

GUIDELINES FOR GRADUATE STUDY

Version 2010.9 (September 2010)

Graduate Programs in Human Genetics

Department of Human Genetics

Graduate School of Public Health

University of Pittsburgh

DEGREE PROGRAMS

The Department of Human Genetics offers the following programs:

Ph.D. in Human Genetics (including genetic counseling emphasis),
M.S. in Human Genetics,
M.S. in Genetic Counseling,
M.P.H. in Public Health Genetics,
Dual M.S. in Genetic Counseling and M.P.H. in Public Health Genetics,
M.D./Ph.D. in Human Genetics (in collaboration with the MSTP program),
Certificate (non-degree) program in Public Health Genetics.

Requirements for each program are described in detail below. This document primarily presents requirements that are specific to the Department of Human Genetics. Students should consult the Graduate and Professional Bulletin of the University of Pittsburgh and the regulations of the Graduate School of Public Health for more general requirements.

CONTACT INFORMATION

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PH.D. IN HUMAN GENETICS

Admission

Application for admission must be made through the Graduate School of Public Health Office of Student Affairs. Applications are accepted at any time, although it is preferable to start the program in the Fall semester. Applicants who wish to be considered for financial aid must apply by December to be considered for admission and aid the following Fall. For specific deadlines in any given year, refer to the GSPH Office of Student Affairs information.

Admission requires a bachelor's degree in a discipline related to the biological, behavioral, or mathematical sciences from an accredited college or university, with a grade point average of 3.0. Prerequisites to admission to the program are a first course in each of the following: genetics, general biochemistry, and calculus. Graduate Record Examination (GRE) scores must be supplied by all applicants and should be above the 70th percentile. Subject GREs are not required. Students seeking a Ph.D. may apply directly to the Ph.D. program regardless of whether they already have a Master's degree. Students in good standing in the M.S. degree program within the Department of Human Genetics may apply to the Ph.D. degree program at any time, but can only be considered for financial aid once per year along with new Ph.D. applicants. All applications are evaluated by the faculty on the basis of undergraduate academic performance, experience, personal statement, letters of recommendation, and scores on the GRE and TOEFL (for those for whom English is a second language). The minimum TOEFL score on the written exam is 550, on the computer-based exam is 213, and on the new exam is 80. The TOEFL must be taken within two years prior to the application for admission.

Applicants who are graduates of an accredited college or university but who do not qualify for admission to full graduate status because of deficiencies in either their undergraduate course program or their scholastic achievement, may be considered for provisional graduate status if there is strong supporting evidence of their ability to successfully complete a graduate program. Courses taken to remove deficiencies do not count toward completion of graduate degree requirements. Transfer from provisional to full graduate status is initiated and recommended by the department, and is possible only after removal of deficiencies and other conditions noted at the time of admission and satisfactory progress in graduate course work.

A PhD in human genetics with a focus on genetic counseling is available. To be considered for admission to this track, applicants need to be board certified in genetic counseling (ABGC or ABMG) and have at least 3 years of work experience as a genetic counselor.

Financial Aid

Most full-time students in the Ph.D. program are supported by Graduate Student Researcher (GSR) positions, which provide both tuition and stipend. Admission to the program does not guarantee financial aid, however. For students who are admitted with a departmental financial aid offer, the department pays both tuition and stipend during the first year of the Ph.D. program. Students who are admitted but not offered departmental aid may seek GSR positions with individual faculty as an alternative. After the first year, the department continues to support tuition for all Ph.D. students with GSRs, and stipends are supported by the student's research advisor. Continuation of GSR support is based on satisfactory performance as described in the University of Pittsburgh Policy statement for Graduate Student Researchers.

Overview

The Ph.D. Program is comprised of a combination of course work and original research, which usually allows attainment of the degree within 4-5 years. The University requires the minimum elapsed residence time for the Ph.D. degree to be six terms of full-time graduate study. General requirements are listed below, but the student should also consult with his/her academic advisor.

Program Objectives

Students successfully completing this program will be able to:

- Describe basic genetic mechanisms and how they affect proteins, chromosomes, cells, individuals, and populations of organisms in normal and disease states
- Describe mechanisms by which genes and the environment interact to affect the distribution of health and disease in human populations
- Demonstrate familiarity with a broad range of molecular, clinical, and analytical methodologies for genetic studies, and demonstrate mastery of a substantial subset of methods
- Read and effectively analyze published research in human genetics at the level needed for effective research and teaching
- Use their in-depth experience with a specific research project in genetics to apply the principles of generating and testing research hypotheses, designing experiments, and interpreting research results
- Present their own research ideas and results, orally and in publishable written form
- Formulate clear hypotheses and develop research programs to test those hypotheses, including study design, implementation, analysis, and interpretation
- Apply fundamental principles of grant-writing

- Apply fundamental principles of laboratory and research program management, and of ethical research practice

Coursework

A minimum total of 72 credits is required. The following courses are required **for students who started their degrees prior to Fall of 2010.**

BIOS 2041	Introduction to Statistical Methods	3 credits
EPIDEM 2110	Principles of Epidemiology	3 credits
HUGEN 2022	Human Population Genetics	2 credits
HUGEN 2031	Chromosomes and Human Disease	3 credits
HUGEN 2034	Biochemical and Molecular Genetics of Complex Disease	3 credits
HUGEN 2040	Molecular Basis of Human Inherited Disease	3 credits
HUGEN 2025	Human Genetics Seminar (must be taken four times)	0 credits
HUGEN 2027	Human Genetics Journal Club (must be taken four times)	1 credit
INTBP 2290	Scientific Ethics (may also be taken non-credit)	1 credit
HUGEN 2033	Quantitative Genetics	3 credits
or		
HUGEN 2048	Linkage Analysis in Human Genetics	3 credits
or		
HUGEN 2029	Introduction to Gene Mapping	3 credits
HUGEN 3010	Research and Dissertation	
or		
HUGEN 2021	Special Studies	
PUBHLT 2022	Dean's Grand Rounds (must be taken for the first two semesters)	0 credits

For students who started their degrees in the Fall of 2010 or later, the requirement above of

HUGEN 2033	Quantitative Genetics	3 credits
or		
HUGEN 2048	Linkage Analysis in Human Genetics	3 credits
or		
HUGEN 2029	Introduction to Gene Mapping	3 credits

has been replaced by

two advanced courses in Human Genetics, at least one of which must be

HUGEN XXXX	Statistical Genetics	3 credits
or		
HUGEN 2029	Introduction to Gene Mapping	3 credits

In addition to these required courses, BIOS 2042 (a second semester course in biostatistics) is highly recommended. Ph.D. students must also make at least two journal club presentations during the course of their degree program.

In the fall of the first year, most students take BIOS 2041, EPIDEM 2110, HUGEN 2040, HUGEN 2027, HUGEN 2025, PUBHLT 2022, and 5 credits of HUGEN 2021. In the spring of the first year most take HUGEN 2022, HUGEN 2034, HUGEN 2039, HUGEN 2025, HUGEN 2027, PUBHLT 2022, and additional credits of HUGEN 2021 or other courses to reach a full-time load of 15 credits. In the second year most students take HUGEN 2031 and one or two advanced courses.

In addition to the courses listed above, students are expected to select, in consultation with their advisor, additional courses appropriate for their areas of concentration. A student's committee may require that a student register for specific courses within or outside the Department of Human Genetics to gain knowledge in an area relevant to the student's area of concentration. It is strongly recommended that entering graduate students who are not fluent in English take a University course in conversational English. This course will not contribute to the student's GPA for the Graduate Program.

Upon successful completion of 72 credits (possibly including transfer credit from previous graduate work), the student may register for "Full-time Dissertation Study," which carries no credits or letter grade but provides full-time status.

First Year Research Rotations and Choice of Major Advisor

When the student enters the program, a faculty advisor will be assigned by the Department of Human Genetics. This advisor will follow the student's progress through the first year.

During the first year of the Ph.D. program, each student is expected to interview faculty members regarding possible research and dissertation areas. Most students participate in research rotations with 1 - 3 prospective advisors during this time. By the end of the first year, the student should choose a research advisor who will give assistance on the choice of a dissertation topic and who will remain in close consultation with the student about various aspects of the research as it progresses. This faculty member also typically provides GSR support for the student, although it is permissible for the student to be supported by a different faculty member than the primary research advisor. The student must submit to the Department written notification of the choice of a faculty research advisor. Exceptions to the procedures described above may be allowed for those students who have previously arranged to work with and be supported by a specific faculty member.

Students may select a faculty research advisor from among the entire faculty of the University of Pittsburgh, provided the advisor is a member of the graduate faculty of the university and his/her research involves genetics in some way. It is highly recommended that students first consider faculty within the Department of Human Genetics, then consider faculty with secondary appointments in Human Genetics, and only then go entirely outside the department. If the advisor does not have a primary appointment in the Department of Human Genetics, the student must also select an academic advisor within the department. In this case the research advisor and the academic advisor typically both provide close guidance to the student throughout his or her tenure in the program.

Ph.D. Qualifying Examination

The purpose of the Qualifying Examination is to assess the breadth of the student's knowledge of the discipline, the student's achievement during the first year of graduate study, and the student's potential to apply research methods independently. This judgment will be based on the student's aptitude and potential for completing the program as well as on his or her mastery of the desired substantive content to date. The Qualifying Examination is an oral examination in which the student presents a critical analysis of a published paper from the contemporary peer-reviewed literature. For full-time students the examination must be taken during the second year in the Ph.D. program, preferably in the fall term or very early in the winter term.

It is the student's responsibility to initiate the appointment of a Qualifying Examination Committee and arrange a date for the examination. If the student has separate research and academic advisors, both normally serve on the qualifying exam committee. The committee must be approved by the GSPH Office of Student Affairs; this approval should be requested in a letter prepared by Ms. Jeanette Norbut and signed by the student's program director or advisor.

Rules for Ph.D. Qualifying Committee membership:

- four or more members,
- members from at least two departments or divisions of the University,
- committee chair and at least one other member must have primary appointments in Human Genetics,
- half or more of the members must be members of the Graduate Faculty,
- half or more of the members must be on the "core educational faculty" list of at least one GSPH department.

The GSPH Office of Student Affairs maintains a list of the core educational faculty of each department, which is available on the Student Affairs web site.

The student's advisor(s), in consultation with the other committee members, select the paper on which the oral examination is based. One week prior to the examination date, the paper is distributed to the student and the committee. During the week in which the student is studying the assigned paper he or she may consult with committee members on background scientific issues, but should not receive direct help in interpreting the paper. He or she should not consult with anyone outside the committee on any issue relevant to the paper. At the examination, the student presents a critical review of the background and hypothesis of the paper, the methods,

results and conclusions of the paper. The presentation is typically 30 - 50 minutes long. The student should be able to critically judge the methods used, the data and its analysis, and the conclusions drawn from these analyses. The student is expected to be able to identify weaknesses in the paper, judge the validity of the conclusions, and suggest alternative ways to test the hypothesis posed. The student may also be asked to answer questions on general background and course material relevant to the degree.

Passing of a candidate in the qualifying examination is by a unanimous vote of the committee. The committee's decision is reported to the department chair, who forwards it to the Office of Student Affairs. A student who fails to pass may repeat the qualifying examination one time. (See GSPH Policy on Probation and Dismissal).

Comprehensive Examination and Dissertation Overview

Students enrolled in the Ph.D. program should take the Ph.D. Comprehensive Examination within two years after passing the Qualifying Examination. The Comprehensive Examination is generally administered after the student has completed his/her coursework and has decided on a dissertation topic.

It is the student's responsibility to initiate the appointment of a Comprehensive Examination Committee and arrange a date for the examination. The student's advisor, with the concurrence of the department chair, recommends the committee membership for approval to the GSPH Office of Student Affairs. Approval is not necessary if the Comprehensive Examination Committee is identical to the Qualifying Examination Committee. It is the function of this committee to administer the examination. The Comprehensive Examination committee is typically chaired by the student's research advisor, and goes on to become the student's dissertation committee. Note that the committee chair need not have a primary appointment in the Department of Human Genetics.

Rules for Ph.D. Comprehensive Committee membership:

- four or more members, including the student's research and academic advisors,
- members from at least two departments or divisions of the University,
- at least two members must have primary appointments in Human Genetics,
- a majority of the members must be members of the Graduate Faculty.

For the Comprehensive Examination, the student is required to complete a dissertation research proposal. The topic of the proposal is generally selected by the student in consultation with his or her research advisor. The proposal is expected to be conceptually well-founded and adequately documented. Attribution to published and unpublished sources must be comprehensive. The proposal is to be well-organized and should describe original and innovative experiments or analyses that will accomplish the stated aims and objectives of the research. The written proposal cannot consist of just a collection of experiments or analyses, but must include the rationale as well as the significance of the proposed experiments or analyses. The significance of the expected results should be discussed. There is no absolute limit on the length of the proposal, but it is recommended that the entire document be no more than 10 - 20 pages of text and up to an additional 10 pages of references, appendices, tables, figures, etc. Already-written papers

should be included as appendices, but should be summarized in the main body of the proposal. The final written proposal should be delivered to all members of the committee a minimum of two weeks prior to the oral examination date.

At the oral examination, the student gives a 30 – 45 minute presentation of the dissertation proposal. The Comprehensive Examination committee evaluates the student's proposal and conducts an oral examination on the student's understanding of both the content of the research proposal and the basic concepts underlying the contents. The student is graded pass/fail. A unanimous vote of the panel decides the grade. The chair of the committee shall notify the department chair of the decision and submit the completed, signed evaluation form. The department chair shall notify the GSPH Office of Student Affairs of the decision. A "pass" shall be warranted when both of the following conditions are met: (i) the written proposal is considered acceptable as presented, and (ii) the student has performed knowledgeably in defense of the proposal. In the event of a failure, the student shall be given one opportunity to repeat the Comprehensive Examination provided that the modified written proposal is submitted within four months after notification of failure of the first exam. In the event of a second failure, the faculty shall recommend either dismissal of the student from the program or that the student transfer to the M.S. degree program for the completion of his/her training. See the GSPH Probation and Dismissal Policy for more information.

Doctoral Committee

The primary responsibility of the Doctoral Committee shall be to advise the student in the effective design, conduct and analysis of a research study and to approve a body of original research of sufficient quality to form the basis for the Ph.D. dissertation. The Doctoral Committee shall be proposed by the student and his or her research and academic advisors and approved by the Office of Student affairs. Approval is not necessary if the Doctoral Committee is identical to the Comprehensive Examination Committee. The rules for composition of the Doctoral Committee are the same as those for the Comprehensive Examination Committee above.

The Doctoral Committee has the responsibility of meeting at least annually, and preferably every six months, to review the student's research progress. A simple majority of the Doctoral Committee determines actions of the committee with the exception of final approval of the doctoral thesis.

Dissertation and Final Oral Examination

The student's dissertation must provide evidence of original scholarly research of sufficient quality to be published in a peer reviewed scientific journal. The style and format of the dissertation must conform to the standards set forth in the University's Electronic Thesis and Dissertation (ETD) rules. Subject to the discretion of the dissertation committee, the format of the dissertation can be either a traditional single cohesive document, or individual works in the style of publishable (or published) papers can be included. If the format is that of a compendium of papers, the dissertation must also include a substantial introduction and a substantial discussion that tie the body of work together into a cohesive whole. If the papers have numerous

co-authors, it is also recommended that each chapter include a description of the student's contribution to the work. The dissertation advisor and one or more members of the Doctoral Committee may read preliminary drafts of the dissertation, suggest revisions and approve the final copy for submission to the Doctoral Committee. The defense cannot take place in the same semester as the comprehensive exam.

The final copy of the dissertation will be submitted to the Doctoral Committee at least three weeks prior to the Final Oral Examination (dissertation defense). With consent of every member of the committee, a shorter time-period may be allowed. It is highly recommended that the defense occur at least two weeks prior to the **initial** dissertation submission deadline for the semester in which the student plans to graduate. The dissertation defense will consist of a public seminar on the subject of the dissertation followed by an examination by the Doctoral Committee. Approval of the dissertation is certified by a unanimous vote of the Doctoral Committee. The degree will be granted by the Graduate School of Public Health.

Students intending to graduate must file an application to graduate by the deadline specified in the University Calendar. They must notify the Department of Human Genetics approximately two months prior to the intended date of the dissertation defense, so that public notices of the defense date can be placed according to University policy.

The final copy of the dissertation must be prepared and submitted according to the University guidelines for Electronic Theses and Dissertations (ETD). Detailed information on requirements is available from the GSPH Office of Student Affairs and at www.pitt.edu/~graduate/etd. A hard copy of the final dissertation should be provided to each member of the dissertation committee and to the Department of Human Genetics.

M.S. IN HUMAN GENETICS

Admission

See "Ph.D. in Human Genetics" above. Admission criteria are the same for M.S. applicants.

Financial Aid

Tuition support is not normally available to students in the M.S. program, although M.S. students may be able to arrange for hourly wage/stipend support from research mentors.

Overview

The M.S. in Human Genetics is a research-oriented degree, intended to prepare the graduate to participate in laboratory or biomathematical research or to go on to Ph.D. level study. The requirements for the M.S. in Human Genetics can normally be fulfilled in two years of full-time study. Students interested in pursuing a Ph.D. are encouraged to apply directly to the Ph.D. program; an M.S. is not required for entrance to the Ph.D. program.

General requirements are listed below, but the student should also discuss requirements with his or her faculty advisor.

Program Objectives

Students successfully completing this program will be able to:

- Describe basic genetic mechanisms and how they affect proteins, chromosomes, cells, individuals, and populations of organisms in normal and disease states
- Describe mechanisms by which genes and the environment interact to affect the distribution of health and disease in human populations
- Demonstrate familiarity with a range of molecular, clinical, and analytical methodologies for genetic studies, and demonstrate mastery of at least a subset of methods
- Read and effectively analyze published research in human genetics
- Use their in-depth experience with a specific research project in genetics to apply the principles of generating and testing research hypotheses, designing experiments, and interpreting research results
- Summarize and present a research project orally and in writing

Coursework

A minimum total of 36 credits is required for the M.S. in Human Genetics. The following courses are required.

BIOS 2041	Introduction to Statistical Methods	3 credits
EPIDEM 2110	Principles of Epidemiology	3 credits
PUBHLT 2011	Essentials of Public Health	3 credits
HUGEN 2022	Human Population Genetics	2 credits
HUGEN 2031	Chromosomes and Human Disease	3 credits
HUGEN 2034	Biochemical and Molecular Genetics of Complex Disease	3 credits
HUGEN 2040	Molecular Basis of Human Inherited Disease	3 credits
HUGEN 2025	Human Genetics Seminar (must be taken two times)	0 credits
HUGEN 2027	Human Genetics Journal Club (must be taken two times)	1 credit
INTBP 2290	Scientific Ethics (may also be taken non-credit)	1 credit
HUGEN 2021	Special Studies (Research)	2 credits (min.)
PUBHLT 2022	Dean's Grand Rounds (must be taken for the first two semesters)	0 credits

M.S. students must also make at least one journal club presentation during the course of their degree program.

In the fall of the first year, most students take BIOS 2041, EPIDEM 2110, HUGEN 2031, HUGEN 2040, HUGEN 2027, HUGEN 2025, PUBHLT 2022, and 2 credits of HUGEN 2021. In the spring of the first year most take HUGEN 2022, HUGEN 2034, HUGEN 2039, HUGEN 2025, HUGEN 2027, PUBHLT 2022, PUBHLT 2011, and additional credits of HUGEN 2021 or other courses to reach a full-time load of 15 credits.

In addition to the courses listed above, students are expected to select, in consultation with their advisor, additional courses appropriate for their areas of concentration. A student's committee may require that a student register for specific courses within or outside the Department of Human Genetics to gain knowledge in an area relevant to the student's area of concentration. It is strongly recommended that entering graduate students who are not fluent in English take a University course in conversational English. This course will not contribute to the student's GPA for the Graduate Program.

First Year Research Rotations and Choice of Major Advisor

The process for M.S. students is essentially the same as that described for the Ph.D. program above, except that M.S. students are encouraged to move through the process of choosing an advisor a bit more quickly so that thesis research can begin before the start of the second year.

Comprehensive Examination

A comprehensive examination covering areas of basic knowledge relevant to human genetics must be passed by all M.S. students. The M.S. Comprehensive Examination follows the same form as the Ph.D. Qualifying Examination (described above). The M.S. Comprehensive Examination should be taken in the fall or early in the spring of the second year for full-time students. It must be taken at least one month before the last day of the term on which the student is to graduate. Typically the examination committee is identical or almost identical to the thesis (advisory) committee. The committee must be approved by the GSPH Office of Student Affairs; this approval should be requested in a letter prepared by Ms. Jeanette Norbut.

Rules for M.S. Comprehensive Committee membership:

- three or more members, including the student's research and academic advisors,
- members from at least two departments or divisions of the University,
- chair must have a primary appointment in Human Genetics,
- half or more of the members must be members of the Graduate Faculty,
- half or more of the committee members must be on the “core educational faculty” list of at least one GSPH department

Advisory Committee

The thesis advisory committee should be selected by the student in consultation with the research advisor. The committee composition requirements are identical to those described above for the M.S. comprehensive examination, except that the advisory committee can be chaired by the student's research advisor, even if that individual does not have a primary appointment in Human Genetics. If the Advisory Committee is not identical to the Comprehensive Examination Committee, it must be approved by the GSPH Office of Student Affairs. It is the responsibility of the Advisory Committee to guide the student in selecting an appropriate research topic and in the completion of a satisfactory thesis on an original problem in the area of the student's primary interest. The Committee will meet periodically with the student to give advice on the completion of the research project and preparation of the thesis. If the research advisor does not have a primary appointment in Human Genetics, the student must also select an academic advisor within the department. In this case the research advisor and the academic advisor typically both provide close guidance to the student throughout his or her tenure in the program.

Thesis

The M.S. thesis must demonstrate a mastery of knowledge in the specific topic area and demonstrate the student's ability to articulate a substantive research question and address the question through laboratory or non-laboratory research or through a comprehensive review of the literature. The style and format of the dissertation must conform to the standards set forth in the University's Electronic Thesis and Dissertation (ETD) rules. The Advisory Committee will judge the adequacy of the thesis by an open oral examination covering the subject of the thesis. Successful completion of the M.S. thesis requires unanimous agreement by the Advisory Committee.

All M.S. students must register for at least one credit during the term in which they intend to graduate.

Students intending to graduate must file an application to graduate by the deadline specified in the University Calendar.

The final copy of the thesis must be prepared and submitted according to the University guidelines for Electronic Theses and Dissertations (ETD). A hard copy of the final thesis should be provided to each member of the advisory committee and to the Department of Human Genetics.

M.S. IN GENETIC COUNSELING

(A Ph.D. in Human Genetics with a focus on genetic counseling is available. Please see the Ph.D. in Human Genetics section for further information.)

Admission

Application for admission must be made through the Graduate School of Public Health Office of Student Affairs. The admissions process is highly structured, and includes a required interview. Further information is available on the Human Genetics web site.

Admission to the Graduate Program in Genetic Counseling requires a bachelor's degree in a discipline related to the biological or behavioral sciences from an accredited college or university with a minimum quality point average (GPA) of 3.0. The General Graduate Record Examination (GRE) scores for the verbal, quantitative and analytical tests must be supplied with the application for admission and should be above the 70th percentile in each of these three areas. The preferred undergraduate background includes courses in each of the following: genetics, organic chemistry, general biochemistry, calculus, statistics, and a behavioral or social science. Prior to admission, student applicants are encouraged to volunteer at clinical genetic centers and/or at an agency that would offer opportunity to gain experience working with individuals in a crisis situation. Applicants also need to demonstrate a robust understanding of the genetic counseling profession.

Financial Aid

Tuition support is not normally available to students in the M.S. program, although M.S. students are typically able to arrange for hourly wage/stipend support from research mentors or other faculty.

Overview

The Genetic Counseling Program in the Department of Human Genetics at the University of Pittsburgh has a long history. The Program was established in 1971 and is the second oldest program nationally. The Genetic Counseling Program received full accreditation from the American Board of Genetic Counseling in 1997. Our next reaccreditation will occur in 2011.

Recent discoveries concerning the genetic contribution to human diseases mean that genetic counseling has an increasingly important role in health care delivery. The genetic counselor is trained to provide patients and families with pertinent genetic information to understand their risk for disease and to make informed decisions. The Genetic Counseling Program at the University of Pittsburgh is committed to providing up-to-date training in the complex science of human genetics, as well as in counseling skills. As a result, the Genetic Counseling Program is based on three important foundations: scientific training in human genetics, clinical experience, and understanding the psychology and social aspects of counseling.

The two-year program provides students with an in-depth background in human genetics and counseling. Training incorporates specific aspects of disease as they relate to individuals or families, including disease prognosis, consequences, treatment, risk of recurrence, and prevention. An internship in the second year requires students to integrate the science of human genetics with the social, psychological, moral, and ethical issues of genetic counseling. This program consists of prescribed courses during the first ten months, followed by an intensive rotation experience through the department's training programs at Children's Hospital of Pittsburgh, Magee-Women's Hospital, the Cancer Genetics Program, Allegheny General

Hospital, and the University of Pittsburgh Health System. All rotations sites are in the Pittsburgh area with most being located within walking distance from the Graduate School of Public Health.

The program provides general content areas to support the development of practice-based competencies in genetic counseling. Most course work is completed in the first academic year. The clinical rotations begin in May and continue through March of the second year. Most students see approximately approximately 150 cases during their clinical rotations.

The theory and application of counseling and interviewing including areas such as individual psychosocial development and dynamics; family dynamics; crisis intervention; psychosocial assessment and referral; grief/bereavement counseling; and cross cultural issues are incorporated throughout the curriculum. The social, ethical and legal issues as they pertain to the delivery of genetic services with review of health care delivery systems and principles of public health are provided in the Principles of Genetic Counseling course and the Intervention Skills for Genetic Counselors course.

The curriculum also includes principles and applications of human genetics and related sciences: cytogenetics; biochemical genetics; molecular genetics; population and quantitative genetics; human variation and disease susceptibility; embryology; and teratology.

Courses also address principles and practice of clinical/medical genetics: clinical features and natural history of a broad range of genetic diseases; indications for and methods of genetic diagnosis, including physical assessment, dysmorphology, laboratory and other diagnostic studies; indications for and methods of prenatal diagnosis including obstetric and genetic techniques; family history and pedigree analysis; risk assessment; use of the genetic literature; and case management skills.

The methods of genetic testing including indications, limitations, and methodology of tests used in cytogenetic, biochemical genetic, and molecular genetic laboratories are covered.

Teaching skills for presentations are reviewed in several classes and all students must present multiple cases at clinical case conference and at the rotation sites.

Research methods are reviewed in the biostatistics and epidemiology classes and are applied in the preparation of the Master's thesis project proposal.

Program Objectives

Students who receive the M.S. in genetic counseling will achieve the practice-based competencies outlined by the American Board of Genetic Counselors. These are as follows.

Domain I: Communication Skills

1. Can establish a mutually agreed upon genetic counseling agenda with the client.
The student is able to contract with a client or family throughout the relationship; explain the genetic counseling process; elicit expectations, perceptions and knowledge; and establish rapport through verbal and non-verbal interaction.

2. Can elicit an appropriate and inclusive family history.

The student is able to construct a complete pedigree; demonstrate proficiency in the use of pedigree symbols, standard notation, and nomenclature; structure questioning for the individual case and probable diagnosis; use interviewing skills; facilitate recall for symptoms and pertinent history by pursuing a relevant path of inquiry; and in the course of this interaction, identify family dynamics, emotional responses, and other relevant information.

3. Can elicit pertinent medical information including pregnancy, developmental, and medical histories.

The student is able to apply knowledge of the inheritance patterns, etiology, clinical features, and natural history of a variety of genetic disorders, birth defects, and other conditions; obtain appropriate medical histories; identify essential medical records and secure releases of medical information.

4. Can elicit a social and psychosocial history.

The student is able to conduct a client or family interview that demonstrates an appreciation of family systems theory and dynamics. The student is able to listen effectively, identify potential strengths and weaknesses, and assess individual and family support systems and coping mechanisms.

5. Can convey genetic, medical, and technical information including, but not limited to, diagnosis, etiology, natural history, prognosis, and treatment/management of genetic conditions and/or birth defects to clients with a variety of educational, socioeconomic, and ethnocultural backgrounds.

The student is able to demonstrate knowledge of clinical genetics and relevant medical topics by effectively communicating this information in a given session.

6. Can explain the technical and medical aspects of diagnostic and screening methods and reproductive options including associated risks, benefits, and limitations.

The student is able to demonstrate knowledge of diagnostic and screening procedures and clearly communicate relevant information to clients. The student is able to facilitate the informed-consent process. The student is able to determine client comprehension and adjust counseling accordingly.

7. Can understand, listen, communicate, and manage a genetic counseling case in a culturally responsive manner.

The student can care for clients using cultural self-awareness and familiarity with a variety of ethnocultural issues, traditions, health beliefs, attitudes, lifestyles, and values.

8. Can document and present case information clearly and concisely, both orally and in writing, as appropriate to the audience.

The student can present succinct and precise case-summary information to colleagues and other professionals. The student can write at an appropriate level for clients and professionals and produce written documentation within a reasonable time frame. The

student can demonstrate respect for privacy and confidentiality of medical information.

9. Can plan, organize, and conduct public and professional education programs on human genetics, patient care, and genetic counseling issues.

The student is able to identify educational needs and design programs for specific audiences, demonstrate public speaking skills, use visual aids, and identify and access supplemental educational materials.

Domain II: Critical-Thinking Skills

1. Can assess and calculate genetic and teratogenic risks.

The student is able to calculate risks based on pedigree analysis and knowledge of inheritance patterns, genetic epidemiologic data, and quantitative genetics principles.

2. Can evaluate a social and psychosocial history.

The student demonstrates understanding of family and interpersonal dynamics and can recognize the impact of emotions on cognition and retention, as well as the need for intervention and referral.

3. Can identify, synthesize, organize and summarize pertinent medical and genetic information for use in genetic counseling.

The student is able to use a variety of sources of information including client/family member(s), laboratory results, medical records, medical and genetic literature and computerized databases. The student is able to analyze and interpret information that provides the basis for differential diagnosis, risk assessment and genetic testing. The student is able to apply knowledge of the natural history and characteristics/symptoms of common genetic conditions.

4. Can demonstrate successful case management skills.

The student is able to analyze and interpret medical, genetic and family data; to design, conduct, and periodically assess the case management plan; arrange for testing; and follow up with the client, laboratory, and other professionals. The student should demonstrate understanding of legal and ethical issues related to privacy and confidentiality in communications about clients.

5. Can assess client understanding and response to information and its implications to modify a counseling session as needed.

The student is able to respond to verbal and nonverbal cues and to structure and modify information presented to maximize comprehension by clients.

6. Can identify and access local, regional, and national resources and services.

The student is familiar with local, regional, and national support groups and other resources, and can access and make referrals to other professionals and agencies.

7. Can identify and access information resources pertinent to clinical genetics and counseling.

The student is able to demonstrate familiarity with the genetic, medical and social-science literature, and on-line databases. The student is able to review the literature and synthesize the information for a case in a critical and meaningful way.

Domain III: Interpersonal, Counseling, and Psychosocial Assessment Skills

1. Can establish rapport, identify major concerns, and respond to emerging issues of a client or family.

The student is able to display empathic listening and interviewing skills, and address clients' concerns.

2. Can elicit and interpret individual and family experiences, behaviors, emotions, perceptions, and attitudes that clarify beliefs and values.

The student is able to assess and interpret verbal and non-verbal cues and use this information in the genetic counseling session. The student is able to engage clients in an exploration of their responses to risks and options.

3. Can use a range of interviewing techniques.

The student is able to identify and select from a variety of communication approaches throughout a counseling session.

4. Can provide short-term, client-centered counseling and psychological support.

The student is able to assess clients' psychosocial needs and recognize psychopathology. The student can demonstrate knowledge of psychological defenses, family dynamics, family theory, crisis-intervention techniques, coping models, the grief process, and reactions to illness. The student can use open-ended questions; listen empathically; employ crisis intervention skills; and provide anticipatory guidance.

5. Can promote client decision-making in an unbiased, non-coercive manner.

The student understands the philosophy of non-directiveness and is able to recognize his or her values and biases as they relate to genetic counseling issues. The student is able to recognize and respond to dynamics, such as countertransference, that may affect the counseling interaction.

6. Can establish and maintain inter- and intradisciplinary professional relationships to function as part of a health-care delivery team.

The student behaves professionally and understands the roles of other professionals with whom he or she interacts.

Domain IV: Professional Ethics and Values

1. Can act in accordance with the ethical, legal, and philosophical principles and values of the profession.

The student is able to recognize and respond to ethical and moral dilemmas arising in practice and seek assistance from experts in these areas. The student is able to identify factors that promote or hinder client autonomy. The student demonstrates an appreciation of the issues surrounding privacy, informed consent, confidentiality, real or potential discrimination, and other ethical/legal matters related to the exchange of genetic information.

2. Can serve as an advocate for clients.

The student can understand clients' needs and perceptions and represent their interests in accessing services and responses from the medical and social service systems.

3. Can introduce research options and issues to clients and families.

The student is able to critique and evaluate the risks, benefits, and limitations of client participation in research; access information on new research studies; present this information clearly and completely to clients; and promote an informed-consent process.

4. Can recognize his or her own limitations in knowledge and capabilities regarding medical, psychosocial, and ethnocultural issues and seek consultation or refer clients when needed.

The student demonstrates the ability to self-assess and to be self-critical. The student demonstrates the ability to respond to performance critique and integrates supervision feedback into his or her subsequent performance. The student is able to identify and obtain appropriate consultative assistance for self and clients.

5. Can demonstrate initiative for continued professional growth.

The student displays a knowledge of current standards of practice and shows independent knowledge-seeking behavior and lifelong learning.

Coursework

The following courses are required.

Fall Term of 1st year

BIOS 2041	Introduction to Statistical Methods	3 credits
EPIDEM 2110	Principles of Epidemiology	3 credits
HUGEN 2031	Chromosomes and Human Disease	3 credits
HUGEN 2040	Molecular Basis of Human Inherited Disease	3 credits
HUGEN 2035	Principles of Genetic Counseling	3 credits
HUGEN 2025	Human Genetics Seminar	0 credits
HUGEN 2047	Clinical Genetics Case Conference	0 credits
HUGEN 2027	Human Genetics Journal Club	0 credits
PUBHLT 2022	Dean's Grand Rounds	0 credits
Ethics Case Conference		
Embryology (alternate years by arrangement)		
Biochemistry (for those not completing prior to admission)		

Spring Term of 1st year

HUGEN 2038	Intervention Skills for Genetic Counselors	3 credits
HUGEN 2022	Human Population Genetics	2 credits
HUGEN 2039	Risk Calculation in Genetic Counseling	1 credit
HUGEN 2032	Genetic Techniques	2 credits
HUGEN 2034	Biochem. and Mol. Genetics of Complex Disease	3 credits
HUGEN 2025	Human Genetics Seminar	0 credits

HUGEN 2047	Clinical Genetics Case Conference	1 credit
PUBHLT 2011	Essentials of Public Health	3 credits
PUBHLT 2022	Dean's Grand Rounds	0 credits

Summer Term of 1st year

Begin internship in the Summer Term (May 1)

Fall Term of 2nd year

HUGEN 2036	Genetic Counseling Internship	4 credits
HUGEN 2047	Clinical Genetics Case Conference Ethics Case Conference	0 credits

Spring Term of 2nd year

HUGEN 2036	Genetic Counseling Internship	4 credits
HUGEN 2047	Clinical Genetics Case Conference	0 credits

Comprehensive Examination

The Comprehensive Examination for M.S. (Genetic Counseling) students is a two part examination. The written examination consists of 100 multiple choice questions in a format similar to the Certification Examination of the American Board of Genetic Counseling. The written examination is administered in the Fall term of the second year of study. A student failing a minimum score of 70% must repeat the written examination within 90 days and achieve a minimum score of 70% or undergo a series of supervised tutorial sessions to overcome areas of deficiencies. The second part of the examination, administered in the Spring term of the second year of study, consists of an oral examination based on a "fictional" clinical case presented to a panel of examiners. A student failing to achieve a passing score on the oral exam must satisfactorily complete a series of tutorial sessions under the direction of the Program Co-Directors or their designee.

Genetic Counseling Internship

The genetic counseling internship consists of a rotation through the Division of Medical Genetics at Children's Hospital of Pittsburgh, the Division of Reproductive Genetics at Magee-Womens Hospital, the UPMC Cancer Genetics Program, the Division of Maternal-Fetal Medicine and the Cancer Genetic Program at Allegheny General Hospital and Genetics Services of the University of Pittsburgh Medical Center.

Advisory Committee

The thesis advisory committee should be selected by the student, in consultation with the research advisor. The committee composition rules are the same as those outlined above for the M.S. in Human Genetics. The committee must be approved by the GSPH Office of Student Affairs; this approval should be requested in a letter prepared by Ms. Jeanette Norbut and signed by the student's program director or advisor. It is the responsibility of the Advisory Committee to guide the student in selecting an appropriate research topic and in the completion of a

satisfactory thesis on an original problem in the area of the student's primary interest. The Committee will usually meet periodically with the student to give advice on the completion of the research project and preparation of the thesis.

Thesis

The M.S. thesis must demonstrate a mastery of knowledge in the specific topic area and demonstrate the student's ability to articulate a substantive research question and address the question through laboratory or non-laboratory research or through a comprehensive review of the literature. The Advisory Committee will judge the adequacy of the thesis by an open oral examination covering the subject of the thesis. Successful completion of the M.S. thesis requires unanimous agreement by the Advisory Committee.

All M.S. students must register for at least one credit during the term in which they intend to graduate.

Students intending to graduate must file an application to graduate by the deadline specified in the University Calendar.

The final copy of the thesis must be prepared and submitted according to the University guidelines for Electronic Theses and Dissertations (ETD). A hard copy of the final thesis should be provided to each member of the advisory committee and to the Department of Human Genetics.

M.P.H. IN PUBLIC HEALTH GENETICS

Admission

Application for admission must be made through the Graduate School of Public Health Office of Student Affairs.

Candidates for the M.P.H. program in Human Genetics must meet the general admission requirements of the University of Pittsburgh Graduate School of Public Health M.P.H. program. In addition, the following departmental requirements and guidelines apply.

- Candidates must have a degree in a discipline relevant to public health or must have substantial knowledge of a discipline relevant to public health gained through either study or experience.
- Candidates should submit a personal statement describing their interests and educational goals.
- GRE scores must be submitted and should generally be above the 70th percentile in all categories.
- Coursework in genetics, biochemistry, and calculus is helpful but is not required.

Applicants who are graduates of an accredited college or university but who do not qualify for admission to full graduate status because of deficiencies in either their undergraduate course program or their scholastic achievement, may be considered for provisional graduate status if there is strong supporting evidence of their ability to successfully complete a graduate program. Courses taken to remove deficiencies do not count toward completion of graduate degree requirements. Transfer from provisional to full graduate status is initiated and recommended by the department, and is possible only after removal of deficiencies and other conditions noted at the time of admission and satisfactory progress in graduate course work.

Financial Aid

Tuition support is not normally available to students in the M.P.H. program, although M.P.H. students may be able to arrange for hourly wage/stipend support from research/practice mentors.

Overview

This M.P.H. program integrates genetics and the public health science disciplines of epidemiology, pathobiology, biostatistics, environmental health and health services research, with ethics, social sciences, public affairs, economics and law. Public health genetics focuses on phenotypic disease prevention in populations, not just individual patients and their families. It addresses society's legal, ethical, financial, regulatory and organizational responsibilities in offering genetic services, and devising environmental and occupational interventions to prevent disease in populations.

The requirements for the M.P.H. in Public Health Genetics can normally be fulfilled in two years of full-time study. General requirements are listed below, but the student should also review the requirements with his or her faculty advisor.

Program Objectives

A student completing the MPH program in Public Health Genetics will be able to:

- Command the essential competencies of public health's core content areas, and apply these competencies to complex public health issues.
- Explain how genetics contributes uniquely to the study of population health, and how it intersects with other public health disciplines.
- Articulate and advocate the values and ethics that distinguish public health as an historic, contemporary, and cohesive field of practice and inquiry.
- Successfully plan and execute programs and/or research intended to advance the public's health and health awareness, nationally and globally.
- Communicate effectively and appropriately with diverse groups of professional colleagues and public constituents.
- Locate, assemble, and critically analyze data, information, and knowledge resources.
- Develop a sense of identity, authority, and service in public health and in human genetics.
- Assume key management roles in health organizations, and provide leadership in creating, implementing, and interpreting policy that promotes the ideas of public health.

- Apply knowledge of inheritance, including basic cellular and molecular mechanisms, to understanding a variety of rare and common health conditions.
- Apply epidemiological and statistical approaches to the study of risk factors and disease with a genetic component.
- Identify interactions among genes, environmental factors, and behaviors.
- Understand how genetic principles/technologies apply to diagnosis, screening, and interventions for disease prevention and health promotion programs.
- Incorporate genetic information into assessment, policy development and assurance activities.
- Apply methods to address ethical, legal, social and financial implications of the use of genetic principles/technologies in public health, including protecting privacy and autonomy, and preventing discrimination.

Coursework

A minimum of 47 credits is required for the MPH. This total is made up of the GSPH core courses, a core of required courses in the department of Human Genetics, and electives relevant to the student's program goals.

GSPH core course requirements

PUBHLT 2014	Public Health Overview	1 credit
PUBHLT 2015	Public Health Biology	2 credits
BIOS 2041	Introduction to Statistical Methods	3 credits
EPIDEM 2110	Principles of Epidemiology	3 credits
BCHS 2509	Social and Behavior Sciences and Public Health	3 credits
EOH 2013	Environmental Health and Disease	3 credits
HPM 2001	Introduction to Leadership, Management, and Policy for Public Health	3 credits
PUBHLT 2016	Capstone: Problem Solving in Public Health	2 credits
PUBHLT 2022	Dean's Grand Rounds (must be taken for the first two semesters)	0 credits

Students in the Public Health Genetics program with adequate prior background may apply to be exempted from the requirement to take PUBHLT 2015. Most students do this.

Required human genetics courses

HUGEN 2049	Public Health Genetics	3 credits
HUGEN 2025	Human Genetics Seminar (must be taken two times)	0 credits
HUGEN 2022	Human Population Genetics	3 credits
HUGEN 2034	Biochemical and Molecular Genetics of Complex Disease	3 credits
HUGEN 2040	Molecular Genetics of Human Inherited Disease	3 credits
HUGEN 2047	Clinical Genetics Case Conference (must be taken two times)	1 credits
HUGEN 2027	Human Genetics Journal Club	1 credit

HUGEN 2026	(must be taken at least once) Practicum	min 6 credits
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Course Progression

There is a fair amount of flexibility in the scheduling of courses for the M.P.H., depending on the interests of the student and on any other degree or certificate programs in which he or she is enrolled. The most typical schedule is to take HUGEN 2049, HUGEN 2040, PUBHLT 2014 and BIOS 2041 in the first fall semester, along with at least some journal club, seminar, or case conference credits. In the spring of the first year most students take HUGEN 2022 and HUGEN 2034, along with two or more of the core courses. Other core courses can be taken in the summer or in the second year, depending on whether the student is on campus during the summer. Some students use the summer to do a practicum in an off-campus location. Students cannot register for PUBHLT 2016 unless they have taken all of the other core courses, though it is permissible to take one other core course concurrently. The entire program can be completed in 1 1/2 years, though most students prefer to spread it out over two years.

Practicum and Masters Essay

All students are required to complete a Practicum. The Practicum is a supervised practice experience of at least 200 hours, providing students an opportunity to learn how genetics is applied in a public health setting and in the formulation and application of public health policy. It is highly recommended that M.P.H. students discuss potential practicum plans with their advisors by the spring of their first year.

Students must write a master's essay, which will normally be based on the practicum experience. The essay is read and approved by a committee that must consist of at least one faculty member in Human Genetics and one from outside the department. The essay must be approved by unanimous vote of the committee.

DUAL M.S. IN GENETIC COUNSELING AND M.P.H. IN PUBLIC HEALTH GENETICS

Overview

Students interested in receiving both the M.S. in genetic counseling and the M.P.H. in public health genetics may enroll in the dual degree program, which awards both degrees simultaneously at the end of a 3-year program. All requirements for both programs must be fulfilled, with the exceptions noted below.

Admission

Application for admission must be made separately to the two programs. It is not absolutely necessary for students to be admitted to each degree program at the same time. For example, a

student might enter the M.S. program initially and then be accepted into the M.P.H. program after the first term. Or a student might enter the M.P.H. program and then be accepted into the M.S. program starting in the next Fall.

Coursework

All required courses for both degrees must be taken by dual degree students, with the exception of PUBHLT 2011, Essentials of Public Health. The total number of credits required for the dual degree is 62. In general, dual degree students spend the first two years doing their M.S. work and concentrate on the core courses for the M.P.H. in the third year, but all programs are arranged individually with the faculty advisors.

M.S. Thesis and M.P.H. Essay

If the M.S. thesis topic involves substantial public health content, the student may submit a single document (in M.S. thesis form) to fulfill the requirements for both the thesis and the M.P.H. essay. The student may elect to submit both an M.S. thesis and an M.P.H. essay. The essay should focus upon elements of the practicum.

OTHER DEGREE COMBINATIONS

Many students choose to combine a degree in Human Genetics with a degree in another department. In addition, some students pursue more than one degree within the department. Recent examples have included:

- M.P.H. and Ph.D. in Human Genetics
- M.P.H. in Epidemiology and Ph.D. in Human Genetics
- M.S. in Biostatistics and Ph.D. in Human Genetics
- M.S. in Human Genetics and Dr.P.H. in Epidemiology

Students considering pursuing more than one degree should talk to advisors in both departments as early as possible in the process. There are strict limits on the number of credits that may be "shared" between two degrees in different departments; in general a Masters and a Ph.D. may share only 24 credits, and two Masters degrees may share only 6, but consult the Office of Student Affairs for rules specific to your situation.

CERTIFICATE PROGRAM IN PUBLIC HEALTH GENETICS

Overview

The overall goal of the program is to give public health professionals the core genetics competencies that they need to integrate genetics into any public health discipline. Students enrolled in this certificate program are trained to incorporate knowledge of how genes, together with the environment and behavior, influence health and apply this insight into their area of practice or research. The certificate program assumes that participants already have standard public health competencies, or are in the process of acquiring them through other coursework.

Admission

The program is open to currently matriculated GSPH students and also to non-degree students who hold at least a bachelor's degree. The standards for admission are the same as those for the M.P.H. Applicants who are not enrolled in degree programs in the GSPH must demonstrate prior public health experience in the form of academic work or appropriate job experience.

Program Objectives

Students completing the Public Health Genetics Certificate will be able to:

- Demonstrate basic knowledge of the role that genetics plays in the development of disease
- Identify the limits of his/her genetic expertise
- Make appropriate referrals to those with more genetic expertise
- Apply the basic public health sciences, (including behavioral and social sciences, biostatistics, epidemiology, informatics, environmental health) to genomic issues and studies and genetic testing, using the genomic vocabulary to attain the goal of disease prevention
- Identify ethical and medical limitations to genetic testing, including uses that don't benefit the individual
- Maintain up-to-date knowledge on the development of genetic advances and technologies relevant to his/her specialty or field of expertise and learn the uses of genomics as a tool for achieving public health goals related to his/her field or area of practice
- Identify the role of cultural, social, behavioral, environmental and genetic factors in development of disease, disease prevention, and health promoting behaviors; and their impact on medical service organization and delivery of services to maximize wellness and prevent disease
- Participate in strategic policy planning and development related to genetic testing or genomic programs
- Collaborate with existing and emerging health agencies and organizations, academic, research, private and commercial enterprises, including genomic-related businesses, agencies and organizations and community partnerships to identify and solve genomic-related problems
- Participate in the evaluation of program effectiveness, accessibility, cost benefit, cost effectiveness and quality of personal and population-based genomic services in public health
- Develop protocols to ensure informed consent and human subject protection in research

Curriculum

The curriculum consists of 15 credits, of which at least 12 must be traditional classroom courses. The remaining 3 credits can be seminar, project, or practicum work, as described below.

1) All students must take

HUGEN 2049 3 Public Health Genetics

2) Students must take at least two of the following four courses to achieve competency in the basic science of genetics.

HUGEN 2022 2 Human Population Genetics
HUGEN 2034 3 Intro. to Human Biochemical and Molecular Genetics
HUGEN 2040 3 Molecular Genetics of Human Inherited Disease
HUGEN 2031 3 Chromosomes and Human Diseases

3) A maximum of 3 credits may come from the following courses.

HUGEN 2047 1 Clinical Genetics Case Conference (may be
taken more than once)
HUGEN 2027 1 Human Genetics Journal Club (may be taken
more than once)
HUGEN 2026 1-3 Special Studies in Human Genetics –
Practicum (1-3 credits)

Additional courses permitted for the certificate include the following.

All other Human Genetics courses

EPIDEM 2601 2 Molecular Epidemiology Laboratory
BCHS 2572 3 Risk Communication

Other courses must be approved by the Director of Graduate Studies for the Department of Human Genetics.

In addition, all students receiving the certificate must give one presentation at the Human Genetics Journal Club, regardless of whether they register for the journal club course for credit.

Students enrolled in Human Genetics degree programs other than the M.P.H. in Public Health Genetics may receive the certificate, with the stipulation that the certificate curriculum must include at least 6 credits of coursework that is not part of the coursework for their degree. This 6 credits will consist of the Public Health Genetics course and at least 3 additional credits of work that is specifically focused on ethics or public health genetics (as opposed to the basic science of genetics), such as a practicum, a biomedical ethics course, or the Clinical Genetics Case Conference Course.

Advising

Each student who is admitted to the certificate program is assigned a faculty advisor who is responsible for helping the student choose courses and integrate the genetics experiences with the student's regular degree program or professional goals.

ADDITIONAL INFORMATION FOR STUDENTS IN ALL PROGRAMS

Institutional Review Board Approval

All research carried out by students in the GSPH which involves human subjects must be approved by the institutional Review Board of the University of Pittsburgh. It is the responsibility of the student, in consultation with their advisor, to assure that requirements for the protection of human subjects are met prior to initiating a research project. Information regarding IRB requirements and procedures is available at www.irb.pitt.edu. Students engaged in human subjects research must complete on-line training modules appropriate to their research area.

Research Integrity

All research and degree related activities in the Department of Human Genetics must comply with the policies of the University of Pittsburgh set forth in the Guidelines for Ethical Practices in Research. These guidelines are available from the Office of Research Integrity, University of Pittsburgh. All students must complete on-line training on research ethics and integrity modules.

Academic Integrity

Students are expected to be familiar with the University of Pittsburgh Policy on Academic Integrity, and to complete the GSPH on-line training module.

Bioinformatics Training

In addition to the formal courses offered through the Department, the Health Sciences Library offers a selection of excellent workshops and short courses on different topics and tools in bioinformatics. These are highly recommended for all Human Genetics students.

Grades

University policy dictates that in order to graduate the student have a cumulative grade point average (GPA) of at least 3.0 in all courses required for the degree. The Program requires that the student maintain a GPA of 3.0. Only A through F grades in required courses are employed for the GPA computation. A GSPH student whose cumulative GPA falls below 3.00 is immediately placed on academic probation, and the student, advisor, and department chairperson are notified by the GSPH Student Performance Committee. The student may be permitted to take additional coursework over no more than two terms (part-time students: a maximum of an additional 18 credit hours) to reach a GPA/GPA of 3.00. Students are given at most two

opportunities to register for and pass each required course, including departmental requirements and GSPH core courses. In some cases a low grade in a non-required course can be omitted from the GPA for the purposes of the above calculations; in this case the course cannot count towards the number of credits required for graduation.

Research Credits

Students enrolled in the M.S. program register for HUGEN 2021 for their research credits, as do students enrolled in the Ph.D. program who have not yet started dissertation research. After starting dissertation research, students enrolled in the Ph.D. program can register for HUGEN 3010 unless/until they are registered for Full Time Dissertation Study.

Transfer Credit

Transfer credits and exemption from required courses should be discussed with the student's advisor as soon as possible after starting the program. No more than six credits may be granted toward the completion of the requirements for a master's degree for work completed at another accredited graduate institution. No more than 24 credits may be accepted for a master's degree awarded by another institution to meet the credit requirements for the Ph.D. degree. In recognition of graduate study beyond the master's degree successfully completed elsewhere, no more than 12 additional credits may be accepted at the time of admission to meet the minimum credit requirement. Exemption from GSPH core courses or departmental required courses is entirely separate from transfer credit, and requires permission of the course instructor.

Alternative schedules for completion of academic milestones

Schedules for completion of academic milestones (preliminary examination, comprehensive examination, etc.) are described above for typical full-time students. Part-time students and Ph.D. students who already have an M.S. when they enter the program should consult with their academic advisors and/or the Director of Graduate Studies to develop individualized time-lines.

Registration in terms prior to graduation

All graduate students must register for at least 1 credit or full-time dissertation study during the 12-month period preceding graduation (that is, must be on active status) and must be registered for the term in which they plan to graduate. Waivers may be obtained by submitting a written request to the registrar from the dean of the school. The request should be based on extenuating circumstances, e.g., inability of the student's dissertation committee to meet during the final term when a student has given reasonable notice or the student has completed all degree requirements in a previous term. Waivers will not be granted to students who are inactive.

Statute of Limitations

The purpose of a statute of limitations is to ensure that a graduate degree from the University of Pittsburgh represents mastery of current knowledge in the field of study. All requirements for the M.S. degree must be completed within a period of four consecutive calendar years from the

student's initial registration for graduate study. All requirements for the Ph.D. degree must be completed within a period of ten years if the student has received credit for a master's degree appropriate to the field of study. Programs in which candidates pursue part-time study while working full-time within their chosen discipline, may be granted a longer statute of limitations at the discretion of the Dean, Graduate School of Public Health.

Under exceptional circumstances, a candidate for an advanced degree may apply for an extension of the statute of limitations. The request must be approved by the department or departmental committee (master's or doctoral) and submitted to the dean for final action. Requests for an extension of the statute of limitations must be accompanied by a departmental assessment of the work required of the student to complete the degree as well as documented evidence of the extenuating circumstances leading to the requested extension. Students who request an extension of the statute of limitations must demonstrate proper preparation for the completion of all current degree requirements.

Students are advised to review the GSPH Schoolwide Probation and Dismissal Policy and Procedures.

Student Organizations

Students of the Graduate School of Public Health have a Graduate Student Organization (GSO) with elected offices. The organization holds regular meetings to discuss academic matters as well as other items of interest to the students and the school. One elected member of the GSO sits on appropriate standing committees of the Graduate School of Public Health to represent the students at the committee meetings and provide a channel of communication between the entire faculty and the student body.

INFORMATION SPECIFIC TO MSTP (M.D./PH.D.) STUDENTS

The University of Pittsburgh School of Medicine offers an M.D./Ph.D. program that requires a minimum of six years of study. M.D./Ph.D. students who choose to pursue Ph.D. training within the Department of Human Genetics will be eligible for graduate student tuition remission and stipend support while they are enrolled in the Ph.D. program. More complete information regarding details for the M.D. requirements and additional financial aid can be obtained from the Human Genetics Director of Graduate Studies or the Director of the M.D./Ph.D. Program in the School of Medicine.

The medical student will be given credit equivalent to 16 graduate credits for completing the first two years of medical school.

INFORMATION SPECIFIC TO M.M.P.H. STUDENTS

The Department of Human Genetics welcomes students from the Multidisciplinary Master of Public Health (MMPH) program who wish to pursue coursework in genetics.

