

# GUIDELINES FOR GRADUATE STUDY

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**Graduate Programs in Human Genetics**

**Department of Human Genetics**

**Graduate School of Public Health**

**University of Pittsburgh**

(Changes since the October 2004 version are marked in color.)

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## DEGREE PROGRAMS

The Department of Human Genetics offers the following degree programs:

- Ph.D. in Human Genetics (including genetic counseling track),
- M.S. in Human Genetics,
- M.S. in Genetic Counseling,
- M.P.H. in Public Health Genetics.

Department faculty also participate in the schoolwide Multidisciplinary M.P.H. Program of the Graduate School of Public Health as well as in the Interdisciplinary Biomedical Graduate Program (Ph.D.) and the M.D./Ph.D. program of the School of Medicine.

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 (<http://www.umc.pitt.edu/bulletins/graduate/index.html>) and the regulations of the Graduate School of Public Health (<http://www.publichealth.pitt.edu/prospective/policies.html>) 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 should be completed by February 1st **in order to receive consideration for financial aid.**

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 minimum quality point average (QPA) of 3.0. Prerequisites to admission to the program are a first course in each of the following: genetics, general biochemistry, calculus, and a behavioral or social science. Graduate Record Examination (GRE) scores must be supplied by all applicants and should be above the 70<sup>th</sup> 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. 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 and on the computer-based exam is 213.

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*

Financial support is usually available to students in the Ph.D. program, but admission to the program does not guarantee financial aid. Most students are supported by Graduate Student Researcher (GSR) positions, which provide both tuition and stipend. Typically the department pays both tuition and stipend during the first year of the Ph.D. program. After the first year, the department continues to support tuition, 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 ([www.pitt.edu/~graduate/gsr.html](http://www.pitt.edu/~graduate/gsr.html) and [www.gsphintranet.pitt.edu/gsphtml.html](http://www.gsphintranet.pitt.edu/gsphtml.html)). The maximum time for which a student can receive full tuition support is three years; this does not include semesters in which the student is registered for full-time dissertation study.

### *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.

### *Coursework*

A minimum total of 72 credits is required, ~~of which 32 credits must come from formal course work~~. The following courses are required.

BIOS 2041	Introduction to Statistical Methods	3 credits
EPIDEM 2110	Principles of Epidemiology	3 credits
HUGEN 2022	Human Population Genetics	3 credits
HUGEN 2031	Chromosomes and Human Disease	3 credits
HUGEN 2034	Introduction to Human Biochemical and Molecular Genetics	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	1 credit
HUGEN 2034	Quantitative Genetics	3 credits
<b>or</b>		
HUGEN 2048	Linkage Analysis in Human Genetics	3 credits
<b>or</b>		

HUGEN 2029	Introduction to Gene Mapping	3 credits
HUGEN 3010 or HUGEN 2021	Research and Dissertation	

In the fall of the first year, most students take BIOS 2041, EPIDEM 2110, HUGEN 2031, HUGEN 2040, HUGEN 2027, HUGEN 2025, and 2 credits of HUGEN 2021. In the spring of the first year most take HUGEN 2022, HUGEN 2034, HUGEN 2025, HUGEN 2027, 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 QPA for the Graduate Program.

#### *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 third term of enrollment** (usually Summer Term), 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. 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, usually having a post-baccalaureate degree or some previous graduate training, 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 primary or jointly appointed faculty of the Department of Human Genetics. In special cases, the advisor may not hold an appointment in the Department of Human Genetics. In such cases, a member of the faculty of the Department of Human Genetics must agree to serve as co-advisor to the student and co-chair of the student's advisory committee and to see that all graduation requirements of the Department of Human Genetics and the Graduate School of Public Health are satisfied. The research advisor must be a member of the Graduate Faculty of the University of Pittsburgh.

#### *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. The examination must be taken during the second year in the Ph.D. program, preferably in the fall term.

It is the student's responsibility to initiate the appointment of a Qualifying Examination Committee and arrange a date for the examination. The student's research advisor, with the concurrence of the department chair, recommends for approval to the GSPH Office of Student Affairs, **a University-wide committee composed of at least four faculty of the University of Pittsburgh representing a minimum of two departments or divisions of the University. The committee chair and at least one other member must have primary appointments in the Department of Human Genetics. Half or more of the committee members must be members of the Graduate Faculty. Half of more of the committee members must be on the "core educational faculty" list of at least one GSPH department.** It is the function of this committee to administer the examination.

The student's advisor, in consultation with committee members, selects 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 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 at <http://www.gsphintranet.pitt.edu/probate.html>.)

### *Comprehensive Examination and Dissertation Overview*

Students enrolled in the Ph.D. program must 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 the general area of thesis research.

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 major 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. The Comprehensive Examination Committee must consist of at least four members, including the student's major advisor. A majority of the committee must be members of the Graduate Faculty. At least two members must have primary appointments in the Department of Human Genetics, and at least one member must have a primary appointment in another department of the University. 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.

For the Comprehensive Examination, the student is required to complete a dissertation research proposal which is conceptually well-founded and adequately documented. The topic of the proposal is generally selected by the student in consultation with his or her research advisor. The examination will require that the student complete a research proposal with the following guidelines rigorously adhered to:

- a. 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 that will accomplish the stated aims and objectives of the research. The written proposal cannot consist of just a collection of experiments, but must include the rationale as well as the significance of the proposed experiments. The significance of the expected results should be discussed.
- b. The Introduction shall be no more than three pages in length, including no more than one page for a statement of specific aims and objectives.
- c. The experimental approach and methodologies section of the research proposal must contain no more than five pages, excluding references, tables and figures.
- d. References, appendices, tables and figures may comprise no more than seven additional pages. Under no circumstances shall the entire proposal contain more than fifteen pages of single space type, excluding the title page.

Shortly after notification of acceptability of a topic, the Examination Committee Chairperson will meet with the student to discuss the guidelines for preparation of the proposal, and answer questions. Students shall take no more than four weeks from their research work in the writing of their (Comprehensive Examination) research proposal. Upon completion, a copy shall be submitted to each member of the Examination Committee. As soon as possible (preferably within two weeks of submission of the written proposal), the Examination Committee Chairperson will convene or poll the Examination Committee for evaluation of the student's proposal. If the written proposal is acceptable, the oral examination will be scheduled as soon as feasible after completion and submission of the written 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 (<http://www.gsphintranet.pitt.edu/probate.html>) for more information.

Upon successful completion of the examination, the student advances to candidacy. Doctoral students who have advanced to candidacy and have completed all of the credit requirements for the degree may register for "Full-time Dissertation Study," which carries no credits or letter grade but provides full-time status.

#### *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 advisor and approved by the Office of Student affairs. Approval is not necessary if the Doctoral Committee is identical to the Comprehensive Examination Committee. The Doctoral Committee shall consist of at least four members, including the student's major advisor. A majority of the committee must be members of the Graduate Faculty. At least two members must have primary appointments in the Department of Human Genetics, and at least one member must have a primary appointment in another department of the University. The Doctoral Committee shall be appointed within six months after the student has advanced to candidacy.

The Doctoral Committee has the responsibility of meeting at least annually to review the student's research progress. The Doctoral Committee, through the major advisor, must forward a progress report with accompanying evaluation to the department chairperson following each meeting. 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 Doctoral Committee will meet at the time the student's research is ostensibly complete and will authorize the student to begin writing the dissertation. The style and format of the dissertation must conform to the standards

set forth in the University's "Style and Form Manual," available at [www.pitt.edu/~graduate/style.html](http://www.pitt.edu/~graduate/style.html). 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 final copy will be submitted to the Doctoral Committee at least three weeks prior to the Final Oral Examination (dissertation defense). 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](http://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 usually available to students in the M.S. program, although M.S. students may be able to arrange for stipend support from their research mentor.

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

### *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
HUGEN 2022	Human Population Genetics	3 credits
HUGEN 2031	Chromosomes and Human Disease	3 credits
HUGEN 2034	Introduction to Human Biochemical and Molecular Genetics	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	1 credit
HPM 2000	Intro to Health Services Administration	1.5 credits
BCHS 2502	Social and Behavioral Aspects of Pub. Health	1.5 credits
HUGEN 2021	Special Studies (Research)	2 credits (min.)

Introduction to Public Health (course number TBA) is recommended as a substitute for HPM 2000 and BCBS 2502. This course will be taught in the Fall semester of 2005.

In the fall of the first year, most students take BIOS 2041, EPIDEM 2110, HUGEN 2031, HUGEN 2040, HUGEN 2027, HUGEN 2025, and 2 credits of HUGEN 2021. In the spring of the first year most take HUGEN 2022, HUGEN 2034, HUGEN 2025, HUGEN 2027, 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 QPA 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), with the following exceptions.

- a) **The examination committee must consist of at least three members, representing at least two departments or divisions of the University. The chair must have a primary appointment in the Department of 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.** Typically the examination committee is identical or almost identical to the thesis (advisory) committee. The committee composition must be approved by the GSPH Office of Student Affairs; typically a memo requesting approval is written by the Chair of the Department of Human Genetics or by the Director of Graduate Studies.
- b) A prerequisite for taking the Comprehensive Examination is a minimum QPA of 3.0. In addition, all course deficiencies must be made up prior to taking the Comprehensive Examination.
- c) The M.S. Comprehensive Examination should be taken in the fall of the second year, unless there are extenuating circumstances. It must be taken at least one month before the last day of the term on which the student is to graduate.

#### *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.** 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.

#### *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 "Style and Form Manual." 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). Detailed information on requirements is available from the GSPH Office of Student Affairs and at [www.pitt.edu/AFShome/g/r/graduate/public/html/etd/](http://www.pitt.edu/AFShome/g/r/graduate/public/html/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 application deadline is February 1. For more information, see [www.hgen.pitt.edu/counseling/index.htm](http://www.hgen.pitt.edu/counseling/index.htm).

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 (QPA) 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. Student applicants are encouraged to volunteer at clinical genetic centers prior to admission. An interview is required for admission to the Genetic Counseling program.

### *Financial Aid*

Financial support in the form of Graduate Student Researcher (GSR) positions is usually available to graduate students in the M.S. Genetic Counseling Program. For the first academic year a GSR position includes a stipend of approximately \$14,000 per year and typically tuition remission. Stipend support but not tuition remission is available for the second year of study. Admission to the program does not guarantee financial aid. GSR positions usually begin at the time of official entrance of the student into his/her advisor's research program.

### *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.

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, dysmorphism, 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 project proposal.

*Coursework*

The following courses are required. **Note that as of September 2005 some additional changes to this course list are pending.**

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
<del>HUGEN 2027</del>	<del>Human Genetics Journal Club</del>	<del>1 credit</del>
Ethics Case Conference		
Embryology (alternate years by arrangement)		
Biochemistry (for those not completing prior to admission)		

Spring Term of 1st year

<del>HUGEN 2038</del>	<del>Intervention Skills for Genetic Counselors</del>	<del>3 credits</del>
HUGEN 2022	Human Population Genetics	3 credits
HUGEN 2032	Genetic Techniques	2 credits
HUGEN 2034	Intro. to Hum. Biochemical and Molecular Genetics	3 credits
EPIDEM 2720	Environmental Causes of Reproductive Failure	2 credits
HUGEN 2025	Human Genetics Seminar	0 credits
HUGEN 2047	Clinical Genetics Case Conference	1 credit
HUGEN 2027	Human Genetics Journal Club	1 credit
<del>PUBHLT 2008</del>	<del>Capstone Course</del>	<del>1 credit</del>
<del>Ethics Case Conference</del>		

Summer Term of 1st year

<del>HUGEN 2039</del>	<del>Risk Calculation in Genetic Counseling</del>	<del>1 credit</del>
Begin internship in the Summer Term (May 1)		

Fall Term of 2nd year

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

Spring Term of 2nd year

HUGEN 2036	Genetic Counseling Internship	4 credits
HUGEN 2047	Clinical Genetics Case Conference	0 credits
<del>HUGEN 2021</del>	<del>Special Studies (Thesis)</del>	<del>2+ credits</del>
	<del>Ethics Case Conference</del>	

*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 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.** 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). Detailed information on requirements is available from the GSPH Office of Student Affairs and at <http://www.pitt.edu/AFShome/g/r/graduate/public/html/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. These include the following.

- A bachelor's degree from an accredited college or university (or the equivalent of a U.S. bachelor's degree) with a grade point average of at least a B (3.0).
- Three college credits in human biology with a grade of C or better.
- Three college credits in algebra or higher-level mathematics with a grade of C or better.
- Six college credits in behavioral sciences, including a course in sociology or social psychology and additional credits in such subjects as sociology, anthropology, psychology, political science, or economics.
- Minimum TOEFL score (if applicable) of 550 on the written exam or 213 on the computer-based exam.

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 70<sup>th</sup> 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 usually available to students in the M.P.H. program, although M.P.H. students may be able to arrange for stipend support from their research mentor.

### *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.

### *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 a concentration in an area of public health outside of human genetics.

#### GSPH core course requirements

BIOS 2041	Introduction to Statistical Methods	3 credits
EPIDEM 2110	Principles of Epidemiology	3 credits
IDM 2011	Health, Disease, and Environment 1	1 credit
EOH 2012	Health, Disease and Environment 2	1 credit
HSADM 2000	Introduction to Health Services Administration	1.5 credits
HSADM 2502	Social and Behavioral Aspects of Pub. Hlth. Prac.	1.5 credits
PUBHCT 2008	A Capstone Course: Roundtable Case Series	1 credit

### Required human genetics courses

HUGEN 2049	Public Health Genetics	3 credits
HUGEN 2025	Human Genetics Seminar (must be taken three times)	0 credits
HUGEN 2022	Human Population Genetics	3 credits
HUGEN 2034	Intro. to Hum. Biochemical and Molecular Genetics	3 credits
HUGEN 2040	Molecular Genetics of Human Inherited Disease	3 credits
HUGEN 2043	Special Topics in Bioethics	3 credits
HUGEN 2047	Clinical Genetics Case Conference (must be taken 3 times)	1 credits
HUGEN 2027	Human Genetics Journal Club (must be taken twice)	1 credit
HUGEN 2026	Practicum	min 6 credits

### Extrdepartmental concentration

Students are required to take a total of at least 9 credits in an area of concentration outside of human genetics but relevant to public health genetics. For example, this may be epidemiology, health education, ethics, health administration, etc. The courses for this concentration must be approved by the program director in consultation with a faculty member in the area of concentration.

### ~~Comprehensive Exam, Practicum and Masters Essay~~

~~Students must pass the school-wide written comprehensive examination covering the material in the GSPH core courses. Additionally, they must pass a written comprehensive examination on the content of their Human Genetics coursework. This exam must be passed with a score of 70% or higher, and students may attempt the exam up to two times.~~

All students are required to complete a Practicum. The Practicum is a supervised practice experience 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.

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 ~~but within the GSPH~~. The essay must be approved by unanimous vote of the committee.

## **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](http://www.irb.pitt.edu). Students engaged in human subjects research must complete on-line training available at <http://rpf.health.pitt.edu/rpf>.

### *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 available at <http://rpf.health.pitt.edu/rpf>.

### *Academic Integrity*

Students are expected to be familiar with the University of Pittsburgh Policy on Academic Integrity at [www.pitt.edu/~provost/ai1.html](http://www.pitt.edu/~provost/ai1.html).

### *Grades*

University policy dictates that in order to graduate the student have a cumulative quality grade point average (QPA) of at least 3.0 in all courses required for the degree. The Program requires that the student maintain a QPA of 3.0. Only A through F grades in required courses are employed for the QPA computation. A GSPH student whose cumulative grade point average (GPA is the same as QPA) 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/QPA 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.

### *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 advanced to candidacy. After advancement to candidacy, students enrolled in the Ph.D. program can register for HUGEN 3010 unless/until they are registered for Full Time Dissertation Study. The I (Incomplete) grade will be used for research credit courses at each grading period, and all such accumulated I grades will be changed to S (Satisfactory) grades at the time the degree requirements are complete.

### *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. General guidelines are available at <http://www.umc.pitt.edu/bulletins/graduate/index.html>, but additional restrictions may apply. 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 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 at [www.gsphintranet.pitt.edu/probate.html](http://www.gsphintranet.pitt.edu/probate.html).

### *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 regarding other resources for students can be found at [www.publichealth.pitt.edu/index.html](http://www.publichealth.pitt.edu/index.html).

### **INFORMATION SPECIFIC TO STUDENTS IN THE SCHOOL OF MEDICINE INTERDISCIPLINARY BIOMEDICAL SCIENCE PROGRAM**

The Department of Human Genetics also participates in the Interdisciplinary Biomedical Sciences Program based in the School of Medicine. Information regarding application, admission and requirements of the Interdisciplinary Biomedical Graduate Program is available at <http://www.gradbiomed.pitt.edu/>. For more information on specific requirements, students should speak with the Program Director (contact via Ms. Jeanette Norbut at the address above).

### **INFORMATION SPECIFIC TO 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. This section provides a summary description of the program as it applies to students who choose to pursue Ph.D. Training within the Department of Human Genetics. While working towards a Ph.D. degree, the M.D./Ph.D. candidate will be eligible for graduate student tuition remission and stipend support, the same as available to students in the Ph.D. program. More complete information regarding details for the M.D. requirements and additional financial aid can be obtained from the admissions office or the Director of the M.D./Ph.D. Program in the School of Medicine.

The Director of the M.D./Ph.D. Program in the School of Medicine or a designated M.D./Ph.D. advisor will serve as the temporary advisor for admitted students during their first year. This advisor will aid the student in planning his/her scientific work, in the department selected by the student, during the summer following the first year of medical school and urge the student to select a permanent thesis advisor as early as possible during the second year of the program. It is expected that most of these students will finish the first two years of Medical School with their classmates and take the National Board Examinations Part I at the usual time.

The Doctoral Committee will consist of five members, four of whom must be members of the Graduate Faculty, including one from outside the student's major department. This Committee will be formally appointed at the time of the student's admission to candidacy.

The examinations set for Ph.D. students will be taken by M.D./Ph.D. students as follows: The qualifying examination is usually taken by the end of the third year. The comprehensive

examination is usually taken by the end of the fourth year or sooner and the final oral examination will be taken after completing the Ph.D. dissertation.

The medical student will be given credit equivalent to 16 graduate credits for completing the first two years of medical school which includes the courses: Biochemistry, Anatomy and Cell Biology, Neurobiology, Physiology, Pharmacology, Microbiology, and Pathology. The entire two-year medical curriculum is rated for 30 credits/year or a total of 60 credits.

The students pursuing a Ph.D. degree will, in their third and fourth years, continue research work. They are required to take Human Population Genetics (3 credits), Chromosomes and Human Disease (3 credits), Human Biochemical and Molecular Genetics (3 credits), Molecular Basis of Human Disease (3 credits), Introduction to Statistical Methods I (2 credits) and Introduction to Statistical Methods II (2 credits), and any electives deemed necessary by the student's Doctoral Committee.

Details regarding application, admission and requirements of the M.D./Ph.D. program are posted at [www.mdphd.pitt.edu](http://www.mdphd.pitt.edu).

M.D./Ph.D. students may also concentrate in Human Genetics via the Interdisciplinary Biomedical Sciences Program based in the School of Medicine.

### **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 a concentration in genetics. Information regarding application and requirements of the MMPH are available at [www.publichealth.pitt.edu/departments/multidisciplinary.html](http://www.publichealth.pitt.edu/departments/multidisciplinary.html).