Prerequisite: graduate standing in Pathobiology.

PABIO 591 Selected Topics (1)
Intensive 3-week offerings focusing on topics such as pathogenesis, immunology, virology, disease agents, bioinformatics and grant writing. Topics differ from year to year. Prerequisite: permission of instructor.

PABIO 598 Didactic Pathobiology (2)
Supervised teaching experience in Pathobiology courses for Enrolled graduate students in the Interdisciplinary Pathobiology program on the PhD track. Prerequisite: permission of instructor.

Department of Epidemiology

EPI 511 Introduction to Epidemiology (4)
For the graduate student wanting an overview of epidemiologic methods. Description of ways in which variation in disease occurrence is documented, and how that variation is studied to understand causes of disease. Prerequisite: graduate standing.

Department of Immunology

IMMUN 441 Introduction to Immunology (4)
General properties of immune responses; cells and tissues of immune system; lymphocyte activation and specificity; effector mechanisms; immunity to microbes; immunodeficiency and AIDS; autoimmune diseases; transplantation.

University Conjoint Courses

UCONJ 510: Introductory Laboratory Based Biostatistics (2)
Introduces methods of data description and statistical inference for experiments. Covers principles of design and analysis of experiments; descriptive statistics; comparison of group means and proportions; linear regression; and correlation. Emphasizes examples from laboratory-based biomedical sciences, and provides demonstrations using standard statistical programs.

Public Health Interdisciplinary / Health Services

HSERV 579: Structural Racism and Public Health (1)
Introduces the concept of institutional racism and ways structural racism undermines public health. Discusses history of racism and intersections between structural racism and other systems of oppression. Explores relationship to racism and ways internalized racism acts as a barrier to health equity. Considers public health practitioners' role in addressing racism.