# University of Washington
# Institute for Public Health Genetics

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## Ph.D. in Public Health Genetics Guidelines

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**(**http://depts.washington.edu/phgen/pdf/PhD_Guidelines_Part 2.pdf**)**

# Ph.D. in Public Health Genetics
# Part 1 of 2: Program Goals, Admission Requirements, and Curriculum

## I. Program Goals and Learning Objectives

The *overall goals* of the interdisciplinary Ph.D. program in Public Health Genetics are:

1) To train researchers, educators, and program administrators for careers in academic institutions, health care delivery systems, public health departments, government agencies and the private sector; and
2) To provide interdisciplinary education in the core knowledge areas of public health genetics (genetic & molecular epidemiology; ecogenetics & pharmacogenetics; clinical aspects of genomics; ethics & social science; law & policy; health economics & outcomes research), based on the fundamental areas of study (human genetics & genomics; public health), so that graduates can address scientific and policy questions from a variety of perspectives.

### *Learning Objectives*

There are two sets of learning objectives for the Ph.D. program in Public Health Genetics.

**Set I.** The first set of learning objectives is a general set of objectives for all Ph.D. programs in the School of Public Health and Community Medicine at the University of Washington, and is as follows:

1) Describe major research study designs and their advantages and limitations;
2) Critically review the scientific literature, synthesize the findings across studies, and make appropriate recommendation based on current knowledge;
3) Organize data and information, prepare technical reports, and give oral presentations appropriate to the scientific community and/or the general public;
4) Function as a professional within a management structure (academic, governmental, or other), including working with professionals from other disciplines;
5) Collect, analyze, interpret, and use data for solving problems in an area of research interest;
6) Formulate a hypothesis, design an experiment to test that hypothesis, conduct a study, and complete a research-based thesis.
7) Display comprehensive understanding and in-depth knowledge of a methodology or subject area;
8) Display knowledge of the discipline within the context of the field of public health; and
9) Conceive and conduct independent research.

**Set II.** Learning objectives specific for the Ph.D. program in Public Health Genetics were first developed based on competencies recommended by the Public Health Genetics Training

Collaboration. This collaboration consists of five universities that provide training related to Public Health Genetics, the Washington State Department of Health, and liaisons to the Centers for Disease Control and Prevention and the Genetics Services Branch of the Health Resources and Human Services Administration in 2001 (Austin MA, Arnett D, Beaty T, Durfy S, Fineman R, Gettig E, Lochner Doyle D, Peyser P, Sorenson J, Thompson JD, Watts C. Opportunities for public health genetics trainees: Results from an employer/workplace survey. Community Genetics 4:143-147, 2001.)

Following an interactive internal review of the Ph.D. program by students active in the program during the 2007-2008 academic year, alumni of the program, and faculty, the following, updated objectives were developed:

1) Display competency in "Genomics in Public Health" (Core Knowledge Area A):
    a. Apply knowledge of inheritance and genomic advances, including cellular and molecular mechanisms and technical developments, to understanding the etiology of a variety of rare and common, complex diseases and health conditions.
    b. Apply epidemiological and statistical approaches to the study of risk factors and diseases with a genetic component.
    c. Identify interactions among genes, environmental factors, and behaviors, and their roles in health and disease.
2) Understand how genetic principles and genomic technologies apply to diagnosis, screening, and interventions for disease prevention Display competency in "Implications of Genetic for Society" (Core Knowledge Area B):
    a. Incorporate genetic information into the public health activities of assessment, policy development and assurance activities.
    b. Apply methods to address ethical implications of the use of genetic information and technologies in public health;
    c. Understand legal concepts and the role of the law in the development of policies relating to genetics and genomics; and identify legal implications of the application of genetics and genomic technologies in public health.
    d. Apply knowledge of key social science concepts in analysis of the political, social and cultural forces that influence the research and clinical application of genetics and genomic technology in public health;
    e. Analyze the interaction and impact of market forces and public policy on the development and delivery of genetic services.
3) Acquire advanced knowledge in one of these core knowledge areas through coursework and dissertation project research.
4) Demonstrate effective integration of the two core knowledge areas while conducting independent, interdisciplinary research in public health genetics.
5) Acquire skills needed to stay current with the rapid advances in genomics, public health genetics, and clinical genetics, and their application in public health settings.
6) Communicate effectively about public health genetics to audiences from diverse backgrounds, including writing at a professional level and giving oral presentations.

# II. Curriculum: Course of Study

## A. Overview

The Ph.D. in Public Health Genetics is a unique, interdisciplinary degree within the UW Graduate School, administered by the Institute for Public Health Genetics (IPHG) and guided by the Interdisciplinary Group in Public Health Genetics. The course of study described below is intended to provide a broad, comprehensive program in the fields of study relevant to public health genetics, while also preparing graduates with advanced skills in one of the relevant core knowledge areas.

The Ph.D. training program will first seek to educate all students in the *Fundamental Areas of Study*, namely: 1) human genetics, and 2) public health (including epidemiology, biostatistics, environmental health and health services). Further, all students will take required courses in each of the two *Core Knowledge Areas* related to PHG: A) Genomics in Public Health (including genetic epidemiology, and ecogenetics & pharmacogenetics, and clinical aspects of genomics); B) Implications of Genetics for Society (including ethics & social science, law & policy, and health economics & outcomes research). This core coursework will generally be completed during the first two years of study, and students will be expected to pass a written *Preliminary Examination* upon completion of the coursework.

*Selective Courses and Dissertation Topic:* Once these course requirements are complete, students are expected to focus their studies in one of the two core knowledge areas, including completion of appropriate "selective courses" in their primary area. Similarly, the dissertation topic will be focused in one of these two areas, but with at least one chapter devoted to the second core knowledge area. When the student has identified his or her research project, the Dissertation Supervisory Committee will be formed, reflecting the appropriate expertise necessary to evaluate the student's progress in these areas. Specifically, the chair of the Supervisory Committee will be an expert in the student's primary core knowledge area. A second member of the committee, a co-advisor of the student, will represent the secondary core knowledge area. Because of the importance of providing guidance to the student in both core knowledge areas, the full Supervisory Committee will meet with the student at least annually to discuss progress on the dissertation project. (See Part 2 of guidelines for details http://depts.washington.edu/phgen/pdf/PhD_Guidelines_Part_2.pdf)

## B. Fundamental Areas of Study

The fundamental areas of study for the Ph.D. in PHG are: 1) human genetics and 2) public health. In order to be effective in public health genetics settings, students must have a fundamental grounding in the underlying science of human genetics, molecular biology, and the biotechnology and bioinformatics tools related to genetics. Courses in epidemiology, biostatistics, environmental health and health services provide students with basic skills in the disciplines of public health. All students in the program will be expected to have basic training in these areas, as described below, as a basis for their more focused study in the core knowledge areas. As shown in Table 1, students will be required to take at least 17 course units in these areas during their first two years.

Students are also expected to demonstrate proficiency in written communication for an

interdisciplinary audience. Students who require additional training in this area should refer to the IPHG website: http://depts.washington.edu/phgen/resources/writing.shtml.

**Table 1. Coursework for Ph.D. in Public Health Genetics: Fundamental Areas of Study**

| Fundamental Area of Study | Core Course Requirements and [Recommended Courses in brackets] (17 to 33 units) |
|---|---|
| Human Genetics | • PHG 551: Human Genomics: Science, Ethics, and Society (3) *OR* GENOME 565: Advanced Human Genetics (4)<br>• [Genome 552: Technologies for Genome Analysis (1.5). Note prerequisites: Genome 551: Mechanisms of Gene Regulation in Prokaryotes and Eukaryotes (1.5); Genome 559: Introduction to Statistical and Computational Genomics (3)]<br>• [PHG 536: Bioinformatics and Gene Sequence Analysis (3)] |
| Public Health | • EPI 511: Introduction to Epidemiology (4) *OR* EPI 512 and EPI 513: Epidemiologic Methods I & II (8)<br>• BIOST 511: Medical Biometry I (4) *OR* BIOST 517: Applied Biostatistics I (4)<br>• [BIOST 512/513: Medical Biometry II, III (8)]<br>• [BIOST 518: Applied Biostatistics II (4)]<br>• ENVH 511: Environmental and Occupational Health (3) *OR* ENVH 510: Global Environmental and Occupational Health (4) *OR* ENVH 577: Risk Assessment for Environmental Health Hazards (3/4) *OR* ENVH 570: Occupational and Environmental Epidemiology (3) *OR* ENVH 517: Children's Environmental Health (3) *OR* ENVH 584: Occupational and Environmental Health: Policy and Politics (3)<br>• HSERV 511: Introduction to Health Services and Public Health (3-4) |

## C. Core Knowledge Areas

In addition to the fundamental areas of study, two core knowledge areas have been identified as central to the study of public health genetics at the doctoral level: 1) Genomics in Public Health and 2) Implications of Genetics for Society (Table 2). These core knowledge areas represent complementary components of the emerging field of public health genetics. In combination with the Fundamental Areas of Study, they comprise the interdisciplinary perspective of public health genetics. This multifaceted education is one of the major goals of this Ph.D. degree program.

All Ph.D. students will be expected to have basic knowledge and competence in each core knowledge area, described in detail below. In addition, each student's dissertation topic will fall broadly within one of the core knowledge areas, and the student will be expected to develop additional expertise in that area through electives and dissertation work. The overall content of

each area is described briefly below; the required core courses are listed in **Table 2.** All students in the program will be expected to complete these courses, for a total of 30 units.

**Table 2. Coursework for Ph.D. in Public Health Genetics: Requirements for Core Knowledge Areas**

| **Core Knowledge Area** | **Core Requirements (30 units) and [Recommended courses in brackets]** |
|---|---|
| Core Knowledge Area A. Genomics in Public Health<br>• Genetic Epidemiology<br>• Ecogenetics & Pharmacogenetics<br>• Clinical Aspects of Genomics | • PHG 511: Genetic Epidemiology (3)<br>• [PHG 518 Computer Applications in Genetic Epidemiology (2-4)<br>• [PHG 519 Statistical Methods in Genetic Epidemiology (3)]<br>• PHG 513: Basic Concepts in Pharmacogenetics and Toxicogenomics (3)<br>• [PHG 536 Bioinformatics and Gene Sequence Analysis (3)]<br>• PHG 542: Genetic Discovery in Medicine and Public Health (3) |
| | • PHG 580: Interactive Seminar in PHG (6) |

| Core Knowledge Area | Core Requirements (30 units) and [Recommended courses in brackets] |
|---|---|
| Core Knowledge Area B. Implications of Genetics for Society<br><br>• Ethics & Social Science<br>• Law & Policy<br>• Health Economics & Outcomes Research | • PHG 512: Legal, Ethical, And Social Issues in Public Health Genetics (3)<br>• PHG 521: Culture, Society, and Genomics (3)<br>• PHG 522: Ethical Frameworks for Public Health Genetics (2)<br>*OR* PHG 525: Public Commentary on Ethical Issues in Health Genetics (3)<br>• PHG 523: Genetics and the Law (2)<br>• [PHG 552: Advanced Qualitative Methods; HSERV 521: Qualitative Methods in Health Services Research; HSERV 526: Qualitative Research Methods for Public Health; NMETH 582: Interpretative Methods in Nursing Research; NMETH 583: Interpretative Methods in Nursing Research; SOC W 506 Social Welfare Research and Evaluation; EDLPS 544: Comparative Education: Introduction to Concepts and Methods] |

***Core Knowledge Area A. Genomics in Public Health: Genetic Epidemiology; Ecogenetics & Pharmacogenetics; Clinical Aspects of Genomics***

Genetic epidemiology is a rapidly evolving field that focuses on complex diseases (those not caused by a single gene) in which both genetic and environmental factors contribute to the disease etiology. Genetic epidemiology incorporates human genetics, epidemiology, biostatistics, statistical genetics, bioinformatics, and molecular biotechnology into studies designed to identify genetic and environmental influences on diseases among relatives and in diverse human populations. Research methods in genetic epidemiology include studies of twins and extended families, heritability and segregation analyses, genetic mapping studies using genetic linkage analysis, and population-based genetic association studies. The knowledge gained from research in genetic epidemiology will allow better prediction of disease among high risk individuals and families, and the design of more effective environmental and behavioral interventions to prevent disease. With the sequence of the human genome now available, genetic epidemiology has become an essential discipline for evaluating genetic influences on disease, as well as for identifying gene-gene and gene-environment interactions that contribute to health outcomes.

It has been known for decades that some members of the human population respond adversely to doses of drug and non-drug chemicals that most people tolerate well. Such adverse reactions, sometimes referred to as ‘idiosyncratic’ reactions, often have a genetic basis. In many instances, the increased sensitivity to the pharmacological or toxicological effects of the drug/chemical is due to a genetically determined variation in the way the chemical is metabolized (biotransformed) in the body. With the new development of rapid DNA sequencing and high

throughput genotyping in populations, there are now hundreds of specific 'genetic polymorphisms' identified in a plethora of different drug metabolizing enzymes that may impart differential sensitivity to a huge variety of drugs and chemicals found in our environment. In addition, genetic variation in cellular receptors, signal transduction pathways, DNA repair, cell cycle regulators and other biochemical pathways that are targets of drugs and other exogenous and endogenous chemicals are continually being discovered. Genetically determined differences in the structure of protein targets, or in their cellular concentration, can affect the intrinsic pharmacological response to a given level of drug/chemical exposure. The closely related fields of Ecogenetics, Pharmacogenomics and Toxicogenomics address how specific genetic differences in an individual confer increased or decreased response to drugs and other chemicals. Understanding such differences is important to public health because such information can lead to a better understanding of 1) adverse drug reactions, 2) failure of efficacy in drug therapy, 3) new molecular targets for prevention, diagnosis, and treatment of diseases, and 4) the etiology of environmentally-related diseases. Such information will greatly enhance the development of effective prevention strategies, as well as improve diagnosis and treatment of diseases of public health importance.

As genomic technology develops, opportunities for clinical intervention occur. Genetic information is currently used in a variety of health care settings for a range of different purposes. These include diagnosis in symptomatic patients, identification of individuals at risk of developing disease and/or of having children with genetic disorders, pharmacogenetics, reproductive decision-making and newborn screening. Each of these uses raises different questions related to the performance characteristics of genetic tests, the populations for which tests and services are provided, the quality of informed consent and genetic counseling, and outcomes evaluation. In addition, what health promotion opportunities may exist for the general public? Knowledge about current and potential future uses of genetic information in medicine and public health provides an important background for investigation of social, legal, ethical and policy concerns.

***Core Knowledge Area B. Implications of Genetics for Society: Ethics & Social Science; Law & Policy; and Health Economics & Outcomes Research***

The implications of genetic science and technologies on individuals and society are receiving increased attention with the recent completion of the sequence of the human genome. Technologies are emerging that can create individual genetic profiles imbedded in a microchip on a 'gene card'. Health care providers might utilize this genetic profile to identify risk for certain diseases well in advance of their development, or identify genetic changes to facilitate diagnosis in early stages of disease development. The genetic profile might be used to find the right drug and dosage to ensure optimum treatment with minimum adverse effects. Drug companies are likely to take advantage of this technology to develop new, safer and more specific drugs for the treatment or even prevention of diseases. While the technology appears to provide the potential for extraordinary medical benefits, it also poses potential harms. Information about future disease risks could stigmatize individuals, or cause psychological distress with the effect that the diagnosis is more harmful than the disease. Certainly some diseases carry the risk for stigmatization, for example, a future risk of dementia could have more profound social consequences than a future risk of heart disease. Similarly, social consequences of genetic information are likely to vary within different cultures. Genetic information will typically predict a probability of future disease, rather than a certainty, so that policies will need

to be developed to determine what level of risk constitutes information of public health significance. Such policies could have major social, economic and legal consequences, affecting, for example, whether a person with a susceptibility to an environmental exposure could be barred from certain workplaces, or whether health care providers have a duty to disclose certain genetic risks to family members who are not their patients. A major challenge in this area is to apply social and ethical theories as they interact with law and policy in order to develop strategies to define and study the potential social risks of genetic information, so that their scope can be defined and preventive measures assessed and implemented.

Genetic technologies are developed in the academic sector and the marketplace, applied in the health care delivery system, paid for by patients and health insurers, and regulated by federal, state, and local governments. Decision makers in each of these segments influence how these technologies are used, and what their ultimate influence on public health will be. There are numerous stakeholders with an interest in public health genetics. Each stakeholder has particular objectives and points of view. There are often conflicts among stakeholders, including conflicts over the interpretation of scientific data, the importance of privacy and confidentiality, appropriate use of genetic technology, and access to genetic services. The goal of public policy is to balance the interests of public and private stakeholders in these areas such that the welfare of those affected is maximized. Inevitably, policy choices will involve tradeoffs between efficiency and equity considerations. Policy makers must also consider historical precedents and the cultural context in which a policy will be applied. As a new technology, genetics may challenge assumptions and raise new questions for policy-makers. As knowledge of genetic contributors to disease increase, policy-makers will be challenged to devise strategies to strike a balance between the potential benefits of genetic technology and potential harms, including the potential for discrimination and stigmatization based on genetic identity.

## D. Interactive Seminar

For the Ph.D. degree, 6 units of the IPHG interactive seminar (PHG 580) are required. Ph.D. students are required to take the seminar each quarter of the academic year (Autumn, Winter, Spring) until they pass the preliminary exam. The seminar is the only time that all of the IPHG "community" convenes, and it is important for doctoral students to participate in these sessions.

If a student takes the preliminary examination before completing 6 units of seminar, he/she must take the remaining units after the examination. If a student has taken 6 units of PHG 580 as part of the IPHG MPH program, these can be counted as the required units.

Once a student passes the preliminary exam, attendance at the seminar is still highly recommended. Students can register for seminar any number of times; there is no maximum. Although these units can count towards the total number of credits needed for the degree, they cannot be counted as the 9 required Selective units. To count towards the degree, seminar units must be taken while a student is registered as an official IPHG Ph.D. student.

## E. Preliminary Examination

During the first two years of study, each student will be expected to take a Preliminary Examination focused on integrating skills and knowledge in the two core knowledge areas described above.

Depending on each student's background, he or she may elect to undertake the Preliminary Examination at any time after completion of the required coursework. Most students take the examination after the Spring Quarter of the second year of study, and must pass the examination before officially forming the Dissertation Supervisory Committee.

The Preliminary Examination is administered once a year, soon after the end of Spring Quarter. It is a one-day, open book examination. The examination is written and graded by APC faculty members: [http://depts.washington.edu/phgen/programs/phd/phd-preliminary-exam]

Results of the preliminary examination (pass/fail) are provided to students within a month. Students may request written comments on the examination responses from the program director within two weeks of receiving their examination results. Previous years' exams are available upon request at the IPHG office.

In the event that a student fails the Preliminary Exam, he or she will be allowed one additional attempt to pass. Students who fail the Preliminary Exam twice will have the option of pursuing an M.S. degree in Public Health Genetics. Students will also have the option of petitioning the APC to pursue the M.S. in PHG degree after failing the Preliminary Exam one time. The M.S. in PHG degree requires students to complete a written capstone project developed and approved by his/her advisors.

In the rare event that a student believes that there has been an error in grading the preliminary exam, he/she may petition the APC for a review of his/her responses. Such a petition should be in writing and should be submitted to the program director within one month of receiving the examination results.

The student should request one of his/her advisors to present the petition to the APC. The petition will be considered by the APC at its first or second meeting of the Autumn Quarter without the student present. The student will be informed of the APC's decision on the petition, in writing, within two weeks of the meeting.

## F. "Selective Courses"

By the end of the second year of the program, it is anticipated that each student will begin to focus on a research project that will form the basis of his or her dissertation. By this time, students will have a broad background in the core knowledge areas of PHG, and will have identified specific research areas that are of particular interest. Students will be expected to select one of the core knowledge areas for their primary area research, with the other core knowledge area being a secondary area or research.

Once the research project begins to develop, students will be expected to take at least 9 additional units of selective courses related to his/her dissertation project. Although a list of

example courses, available in a variety of departments at the UW, is listed in **Tables 3A and 3B,** the course of study from this point on will be individualized. The student needs to work with his/his dissertation supervisory committee to identify the 9 units of selectives that will be the most useful in completing his/her dissertation project. That is, the final selection of electives must be approved by the student's Dissertation Supervisory Committee. Ph.D. students may use the S/NS grading mechanism for selective courses.

**Table 3A. Example Courses for Core Knowledge Area A Selectives**

| | |
|---|---|
| Genetic and Molecular Epidemiology | PHG 518: Computer Demonstrations in Genetic Epidemiology (2-4)<br>PHG 519: Statistical Methods in Genetic Epidemiology (3)<br>PHG 536 Bioinformatics and Gene Sequence Analysis (3)<br>EPI 507: HIV and STIs in Women and Children (3)<br>EPI 512: Epidemiologic Methods I (4)<br>EPI 513: Epidemiologic Methods II (4)<br>EPI 519: Cardiovascular Epidemiology (3)<br>EPI 520: Epidemiology of Infectious Diseases (3)<br>EPI 524: Epidemiologic Studies of Cancer Etiology and Prevention (3/4)<br>EPI 530: AIDS: A Mutlidisciplinary Approach (2)<br>EPI 536: Categorical Data Analysis in Epidemiology (4)<br>EPI 537: Survival Data Analysis in Epidemiology (4)<br>EPI 538: Nutritional Epidemiology (3)<br>EPI 540: Introduction to Cancer Biology (3)<br>EPI 570: Occupational and Environmental Epidemiology (3)<br>EPI 571: Neuroepidemiology and Environmental Risk Factors (3)<br>EPI 573: Methods & Issues in Using Biological Measurements in Epidemiologic Research (3)<br>EPI 588: Preparing and Writing Research Proposals (2)<br>EPI 590: Selected Topics in Epidemiology or International Health<br>BIOST/STAT 550: Statistical Genetics I: Mendelian Traits (3)<br>BIOST/STAT 551: Statistical Genetics II: Quantitative Traits (3)<br>BIOST/STAT 552: Statistical Genetics III: Design and Analysis (3)<br>GENOME 453: Genetics of the Evolutionary Process (3)<br>GENOME 550: Methods and Logic in Genetics (3)<br>GENOME 552: Technologies for Genome Analysis (1.5)<br>GENOME 553: Advanced Genetic Analysis (1.5)<br>GENOME 466: Cancer Genetics (3)<br>BIO A 482: Human Population Genetics (5)<br>HSERV 521: Qualitative Methods in Health Services Research (3)<br>PATH 516: Molecular Basis of Human Genetic Disease (3) |
| Ecogenetics and Pharmaco-genomics | ENVH 514: Environmental and Occupational Toxicology I (3)<br>ENVH 515: Environmental and Occupational Toxicology II (3)<br>ENVH 516: Environmental and Occupational Toxicology III (3)<br>ENVH 567: Mechanisms of Carcinogenesis (2)<br>ENVH 577: Risk Assessment for Environmental Health Hazards (3/4)<br>MEDCH 527: Drug Metabolism (4)<br>PCEUT 502: Pharmacokinetics of Drug Metabolism (4) |
| Clinical Aspects of Genomics | BH 548: Introduction to Clinical Ethics (5)<br>MED 547: Quantitative Methods in Medical Genetics (2)<br>MED 549: Clinical Medical Genetics (1) |

**Table 3B. Example Courses for Core Knowledge Area B Selectives**

| | |
|---|---|
| Ethics & Social Science | PHG 552: Advanced Qualitative Methods; HSERV 521: Qualitative Methods in Health Services Research; HSERV 526: Qualitative Research Methods for Public Health; NMETH 582: Interpretative Methods in Nursing Research; NMETH 583: Interpretative Methods in Nursing Research; SOC W 506 Social Welfare Research and Evaluation; EDLPS 544: Comparative Education: Introduction to Concepts and Methods<br>ANTH 474: Social Difference and Medical Knowledge (5)<br>ANTH 475: Perspectives in Medical Anthropology (5)<br>EPI 586: Responsible Conduct of International Research (3)<br>HSERV 510: Society and Health (3)<br>BH 402: Ethical Theory (5)<br>BH 548: Introduction to Clinical Ethics (5)<br>BH 552: Advanced Qualitative Methods (4)<br>BH 474: Justice in Health Care (5)<br>PB AF 506: Ethics and Public Policy (3) |
| Law & Policy | HSERV 514: US Health and Health Care: Health Policy Research (3)<br>HSERV 551/LAW H 512: Health Law (2)<br>HSERV 552: Health Policy Development (3)<br>HSERV 590: Selected Topics in Health Services<br>LAW H 502: Medical Malpractice (3/4)<br>LAW H506: International Bioethics, Social Justice, and Health Seminar (1)<br>LAW H 570: Biotechnology and the Law (3)<br>PB AF 516: Microeconomic Policy Analysis (4)<br>PB AF 518: Applied Cost Benefit Analysis (3)<br>PB AF 585: Topics in Science, Technology and Public Policy (3)<br>Pol S 575: Policy Processes (5)<br>SOC W 589: Policy Advocacy Seminar (3) |
| Health Economics & Outcomes Research | PHARM 534/HSERV 583: Economic Evaluation in Health and Medicine (3)<br>HSERV 523: Advanced Health Services Research Methods I (4)<br>HSERV 575: Cancer Prevention and Control (3)<br>HSERV 583: Economic Evaluation in Health and Medicine (3)<br>HSERV 584/ PHARM 535: Assessing Outcomes in Health and Medicine (3)<br>HSERV 587: Health Policy Economics (3)<br>HSERV 590: International Program Planning and Evaluation |

## G. Unit Requirements for Completion of the Ph.D. Program

(See the Graduate School website: http://www.grad.washington.edu/policies/doctoral)

- *Required Units:* Completion of at least 90 credits, 60 of which must be at the University of Washington. This includes courses from the Fundamental Areas of Study (minimum of

17 units), courses from the two core knowledge areas (minimum of 30 units), selective courses (minimum of 9 units), and at least 27 dissertation units.

- *Credits from other degree programs and other universities:* A master's degree from the UW or from another institution may be used as a substitute for 30 credits of enrollment. The coursework completed for this master's degree must fall within the ten-year time period allowed for completion of all work for the doctoral degree. All credits and coursework earned towards an MPH degree in Public Health Genetics may count towards the Ph.D. degree.
- *Credits required prior to the General Examination:* At least 60 credits must be completed prior to scheduling the General Examination. A non-PHG master's degree from the UW or another institution may be used as a substitute for 30 of these credits. At least 18 credits of UW coursework at the 500 level and above must be completed prior to the General Examination. At least 18 numerically graded UW credits of approved 400 and all 500 level courses must be completed prior to scheduling the General Examination. The Graduate School accepts numerical grades in approved 400-level courses accepted as part of the major, and in all 500-level courses. Course work unrelated to public health genetics and at the 300-level or below will not count.
- *Minimum GPA:* A minimum cumulative GPA of 3.00 is required for a graduate degree at the University of Washington. The GPA must be maintained throughout the student's graduate studies to avoid academic probation.
- *Creditable passage of the General Examination:* Registration and completion of at least 2 credits as a graduate student is required during the quarter the exam is taken and candidacy is conferred.
- *Dissertation Units:* The Candidate must register and complete a minimum of 27 units of dissertation credit (PHG 800) over a period of at least three quarters. At least one quarter must be after the student passes the General Examination. Students are limited to a maximum of 10 credits per quarter of dissertation units (PHG 800).
- *Creditable passage of a Final Examination:* The Final Examination is devoted to the defense of the dissertation and the field with which it is concerned. The General and Final Examinations cannot be scheduled during the same quarter. Registration and completion of at least two credits as a graduate student is required during the quarter the exam is taken as well as in the quarter the degree is conferred.
- *Dissertation acceptance:* Preparation of and acceptance by the Dean of the Graduate School of a dissertation that is a significant contribution to knowledge and clearly indicates training in research is required for graduation.
- *Time limit for degree completion:* Completion of all work for the doctoral degree must take place within ten years. This includes quarters spent On-Leave or out of status, as well as applicable work from a master's degree from the University of Washington or a master's degree from another institution, if these are used to substitute for 30 credits of enrollment.
- *Finally,* a student must satisfy the requirements that are in force at the time the degree is to be awarded.