

UNIVERSITY OF MARYLAND, BALTIMORE
School of Medicine



STUDENT HANDBOOK

Epidemiology and Human Genetics

**Academic Year
2009-2010**

August 11, 2009

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A Message from the Director and Track Leaders

We would like to take this opportunity to welcome you to the Ph.D. Program in Epidemiology and Human Genetics. You have been selected from among many applicants and we are excited that you have chosen to participate in our Graduate program. The Graduate program in Epidemiology and Human Genetics is governed by policies established by the Graduate School of the University of Maryland, Baltimore, and the Graduate Program in the Life Sciences (GPILS) in the School of Medicine. We encourage you to study and observe these policies, which are described in the most recent graduate catalog on the Graduate School's website <http://www.graduate.umaryland.edu>, and on the GPILS website <http://lifesciences.umaryland.edu>. Additional program-specific policies and expectations are described in these Guidelines, and are designed to answer many of the questions that you may have regarding our program and the course of study. If after reviewing these Guidelines you have further questions, we encourage you to discuss them with us.

Governing Committee (Graduate Program Committee, GPC) for 2009–2010

Patricia Langenberg, Ph.D.

Program Director, Graduate Program in Epidemiology and Human Genetics
Professor and Vice Chair, Department of Epidemiology and Preventive Medicine, School of Medicine
(410) 706-3251, plangenb@epi.umaryland.edu

Mona Baumgarten, Ph.D.

Leader, Track in Epidemiology
Associate Professor, Department of Epidemiology and Preventive Medicine, School of Medicine
(410) 706-1531, mbaumgar@epi.umaryland.edu

Jon Furuno, Ph.D.

Leader, Track in Molecular Epidemiology
Assistant Professor, Department of Epidemiology and Preventive Medicine, School of Medicine
(410) 706-0134, jfuruno@epi.umaryland.edu

Braxton D. Mitchell, Ph.D.

Leader, Track in Human Genetics and Genomic Medicine
Professor, Department of Medicine, School of Medicine
(410)706-0161, bmitchel@medicine.umaryland.edu

Toni I. Pollin, Ph.D.

Associate Leader, Track in Human Genetics and Genomic Medicine
Assistant Professor, Department of Medicine, School of Medicine
(410)706-1630, tpollin@medicine.umaryland.edu

The Ph.D. Program in Epidemiology and Human Genetics
The M.S. Program in Epidemiology and Preventive Medicine
The M.S. Program in Human Genetics

The Graduate Program in Epidemiology and Human Genetics at the University of Maryland is an inter-disciplinary program of study leading to the M.S. and the Ph.D. degree. This program combines traditional areas of biomedical, clinical, and human genetics studies with opportunities to learn and apply biostatistical, molecular, and genomic tools in their investigations. The Ph.D. Program consists of three different tracks, Epidemiology, Molecular Epidemiology, and Human Genetics and Genomic Medicine, each with a tailored curriculum of study. The M.S. Programs consist of tracks in Epidemiology & Preventive Medicine, Clinical Research, and Human Genetics. For more information on the program and tracks refer to <http://epidemiology.umaryland.edu>.

ACADEMIC STANDARDS AND POLICIES

The *Student Handbook* defines the curriculum requirements, policies, and procedures for the Graduate Program in Epidemiology and Human Genetics graduate degrees (MS and PhD).

Academic policies for the graduate programs are the same as those of the UMB Graduate School. Students are responsible for ensuring that they meet all degree requirements and comply with the policies and procedures.

Academic Standards

Once admitted to a degree program, each student has the obligation to continue a course of study and must register every semester in the academic year (fall and spring semesters) unless on an approved leave of absence.

Any student admitted provisionally will be granted full degree-seeking status when the provisions have been satisfied. Provisionally admitted students who fail to meet the terms of their admission will be dismissed.

Students are expected to meet the highest standards of integrity. Cheating, plagiarism, fabrication, or abetting the academic dishonesty of another will result in sanction and may lead to academic dismissal.

Grades

Final grades are assigned using the “plus or minus” grading system. The available letter grades and corresponding quality points used for grade point average calculations are as follows:

A	4.0
D-	3.67
B+	3.33
B	3.0
D-	2.67
C+	2.33
C	2.0
D-	1.67
D+	1.33
D	1.0
D-	0.67
F	0.0

Grades for Required (MS and PhD) Courses

Students enrolled in the programs must earn a grade of B (3.0) or better in all required or core courses and must maintain a minimum cumulative GPA of 3.0 to graduate. A grade of B minus is not acceptable for required or core courses. In order to enroll in any course for which one or more required/core courses are prerequisites, the student must have attained a grade of B or higher in those required/core courses.

A student who earns a grade below a B in a required or core course may be given an opportunity to repeat the course to replace the grade. The grade from the repeated course replaces the original course grade.

Incomplete Grade

Students must be in “good standing” to be eligible for an Incomplete grade, i.e., have passing grades in the course before the time when assignments are missing. Students must complete coursework to replace

a grade of Incomplete with a course grade within one year. The course master may shorten that time frame.

Late Submissions of Course Work

Time limits will vary by course and be determined by the course master.

Course Grade Appeal Procedures

The Graduate School provides students with a mechanism for reviewing course grades alleged to be “arbitrary or capricious”. Mediation services are available when disagreements and differences of opinion arise between students and their advisors and/or the program. This model is followed by the MS and PhD programs in Epidemiology and Human Genetics.

Transferred Credits

No more than six credits of course work completed before matriculation in the program may be transferred to the degree. Students must have taken such courses from an accredited institution no more than five years before applying for the degree. Permission to transfer credit will be made in consultation with the student’s academic advisor(s) and with the approval of the course master.

Credit cannot be transferred for courses that were used to fulfill requirements for any other degree, for credit for correspondence courses or for “credit by examination” courses taken at other universities. Only courses in which the student received a grade of “B” or better are eligible for transfer.

A Request for Transfer of Credit should be completed shortly after matriculation. Students’ advisors must approve the requests. Requests are to be submitted to the academic coordinator. Official transcripts of the courses for which credit is requested must accompany the transfer request forms.

When a Request for Transfer of Credit from other institutions is approved, the credits, but not the grades, will be transferred. A grade of “A” in transfer work will not, therefore, balance a “C” in work completed on this campus.

Course Waivers

A maximum of 6 credit hours can be waived. For the MS and PhD degrees in Epidemiology, the following courses cannot be waived:

- PREV 600 Principles of Epidemiology
- PREV 659 Observational Studies in Epidemiology
- PREV 747 AND 748 Research Practicum, sections I and II

The instructor of the course to be waived has responsibility for assessing the student’s knowledge of the material and for approval of the waiver. Approved requests for course waivers must be in writing and on file in the academic office. Exceptions to this policy may be granted only with the approval of the program director, and are made on a case-by-case basis. Permitting a student to waive courses does not reduce the total number of credits required for the M.S. degree. For the Ph.D. degree, the required credits are reduced.

Elective Credit

Any course offered outside the department or UMB which a student, in consultation with her/his academic advisor, would like to take to fulfill elective credits for a degree, requires the approval of the program director.

Independent Study

Students may develop independent study courses for a maximum of six credits with members of program faculty. The final, signed Independent Study Record must be filed in the academic office prior to the start of the semester.

Non-degree Students

The non-degree status is for students seeking to enhance their knowledge by completing one or more graduate courses. Students may not use non-degree status to obtain full-degree status at the university.

Should the student subsequently be admitted to the program there is no assurance that it will accept credits earned as a non-degree student. In cases where the program does grant such a request, no more than six credits will transfer to the degree.

Leave of Absence

Students who wish to continue in the degree program, but choose not to register in a particular semester, are required to take an approved leave of absence. The student must request approval from both the student's advisor and the program director. Requests for leaves of absence must be in writing and will be considered on a case-by-case basis. A leave of absence does not extend the time in which the degree must be completed. Once the program approves the leave, the university registrar will place the student on Leave of Absence; this notice will appear on the student's transcript. Prior to returning, students should notify the program director and academic coordinator of their intention to return to the program to ensure proper preparation of registration materials.

Withdrawal from Classes

It is possible to withdraw from any class through the first three weeks of the semester without regard to academic performance. Anyone wishing to withdraw from any class beyond the three-week deadline must receive written permission from the program director before submitting a drop request or withdrawal form to the Office of Records and Registration. Unless there are extenuating circumstances, students in academic difficulty will not be permitted to withdraw beyond the three-week deadline.

Communication Between Program Faculty and Administration and Students

Electronic (e-mail) is the official medium by which program faculty and administration communicate information to students enrolled in its degree programs. Students enrolled in the graduate program are assigned a UMNET email account and, for those in epidemiology tracks a limited DEPM e-mail account, when they enroll. It is the student's responsibility to check e-mail accounts regularly and to respond promptly

Faculty Advisors

All students are assigned an academic advisor to help them plan their progress toward the degree. Students are responsible for scheduling regular meetings with their advisors to assess progress and address any questions or concerns.

ACADEMIC CALENDAR AND SCHEDULES FALL 2009

	REGISTRATION BEGINS	REGISTRATION ENDS	INSTRUCTION BEGINS
DENTISTRY FIRST YEAR	April, 2009	August 7	August 10
DENTISTRY SECOND YEAR	April, 2009	August 14	August 17
DENTISTRY THIRD YEAR	April, 2009	July 2	July 6
DENTISTRY FOURTH YEAR	April, 2009	May 22	May 26
DENTAL HYGIENE ENTRY LEVEL I	April, 2009	August 12	August 13
DENTAL HYGIENE ENTRY LEVEL II	April, 2009	August 21	August 24
DENTAL HYGIENE RDH	April, 2009	August 21	August 24
DENTAL POSTGRADUATE	April, 2009	July 1	July 1
GENETIC COUNSELING	April, 2009	August 21	August 24
GRADUATE	April, 2009	August 21	August 24
LAW, FIRST YEAR & CLINIC/LTP	April, 2009	August 25	August 26
LAW, ALL OTHERS	April, 2009	August 25	August 31
MEDICINE FIRST YEAR	April, 2009	August 11	August 13
MEDICINE SECOND YEAR	April, 2009	August 11	August 18
MEDICINE THIRD & FOURTH YEAR	April, 2009	July 2	July 6
MEDICAL TECHNOLOGY	April, 2009	August 21	August 24
NURSING	April, 2009	August 21	August 24
PHARMACY	April, 2009	August 21	August 24
PHYSICAL THERAPY YEARS 1 & 2	April, 2009	August 21	August 24
PHYSICAL THERAPY YEAR 3	April, 2009	August 21	August 24
PHYSICAL THERAPY TRANSITIONAL	April, 2009	August 19	August 20
POST-PROFESSIONAL DSCPT	April, 2009	August 19	August 20
PUBLIC HEALTH	April, 2009	August 21	August 24
SOCIAL WORK	April, 2009	August 30	August 31

HOLIDAYS: LABOR DAY, September 7, 2009; THANKSGIVING, November 26- 27, 2009

Diploma Application Deadline Date: September 11, 2009

TERM ENDS December 23, 2009 DIPLOMA DATE December 23, 2009

WINTER 2010

	REGISTRATION BEGINS	REGISTRATION ENDS	INSTRUCTION BEGINS
ALL SCHOOLS AND PROGRAMS	November, 2009	January 4	January 4

TERM ENDS January 22, 2010

SPRING 2010

	REGISTRATION BEGINS	REGISTRATION ENDS	INSTRUCTION BEGINS
DENTISTRY	November, 2009	January 4	January 4
DENTAL HYGIENE- ENTRY LEVEL	November, 2009	January 4	January 4
DENTAL HYGIENE - RDH	November, 2009	January 24	January 25
DENTAL POSTGRADUATE	November, 2009	January 4	January 4
GENETIC COUNSELING	November, 2009	January 24	January 25
GRADUATE	November, 2009	January 24	January 25
LAW	November, 2009	January 18	January 19
MEDICINE YEAR 1	November, 2009	January 25	January 26
MEDICINE YEAR 2	November, 2009	February 1	February 2
MEDICINE YEARS 3 & 4	November, 2009	January 3	January 4
MEDICAL TECHNOLOGY	November, 2009	January 18	January 19
NURSING	November, 2009	January 24	January 25
PHARMACY	November, 2009	January 18	January 19
PHYSICAL THERAPY YEARS 1 & 2	November, 2009	January 4	January 4
PHYSICAL THERAPY YEAR 3	November, 2009	January 10	January 11
PHYSICAL THERAPY TRANSITIONAL	November, 2009	January 4	January 4
POST-PROFESSIONAL DSCPT	November, 2009	January 4	January 4
PUBLIC HEALTH	November, 2009	January 24	January 25
SOCIAL WORK	November, 2009	January 18	January 19

HOLIDAYS: MLK JR. BIRTHDAY, January 18, 2010 SPRING BREAK, March 15-19, 2010

Diploma Application Deadline Date: February 12, 2010,

TERM ENDS May 21, 2010

COMMENCEMENT MAY 21, 2010

A detailed listing of dates for Academic Calendar 2009-2010 is available on the Graduate School's website at

<http://www.graduate.umaryland.edu/academics/calendar.html>

Change in Registration (Add/Drop)

A completed registration change form must be filed in the academic office to effect an official change in registration. Changes in registration are made in accordance with the schedule indicated below. A refund for dropped courses will be issued only if the courses are dropped before the end of the refund schedule date. No refunds for dropped courses will be issued after this date.

Fall and Spring

Deadline to add a course: 1st week

Deadline to drop a course: 8th week

Refund for dropped course: 1st week only

Summer

Deadline to add a course: 1st week

Deadline to drop a course: 1st week

Refund for dropped course: 1st week only

Time Limits

MS Degree

There is a time limit of five years for completion of the MS degree whether the student is enrolled in the program as a full-time or part-time student.

PhD Degree

The Graduate School requires a minimum of three years or its equivalent of full-time graduate study and research for the PhD degree; at least one year or its equivalent must be spent at the University of Maryland, Baltimore. Students must be admitted to candidacy within five years of admission to the doctoral program and at least two full sequential semesters or sessions (spring, summer, or fall) before graduating. All degree requirements, including the doctoral dissertation and final doctoral examination, must be completed within four years of admission to candidacy and no more than nine years after admission into the doctoral program.

These time limits include any leave of absence granted from the program for a semester or longer.

Information for Graduating Students

Students are responsible for obtaining and completing all forms required for graduation and submitting them by the deadline dates to the academic office. To apply for diploma, login to SURFS (Student User Friendly System) for form. (Your SURFS account was automatically created for you when you were admitted). To activate and access your account, go to the SURFS website at <http://simsweb.umaryland.edu/> and follow the directions for accessing the system. SURFS Accounts are managed by the Office of Records and Registration. If you have questions or problems with SURFS, contact them at 410 706-7480.)

Forms

Forms for marking important student progress points are available on the academic Web pages.

www.medschool.umaryland.edu/epidemiology Click on Graduate/Training Programs and Program Forms.

ADDITIONAL DEPARTMENTAL EDUCATIONAL OPPORTUNITIES

Monthly Seminar Series in DEPM

The series is planned by a faculty committee who distribute announcements in advance of the seminar. Students in the graduate degree program are expected to attend.

Journal Club for MS and PhD students in Epidemiology Tracks

Journal Club meets weekly during fall and spring semesters on Mondays at noon in the Entwisle Conference Room, HH103D. Discussion is lead by a graduate student or resident with guidance from a faculty member. Occasionally a faculty member will be the discussion leader.

The Journal Club serves several important purposes:

it provides an opportunity for faculty and graduate students to interact as colleagues and discuss stimulating papers;

it provides an educational opportunity for students to gain skills in presentation, obtain experience reading and critiquing scientific papers and have a chance to hear diverse viewpoints from faculty and other students.; and

It helps students and faculty keep abreast of major developments in epidemiology, preventive medicine and public health.

Discussion leaders primarily consist of graduate students and residents but each semester there will be several weeks when the discussion leader is a faculty member. The first discussion of the fall semester will be led by a faculty member and it will provide an orientation to Journal Club by example.

Faculty Mentors When a student is the discussion leader, the student will work with a faculty mentor to choose the paper, develop the brief presentation and identify interesting points of discussion. Mentors will be selected from a list of faculty who express willingness to be Journal Club mentors, and who are informed about the goals and format of the Journal Club.

Choice of Papers for Discussion Students should choose recent papers of interest that will lead to discussion. One good source for articles is those reported in the lay press. The faculty mentor should be fully involved in the choice of the paper.

Format. The paper should be presented in 20 minutes, as it would be in a national meeting, and contain 5 to 10 Power Point slides at most.

The paper would then be opened to discussion, led by the leader and using the points for review that are suggested in the Handbook.

Power Point slides listing each review point could be used to facilitate the discussion.

The leader should try to stimulate discussion by identifying some interesting issues that the paper gives rise to.

Discussion leaders should end the discussion at 12:50 so that 1 o'clock classes can start on time.

STUDENT SERVICES

Program Administration

Director, Graduate Programs in Epidemiology and Human Genetics

Patricia Langenberg, PhD, plangenb@epi.umaryland.edu, (410) 706-3251

Academic Office

The academic office is a student and faculty services unit located in Howard Hall, Suite 135. The office provides services for the programs in public health, epidemiology and toxicology.

Robin Moore

Program Coordinator, Graduate Program in Epidemiology and Human Genetics

HH132C

Phone: (410) 706-8492

rmoore@epi.umaryland.edu

Libraries

The department maintains a limited library of books and journals; these collections are kept in several locations in the department. Books and reference materials are kept in the in the Trudy Bush Library (132F Howard Hall). Books and journals specific to biostatistics are kept in the Howard Hall mezzanine area, opposite Room 111. Reference materials may only be used in their designated locations and may not be checked out.

The Health Science / Human Services Library (HS/HSL) provides access to digital and print information and is also available to students for book checkout and literature searches. Debra Berlanstein, MLS is the library liaison for the programs in epidemiology and public health. She can be reached at (410) 706-8862 and by email at dberlans@hshsl.umaryland.edu. Ms. Berlanstein provides orientation for students as part of the programs' new-student orientations. The HS/HSL Web site is <http://www.hshsl.umaryland.edu>.

Computer Resources

Departmental Resources

Students are provided a limited e-mail account which accesses the DEPM Local Area Network (LAN). Two computer lab/study areas designed specifically for students are available in Howard Hall: one is on the mezzanine and the other is located within suite 135.

Computer Support staff are available to help with any questions or problems encountered on the DEPM LAN; contact the academic office to place your request in the *HelpStar* system.

University Resources

Students have access to the research and information commons area of the Health Sciences and Human Services Library which provides Windows-based machines. Access to e-mail, databases, the Web, word processing, desktop publishing, spreadsheet and other software is provided.

Students automatically receive an "Umnet" account which offers a UMB e-mail address and mailbox; free Web access; and access to a wide variety of on-line data bases and electronic reserves.

SURFS – Student User Friendly System

SURFS is a Web-based information utility that allows you to perform functions such as:

- Access enrollment records, including courses, grades and grade point average;
- Register for classes;
- Request transcripts;
- Submit name, address, telephone number and e-mail address changes;
- Complete application for diploma;
- Complete enrollment verification and degree certification requests.

Your *SURFS* account is automatically created for you at the time of admission or when your financial aid application is processed through that office. To activate and access your account, go to the *SURFS* Web site at <http://simsweb.umaryland.edu/> and follow the directions for accessing the system.

To login, enter your UMID and PIN and click on the Login button. UMID is your Social Security Number or the nine-digit number assigned to you by the University. The initial value of your PIN is your date of birth, using the mmddyy format. To change your PIN, simply click on the "Change Pin" button or "Forget PIN?" button.

SURFS accounts are managed by the Office of Records and Registration. If you have questions about or problems with *SURFS*, contact them at 410 706-7480.

Department Access

Classrooms, student study areas and computer labs are open weekdays between 7:30 a.m. and 5:30 p.m. After hours, you must use your ID badge to gain access to the mezzanine level of Howard Hall. Access to the Howard Hall mezzanine and to the student computer lab is controlled. Access codes are given to students during Student Orientation; they are also available in the academic office.

Photo Id Badges

ID application materials are mailed to incoming students prior to the start of the first semester and are also available at Student Orientation and from the academic office.

Student Telephone

The telephone in the mezzanine computer lab (410 706-4493) is available for students to use for local calls. Please provide this number to anyone trying to contact you.

Mail

Mail for students is located in the student mailboxes in the mailroom on the mezzanine.

Photocopying

A photocopy machine is available in the GPILS office, Suite 1-005, Bressler Building

Student Parking

Each student must make her/his own parking arrangements through Parking Services. Call 410 706-6603 or visit the website at www.parking.umaryland.edu.

Student Answer Book

The UMB Student Answer Book is available on-line at www.umaryland.edu/student/sab.

Graduate Research Assistantship (GRA) Guidelines

The UMB Graduate School publication, *Graduate Assistant Policies and Guidelines* provides useful information for PhD students supported as Graduate Research Assistants (GRAs). You may view the GRA policies and guidelines booklet online at <http://graduate.umaryland.edu/resources/forms.html>

Graduate Student Association

The Graduate Student Association (GSA) is a student-run organization comprising the graduate population of the University of Maryland, Baltimore. Representatives from participating programs throughout the Baltimore campus attend GSA monthly meetings and relay information back to their fellow students. GSA representatives are a great source of information on graduate programs, graduate student events and the University. Visit their website at www.graduate.umaryland.edu/gsa/index.html

Web Sites

The Graduate Program in Life Sciences <http://lifesciences.umaryland.edu> contains information about the academic program and faculty research. The UMB Graduate School Web Site www.graduate.umaryland.edu contains information about the academic policies and news and events for the campus community.

DEGREE REQUIREMENTS

The overall goal of the graduate degree programs is to educate and train scientists and public health practitioners in the disciplines of epidemiology, biostatistics, and preventive medicine and in the applications of these disciplines to health care research and practice and to public health.

The Master's degree programs serve several different types of students, including physicians who obtain the Master of Science degree as part of the preventive medicine residency; other doctoral level students (often those working on campus) interested in acquiring clinical research skills; and non-physicians who want to begin a career in public health or health research. In Fall 2005, a new Master's degree in biostatistics was implemented through a joint-degree program with UMBC.

Master of Science

Epidemiology and Preventive Medicine (MS, thesis or non-thesis)

The MS degree in epidemiology and preventive medicine provides course work and research experience for people seeking research careers in public health. These include research or administrative careers in hospitals, health departments, academic institutions, regulatory agencies, international organizations and corporations. The degree requires completion of 36 credit hours and can be completed in eleven months.

Human Genetics and Genomic Medicine (MS, thesis track only)

The MS track in Human Genetics and Genomic Medicine is a thesis-based program that provides broad training in Human Genetics for students wanting to understand human genetic variation and its relation to health and disease. As with the PhD program, students receive a broad overview of the key areas of human genetics (molecular, biochemical, clinical, cytogenetics, and genetic epidemiology), and then choose a mentor and specific area of interest to pursue for their thesis. The degree requires completion of 30 credit hours and is designed to be completed within two years, with the first year devoted to coursework and the second year devoted largely towards the thesis.

Degree requirements for the graduate degrees are detailed on the following pages.

Epidemiology and Human Genetics
Degree Requirements for MS and PhD in Epidemiology/ Molecular Epidemiology

revised 6/11/09

Course Title	When Offered	Credits	M.S.	M.S.	Ph.D. Regular	Ph.D. Molecular
			Regular	Residency		Epidemiology
PREV 600 Principles of Epidemiology	Fall/A	3	✓	✓	✓	✓
619 Biostatistical Computing	Spring/A	2	✓	✓	✓	✓
620 Principles of Biostatistics	Fall/A	3	✓	✓	✓	✓
648 Intro to Health System & Health Policy Mgmt.	Summer & Fall/A	3	✓	✓		
659 Observational Studies in Epi.	Spring/A	3	✓	✓	✓	✓
668 Environment/Occup. Health	Fall/A	3	✓	✓		
716 Chronic Disease Epidemiology	Summer/A	3			✓*	
711 Genetic Epidemiology ¹	Spring/A	3			✓*	✓
GPLS 716 Genomics and Bioinformatics		4				✓
PREV 720 Statistical Methods in Epi.	Spring/A	3	✓	✓	✓	✓
721 Regression Analysis (half-semester course)	Fall/A	2			✓**	
723 Survival Analysis (half-semester course)	Fall/A	2			✓**	
747 Research Practicum I	Spring/A	3	✓	✓	✓	✓
748 Research Practicum II	Summer/A	2	✓	✓	✓	✓
749 Infectious Disease Epi	Fall/A	3			✓*	
758 Health Survey Research Methods	Fall/A	3			✓	
780 Molecular Epidemiology	Fall/A	3			✓*	✓
801 Longitudinal Data Analysis (half-semester course)	Spring/A	3			✓**	
802 Statistics for Molecular Biology (half-semester course)	Spring/ B	2			✓**	✓
803 Clinical Trials/Experimental Epidemiology	Fall/A	3		✓	✓	
PH 610 Foundations of Public Health	Fall/A	3		✓		
<i>Molecular Biology course</i> ²						
<i>Human Physiology Course</i> ³			(✓)		(✓)	
ELECTIVE CREDITS		→	11	5	5 (minimum)	12 (minimum)
RESEARCH CREDITS		→	Optional	N/A	12 (minimum)	12 (minimum)
TOTAL CREDITS REQUIRED FOR DEGREE			36	36	56	56

Key: A= Annual B= Bi-annual

* Students must select two of the courses marked with an asterisk.

** Students must select three of the four courses marked with a double asterisk.

¹ A background in Human Genetics is required as prerequisite.

² A molecular biology course is required of students who have not taken a molecular biology course as an undergraduate.

³ A course in human physiology is required for students with non-biomedical backgrounds.

Epidemiology and Human Genetics
Degree Requirements for MS and PhD in Human Genetics and Genomic Medicine

revised 9/7/09

Course Title	When Offered	Credits	M.S.	Ph.D.
Required:				
HGEN 601 Basic Human Genetics I	Fall/A	4	✓	✓
602 Basic Human Genetics II	Spring/A	4	✓	✓
608 Human Genetics Seminar	Fall & Spring/ A	1	2X	4X+
718 Laboratory Rotations	Fall & Spring/ A	1 – 3		✓
Choose 1 of the following 2:				
PREV 620 Principles of Biostatistics	Fall/ A	3	✓	✓
621 Biostatistical Methods	Fall/ A	3	✓	✓
Electives: Include at least 1 (M.S.) or 2 (Ph.D.) of the following:				
HGEN 701 Human Cytogenetics	Spring/ B	2		
711 Genetic Epidemiology	Spring/ A	3		
720 Genetics and Metabolism	Fall/ B	2		
728 Clinical Genetics I	Fall/ A	2		
731 Clinical Genetics II	Spring/ A	2		
760 Clinical Cancer Genetics	Spring/ A	2		
GPLS 601/602/603 Mechanisms in Biomedical Sciences	Fall/ A	8		
716 Genomics and Bioinformatics				
717 Molecular Genetics & Development in Model Organisms	Fall/ A	2		
750 Topics in Molecular Medicine	Fall/ A	2		
PREV 600 Principles of Epidemiology	Fall/ A	3		
780 Molecular Epidemiology	Fall/ A	3		
BIOL 626 Approaches to Molecular Biology (UMBC campus)*	Fall/ A	4		
ELECTIVE CREDITS		→	11	4+
RESEARCH CREDITS		→	6	12
TOTAL CREDITS REQUIRED FOR DEGREE			30	NA

Key: A= Annual B= Bi-annual

* Strongly recommended for students with limited background in molecular biology

MS IN CLINICAL RESEARCH

The Master of Science degree in clinical research is designed specifically to meet the needs of the clinician or clinician-in-training by providing a combination of course work and research experiences needed for a successful career in clinical investigation. The curriculum provides students with a thorough understanding of clinical research methodology, biostatistics, and research ethics and will provide participants with the necessary skills to conduct independent clinical research, to teach, and to mentor others. Graduates will have gained the ability to identify important clinical questions, develop research protocols, generate pilot data, conduct clinical investigations, analyze and write the results in a publishable form and develop and submit grant proposals. The program will prepare students to be competitive in seeking external support and be knowledgeable in the complex issues associated with conducting sound clinical research.

A total of 36 credits are required for the degree which can be completed on a part-time basis within two years. Students may select from three concentration areas: Epidemiologic Research; Outcomes/Health Services Research; and Human Genetics.

Mentored Research Project

The completion of a research project in the student's area of research interest is one unique aspect of the program. The purpose of requiring this project is to provide the student with a comprehensive awareness of the research experience from the formulation of the research question to the design and conduct of the research protocol, to the analysis and presentation of the findings of the study, to finally the publication of the research results. Students can fulfill this requirement through a Master's thesis or a two-semester course, Research Practicum. Both mentors and students will participate in a formal mentoring program to optimize the mentor-mentee relationship. It is expected that, for most students, the mentoring and training activities invested in the master's thesis ultimately will result in a funded research project.

The clinical research program will provide participants with the necessary skills to conduct independent clinical research, to teach, and to mentor others. Graduates will have gained the ability to identify important clinical questions, develop research protocols, generate pilot data, conduct clinical investigations, analyze and write the results in a publishable form and develop and submit grant proposals.

MS in Clinical Research Course Requirements

CORE COURSES (18 credits)

PREV 600 Principles of Epidemiology (*Credits: 3*)

PREV 620 Principles of Biostatistics (*Credits: 3*)

PREV 720 Statistical Methods in Epidemiology (*Credits: 4*)

PREV 619 Biostatistical Computing (*Credits: 2*)

PREV 706 Research Informatics: Data Management in Research (*Credits: 2*)

PREV 617 Design, Implementation and Reporting of Clinical Research Studies (*Credits: 2*)

PREV 633 Application of Legal and Regulatory Issues in Clinical Research (*Credits: 1*)

CIPP 909 Responsible Conduct of Research (*Credits: 1*)

Remaining Coursework

Practicum/Electives (9-11 credits)

- PREV 747 and PREV 748 Research Practicum I and II or Master's Thesis (5-6 credits)
- Remainder electives to total 36 credits (4-5 credits)

MS in Clinical Research Course Requirements

Courses	Credits	Epidemiologic Research	Outcomes/Health Services Research	Human Genetics
CORE SUBTOTAL	18	18	18	18
PREV 633 Application of Legal and Regulatory Issues in Clinical Research	1			
PREV 659 Observational Studies in Epidemiology	3	√		
PREV 803 Clinical Trials & Experimental Epi	3	√		
PREV 648 Introduction to the Health System, Policy, & Management	3		√	
PREV <i>td</i> Introduction to Outcomes Research ²	3			
PREV 707 Cost Effectiveness in Prevention and Treatment	3		√	
PREV 758 Health Survey Research Methods	3		√	
HGEN 601 Human Genetics I	3			√
PREV 711 Genetic Epidemiology	3			√
GPLS Current Topics in Molecular Medicine	2			
GPLS Applied Bioinformatics	3			
PHIL 650 Moral Theory	3			
PREV Introduction to Research Ethics ²	3			
PREV 638 US & International Issues Involved with Research Ethics and Integrity	3			
PREV 747 AND 748 Research Practicum I and II or Thesis Research ⁴	Research Practicum: 5 Thesis: 6	√	√	√
		36	36	36

td courses are to be developed

* See the Graduate School Web page for Master's Thesis requirements

MS IN STATISTICS, BIOSTATISTICS TRACK

Joint Program with UMBC

The Department of Mathematics & Statistics at the University of Maryland, Baltimore County (UMBC), and the Department of Epidemiology and Preventive Medicine (DEPM) at UMB are collaborating in a joint M.S. track in Biostatistics.

The 30-credit, two-year program provides students with a mathematical statistics foundation through course work at UMBC and medical applications exposure through course work and seminars in DEPM. A capstone project is required and may be completed with faculty at either campus.

REQUIRED COURSES (21 credit hours) *

STAT 651 Basic Probability 3 credits

STAT 653 Basic Mathematical Statistics 3 credits

PREV 600 Principles of Epidemiology 3 credits

STAT 601 Applied Statistics I 3 credits

STAT 699/PREV 789 Capstone Project Course 3 credits

Choose two of three courses:

STAT 602 Design of Experiments 3 credits

STAT 603 Categorical Data Analysis 3 credits

STAT 619 Biostatistics/Principles and Design 3 credits

For the capstone project course, the student works closely with a faculty member on a project that can involve a sophisticated data analysis, a simulation study, a review of the literature, statistical software development, or other activities related to biostatistics.

Students are also required to attend a monthly biostatistics seminar and pass a comprehensive examination at the end of the first year.

The remaining 9 credits of course work would be chosen from a variety of electives with at least one course to be taken in DEPM.

* Courses with the prefix STAT are taught at UMBC; those with the prefix PREV are taught in DEPM

DUAL DEGREE PROGRAMS

The Epidemiology and Preventive Medicine program offers a dual Master's degree for students enrolled in the doctoral programs in Gerontology and Pharmaceutical Health Services Research in which the doctoral students may simultaneously earn a Master of Science degree in Epidemiology and Preventive Medicine with their PhD degrees. The PhD dissertation serves as the M.S. thesis..

Both graduate programs must approve the composition of the student's dual-degree dissertation committee. At least one dissertation committee member, in addition to any member who is serving primarily as a medical consultant, must be an epidemiologist and graduate faculty member with a primary appointment in DEPM; at least one member must be a biostatistician from DEPM and a member of the graduate faculty.

Gerontology Dual Degree

This program is available to students who are accepted into the gerontology Ph.D. program and remain in the program in good standing. While primarily intended for students in the epidemiology track, all gerontology doctoral students are eligible to apply for admission to this program. Those wishing to apply to the dual degree program upon admission should indicate so in their application letter.

The GPC approves the membership of the dissertation committee but leaves the details of the dissertation to that committee's oversight. At least one dissertation committee member must have an appointment in GERO.

Requirements for the dual-degree

Methods (15 credits)

- GERO750 -Theory/Methods I (3)
- GERO751- Theory/Methods II (3)
- PREV600 - Principles of Epidemiology (3)
- PREV659 - Observational Studies in Epidemiology (3)
- PREV758 - Health Survey Research Methods (3)

GERO Core (15 credits)

- GERO614 – Biology of Aging (3)
- GERO681 – Epidemiology of Aging (3)*
- GERO700 – Sociocultural Gerontology (3)
- GERO703 – Policy Analysis of Aging Issues (3)
- GERO786 – Psychological Aspects of Aging (3)

Statistics (13 credits)

- PREV620 – Principles of Biostatistics (3)
- PREV619 - Biostatistical Computing (2)
- PREV720 – Statistical Methods in Epidemiology (4)
- PREV721 – Regression Analysis (2)
- PREV 723 – Survival Analysis (2)

Other requirements

- PREV803 – Clinical Trials (3)
 - Advanced elective in epidemiology (3)
 - Dissertation research (12 credits)
 - CIPP909 Responsible Conduct of Research (no credit)*
-

MS Epidemiology / PhD Pharmaceutical Health Services Research

This program is available to students who are accepted into the PHSR doctoral program and remain in the program in good standing. While primarily intended for students in the pharmacoepidemiology track, all PHSR doctoral students are eligible to apply for admission to this program. Those wishing to apply to the dual degree program upon admission should indicate so in their application letter.

To ensure that the dissertation has significant epidemiological content and/or methods, the Graduate Program Committee will approve the student's General Research Plan. At least one week prior to the committee meeting, the student submits a General Research Plan along with the names *and signatures* (to indicate their approval of the research plan and willingness to work with the student) of recommended members for the dissertation committee to the academic coordinator for presentation to the GPC for its approval. The GPC will notify the student of its approval or disapproval of the General Research Plan and of any change in dissertation committee membership from that proposed by the student.

Requirements for the dual-degree program

Methods (6 credits)

PHSR 701 - Research methods I (3)

PHSR702 - Research methods II (2/3)

Statistics (11 credits)

PREV620 - Principles of biostatistics (3)

PREV720 - Statistical methods in epidemiology (4)

PREV721 – Regression Analysis (2)

PREV 723 – Survival Analysis (2)

PHSR Core (12 credits)

PHSR610 – Pharmacy, drugs, and the health care system (3)

PHSR620 - Introduction to health behavioral theory (3)

PHSR650 - Pharmaceutical economics (3)

PHSR 704 - Pharmacoepidemiology (3)

Epidemiology Core (15 credits)*

PREV600 - Principles of epidemiology (3)

PREV659 - Observational studies in epidemiology (3)

PREV803 - Clinical trials/experimental epidemiology (3)

Epidemiology electives (PREV courses) (6)

Sample of Epidemiology elective courses:

PREV 611 Disease Modeling in Epidemiology (3)

PREV 801 Longitudinal Data Analysis (3)

PREV 706 Research Informatics: Data Management in Research (2)

Other requirements

PREV619 Biostatistical computing (2 credits)

Seminar (3 presentations, 1 credit each)

Dissertation research (12 credits)

GUIDELINES FOR MASTER'S THESIS (EPIDEMIOLOGY TRACKS)

Purpose

The purpose of the Master's Thesis is to provide students with the opportunity to develop an advanced understanding of and skills in epidemiologic research by progressing through each of the following steps:

1. formulation of a research question based on review of the literature and information from experts in the field of interest
2. identification of epidemiologic methods and measurements that will accurately address the research question
3. assembly of adequate data
4. analysis and interpretation of results
5. written and oral presentations of results

A Master's thesis should address an unanswered research question. The scope of the research must be such that it can be both of high quality and completed within the allocated time. There may be acceptable Master's research projects that do not entail generating primary data. However, a student who chooses to use existing data is responsible for gaining access to the data, for ensuring that the data set is adequate to answer the research question, and for establishing that the data are of acceptable quality. The thesis must be submitted through the Graduate School, which appoints an examining committee, schedules a formal defense and keeps copies of the thesis for its records and for publication in Thesis Abstracts. Copies of the forms needed for each step for the degree and for preparing a thesis are contained in the "Instructions for Preparing Master's Theses and Doctoral Dissertations" which is available on the Graduate School Website.

Procedures

- A. Any student interested in proposing Master's Thesis research should first meet with the graduate program director to discuss the student's interests and preparation for initiating the research.
- B. Formulation Stage: General Research Plan for Master's Thesis The purpose of the General Research Plan is to assure that the proposed project appears to be feasible and at an acceptable standard in the initial stages of the project so that large amounts of time and effort are not invested in a potentially unproductive direction. Therefore, the drafting of a General Research Plan is intended to require the minimum time necessary to delineate the basic substance and form of the proposed research. The faculty review of the General Research Plan through the GPC will judge whether the student should pursue development of the proposed research or should re-evaluate the area of interest. Membership of the student's proposed research committee is also subject to the approval of the GPC.
 - 1) The student should select an area of research for the Master's thesis through discussions with his/her academic advisor and other faculty members. Students in the Clinical Track will also consult their clinical mentor. The student will then complete the brief General Research Plan (10 pages or less) in which succinct, preliminary information about the problem, the methods to be utilized and the significance and feasibility of the research are addressed. Students in the Regular Track will identify and obtain approval of a DEPM faculty member as Thesis Committee Chair. Students in the Clinical Track will identify co-chairs, a faculty member in DEPM and a UMB faculty member in the student's clinical department. The student, in consultation with the committee chair(s) will identify potential committee members for his/her research committee to oversee the execution of the entire thesis. Potential committee members are also proposed as part of the submission of the General Research Plan for review and final approval.

Format the General Research Plan for Master's Thesis using the template available on the academic Web page.

- 2) Submit the General Research Plan along with the names *and signatures* (to indicate their approval of the research plan and willingness to work with the student) of recommended members for the dissertation committee to the Academic Coordinator for presentation to the GPC for its approval at least one week prior to the committee meeting. The GPC will notify the student of its approval or disapproval of the General Research Plan and of any change in dissertation committee membership from that proposed by the student.
- 3) The Chair of the Thesis Committee should attend the GPC meeting when their advisee's GRP is discussed or they may delegate this to a member of the thesis committee. The General Research Plan will be evaluated and a decision for or against approval of the thesis and committee membership will be reached. The results of the evaluation and decision will be provided to the student and research committee members.

The Chairperson of the thesis committee must be a full-time, on-site member of the UMB faculty with an academic appointment in the Department of Epidemiology and Preventive Medicine at the rank of assistant professor or above and a Graduate Faculty Member. An exception may be made for a faculty member who is unusually well qualified to chair the committee, but whose primary appointment is in another department. For students in the Clinical Track, the Clinical Co-chair must be a member of the UMB clinical faculty at the rank of Assistant Professor or above with expertise in the biomedical field of the proposed research. At least one member of the Committee, usually a chair, should have experience as a principal investigator of a funded, peer-reviewed research project. At least one member of the committee should be knowledgeable in the biomedical field of the proposed research.

Master's Thesis Proposal

- 1) Submission for approval:
 - a. After approval of the General Research Plan, the student will develop a full Thesis Proposal with the guidance of his/her thesis committee. The proposal must follow the NIH grant proposal format (PHS Form 398: Background and Significance, Objectives and Specific Aims, Preliminary Work (if appropriate), Experimental Design and Methods, Human Subjects, Literature Cited. A thorough review of the relevant literature that forms the background for the proposed thesis should be included.
 - b. Each member must then sign the Approval of Master's Thesis Proposal to indicate that they have: (1) approved the proposal, (2) agreed that the proposed work is feasible, and (3) recommended that the research proceed as planned by the student. This form must be filed with the academic coordinator by the student's Committee.
 - c. The student will be informed by the chair(s) of his/her Thesis Committee when the proposal has been approved and work on the thesis can proceed.
- 2) Completion of the Master's Thesis:
 - a. The student is responsible for all activities necessary to complete the thesis. The student is expected to: (1) obtain Institutional Review Board (IRB) approval, if needed; (2) design required data forms; (3) perform coding for data entry and programming for statistical analysis. The student is expected to work under close supervision of, and in consultation with, his/her committee. The chairperson(s) will serve as liaison with the GPC to keep the latter abreast of the student's progress and will report any problems with or redirection of the work.

- b. The thesis should be organized in the format of a published scientific paper: Background, Methods, Results, Discussion. Appendices should be used for material not central to the primary components of the report.
- c. After the thesis receives final approval by the Thesis Committee and the revisions have been made to the project, the student will make an oral presentation (thesis defense) of the work to the Departmental faculty and students.
- d. See "Instructions for Preparing Master's Theses and Doctoral Dissertations" on the Graduate School Website. The original and one copy of the final Master's Thesis, including the committee members' signatures indicating approval of the project, will be filed with the academic coordinator.
- e. After the Departmental presentation and the filing of copies of the final Master's Thesis, the student will receive six hours of academic credit for completion of the thesis. The student will be given a grade by the Chairperson(s) of the Thesis Committee, in consultation with the other committee members.

GUIDELINES FOR MASTER'S THESIS (HUMAN GENETICS AND GENOMIC MEDICINE TRACK)

Purpose

The thesis is a requirement for the MS degree offered through the Human Genetics and Genomic Medicine track. The purpose of the Master's Thesis is to provide students with the opportunity to develop an advanced understanding of and skills in human genetics research by progressing through each of the following steps:

1. Formulation of a research question based on review of the literature and information from experts in the field of interest
2. Identification of appropriate methods and measurements that will accurately address the research question
3. Assembly of adequate data
4. Analysis and interpretation of results
5. Written and oral presentations of results

A Master's thesis should address an unanswered research question. The scope of the research must be such that it can be both of high quality and completed within the allocated time. There may be acceptable Master's research projects that do not entail generating primary data. However, a student who chooses to use existing data is responsible for gaining access to the data, for ensuring that the data set is adequate to answer the research question, and for establishing that the data are of acceptable quality. The thesis must be submitted through the Graduate School, which appoints an examining committee, schedules a formal defense and keeps copies of the thesis for its records and for publication in Thesis Abstracts. Copies of the forms needed for each step for the degree and for preparing a thesis are contained in the "Instructions for Preparing Master's Theses and Doctoral Dissertations" which is available on the Graduate School Website.

Procedures

A. MS students should meet with the graduate program director in the spring semester of their first year to discuss the student's interests and preparation for initiating the research.

B. Formulation Stage:

The student should select an area of research for the Master's thesis through discussions with his/her academic advisor and other faculty members. The student, in consultation with his or her selected committee chair will identify potential committee members for his/her research committee to oversee the execution of the entire thesis. The Chairperson of the thesis committee must be a full-time, on-site member of the UMB faculty who is affiliated with the Human Genetics and Genomic Medicine program at the rank of Assistant Professor or above and a Graduate Faculty Member. At least one member of the Committee, usually a chair, should have experience as a principal investigator of a funded, peer-reviewed research project. At least one member of the committee should be knowledgeable in the biomedical field of the proposed research.

Master's Thesis Proposal

1) Submission for approval:

a. The student will develop a Thesis Proposal with the guidance of his/her thesis committee. A thorough review of the relevant literature that forms the background for the proposed thesis should be included.

b. Each member must then sign the Approval of Master's Thesis Proposal to indicate that they have: (1) approved the proposal, (2) agreed that the proposed work is feasible, and (3) recommended

that the research proceed as planned by the student. This form must be filed with the academic coordinator by the student's Committee.

c. The student will be informed by the chair(s) of his/her Thesis Committee when the proposal has been approved.

2) Completion of the Master's Thesis:

a. The student is responsible for all activities necessary to complete the thesis. The student is expected to: (1) obtain Institutional Review Board (IRB) approval, if needed; (2) design required data forms; (3) perform coding for data entry and programming for statistical analysis. The student is expected to work under close supervision of, and in consultation with, his/her committee. The chairperson(s) will serve as liaison with the GPC to keep the latter abreast of the student's progress and will report any problems with or redirection of the work.

b. The thesis should have the elements of a published scientific paper: Background, Methods, Results, Discussion. Appendices should be used for material not central to the primary components of the report.

c. After the thesis receives final approval by the Thesis Committee and the revisions have been made to the project, the student will make a public oral presentation and committee-only thesis defense of the work to the Departmental faculty and students in accordance with Graduate School procedures.

d. See "Instructions for Preparing Master's Theses and Doctoral Dissertations" on the Graduate School Website. The original and one copy of the final Master's Thesis, including the committee members' signatures indicating approval of the project, will be filed with the academic coordinator.

DOCTORAL PROGRAM

Departmental Requirements

The PhD degree program in Epidemiology and Human Genetics allows the student to acquire advanced knowledge, skills and experience in completing independent epidemiological research in a biomedical setting. Doctoral students are advised that they must meet all requirements of the University of Maryland Graduate School and of the Graduate Program in Epidemiology and Human Genetics to obtain the Doctor of Philosophy degree. They should refer to the written procedures both here and in the Graduate School Catalog to ensure that they are doing so. Copies of the forms needed for each step for the degree and for preparing a dissertation are available on the Graduate School Website.

Doctoral Student Funding

The Program will assure at least two years of support for PhD students who are admitted with an offer of financial support through GRA awards, training grant funds or other funds. It is expected that the student will find support beyond the second year through research projects, training grants or individual grants.

Student Rotations

Entering PhD students who receive Program-awarded GRAs will be assigned to three mentored research rotations during the first year. In their second year, all PhD students will be expected to identify a research advisor for further research in an area of interest that would be expected to help prepare the student for a dissertation research project. Descriptions of rotation opportunities are available in the academic office.

Graduate Research Assistant (GRA)

The general guidelines governing assistantships are outlined in Graduate Assistant Policies and Guidelines published by the UMB Graduate School. Students receiving a full graduate assistantship may not be employed by the University of Maryland for more than the 20 hours per week committed to their assistantship. A half-time assistant cannot be employed more than 10 hours per week.

Twenty hours per week is considered the maximum time a full-time student can expect to work and successfully complete the degree program. Therefore, any graduate assistant seeking employment outside the University of Maryland, must have approval from the graduate program director. A brief description and reason for outside employment should be submitted in writing prior to making a commitment to outside employment. This approval process will function to improve communication and cooperation between the department and the student while the student is under contract as a full-time student and employee.

Teaching Requirement (Students in the Epidemiology/ Molecular Epidemiology Tracks only)

Student teaching is an important activity that serves to improve the instructional quality of courses taught in the department and provides practical training for PhD students in university-level teaching. PhD students become eligible to assume teaching assistant (TA) responsibilities starting in the spring semester of their second year. Students who desire TA work earlier may be permitted to do so. PhD students are expected to spend approximately five hours per week, per semester (in addition to the 20 hours required for a Graduate Research Assistantship) performing teaching assistant duties. The student and the faculty course master will complete evaluations at the conclusion of the teaching assignment or the end of the semester—whichever comes first.

Procedure:

1. In Spring of each year, faculty members who will teach courses for the following academic year will send their request for TAs to the program coordinator. (Faculty may specify a preference for a student TA.)
2. The program coordinator will compile a list of courses for which TAs are requested, send it to students and ask them which courses they would prefer to TA during the following academic year.
3. A GPC sub-committee will match TAs to courses according to need (e.g., enrollment), and will try to accommodate faculty and student (TA) preference as much as possible.
4. If the availability of TAs is larger than the number of TAs needed for a given semester, students may be excused from serving for that semester, based on seniority or extenuating circumstances.

5. To serve as TA for a course, a student must have previously taken the course or be exempt from taking the course based on previous knowledge.

TA responsibilities:

TA duties may include, but are not limited to:

1. Grading homework, exams, quizzes, projects;
2. Holding office hour/consultation sessions;
3. Leading laboratory/discussion/recitation/review sessions;
4. Guest lecturing;
5. Planning activities including contacting guest speakers organizing course materials, developing assignments or review materials;
6. Providing support for web-based courses.

Required TA duties may be adjusted to accommodate students with extenuating circumstances (e.g., off-site or part-time students, etc.). Students and faculty are expected to work together to develop practical, creative solutions to ensure that each student can participate as a TA in a meaningful way during their graduate career.

Faculty responsibilities:

1. Faculty are expected to ensure that TA activities do not take more than five hours per week, on average, to perform.
2. Faculty are expected to provide a TA environment whereby the student learns university-level teaching skills, e.g., course planning and development, lecturing, course management, etc.
3. Faculty are encouraged to creatively incorporate TAs into their courses to enhance the learning experience of students in the course.

Note: The requirement for students admitted prior to fall 2007 is to teach for one semester in a departmental course as a teaching assistant or lab instructor for a graduate course. The new TA requirements are not mandatory for this group of students, but they are encouraged to participate.

Dissertation Research

A minimum of 12 credit hours of independent doctoral research is required for the PhD degree. The investigation must be on a substantial epidemiological question, designed to test relevant hypotheses with the most appropriate epidemiological and biostatistical methods, and completed at a level that is worthy of publication.

Elective Courses

All courses offered by the department or GPILS are eligible for elective credits. It is expected that the doctoral candidate will develop at least one content area of concentration in some specialization of interest using elective credits. If students plan to take courses outside the Program to apply to their degree, they must obtain permission from their academic advisor and the graduate program director.

Seminar Attendance

PhD students are required to attend fifty percent of offered seminars during each of their first two years in the program. Part-time students will meet the same requirement, but may spread this requirement over a longer time period.

PhD Program Three-Exam System for students in the Epidemiology Tracks

The Doctor of Philosophy degree is the highest degree awarded by the Graduate School and is granted upon sufficient evidence of high attainment in scholarship and the ability to engage in independent research. In epidemiology, a three-exam system is required.

Examination #1 Comprehensive Examination

The purpose of the comprehensive exam is to determine whether students are prepared to begin their independent dissertation research. On this exam, the student must demonstrate mastery of the fundamental principles and skills of epidemiology and biostatistics. In addition, they must demonstrate their ability to apply epidemiologic reasoning to critique existing research, and to develop and implement solutions to new research problems.

An examination committee is annually appointed by the GPC to administer the exam. Students who have completed the third semester of full-time course work are required to take the exam when offered in January of the second year. The exam is scheduled every year prior to January 31; a reading list is distributed by September 30. The GPC determines the examination's structure; it may include two components: written (includes computer data analysis) and oral and may be in an open or closed book format.

The exam is graded as

Pass;

Fail, with the option to retake the exam the following January; or

Fail with no continuation in the program.

Examination #2 Proposal Defense

The proposal defense is an oral defense of the dissertation proposal to faculty and students and is administered by the candidate's dissertation committee. It is taken after the proposal has been approved by the candidate's dissertation committee. The dissertation committee grades the exam as Pass or Fail.

Examination #3 Dissertation Defense

The final dissertation defense is administered by the student's dissertation committee.

STEPS TO PHD DEGREE IN EPIDEMIOLOGY TRACKS

Student completes equivalent of three full-time semesters of course work



Student passes the Comprehensive Exam (in January following the first three semesters)



Within one year of passing the examination, student submits a General Research Plan with proposed committee membership to Graduate Program Committee (GPC)



GPC reviews the General Research Plan to approve both the scope and feasibility of the proposal and the appropriateness of the committee membership



When the General Research Plan is approved, the student is eligible to apply for admission to PhD Candidacy

Note: Students supported by Graduate Research Assistantships (GRAs) become eligible for the Level II stipend when they achieve candidacy. Payment of the higher stipend amount begins at the start of the subsequent contract year.



**Within one year of attaining candidacy status,
Student completes the dissertation proposal**



Student defends the dissertation proposal

*The defense has two components:
a public presentation, followed by a closed session in which the committee questions the student.*



Student completes the proposed research and writes the dissertation



Student defends the dissertation – PhD degree is awarded

PhD Program Three-Exam System for students in the Human Genetics and Genomic Medicine Track

Examination #1 Qualifying Examination

A qualifying exam will be administered to all PhD students to assess overall research skills and program-specific knowledge. The exam is generally administered during year 2 of the program, after completion of most of core coursework. The examination committee will be selected from among Human Genetics and Genomic Medicine and related faculty by the human genetics track leaders. Following successful completion of the qualifying examination the student advances to candidacy. The qualifying exam will consist of two parts and is graded by the examination committee.

Part A (written): The candidate will be given a research question to address or a journal article to review. The candidate has 1 week to provide written response to the assignment.

Part B (oral): An oral exam will then soon follow to address issues in the written document and to assess general knowledge of human genetics.

Examination #2 Proposal Defense

In conjunction with the primary mentor, the candidate will identify a suitable thesis topic. This topic must be judged acceptable by the HGGM examination committee (see above). After approval for the topic is obtained, the candidate will prepare a written proposal for the committee and present orally a defense of the proposal. The HGGM examination committee grades the Exam as Pass or Fail. Upon passing the examination, the student selects a committee of 5 – 7 faculty in accordance with Graduate School policies if the committee has not already been selected.

Examination #3 Dissertation Defense

The final dissertation defense is administered by the student's dissertation committee in accordance with the policies of the Graduate School and includes a public seminar followed by a committee-only oral examination.

DOCTORAL DISSERTATION

Purpose

The purpose of the doctoral dissertation is for a student to successfully complete an original, scholarly research project that demonstrates an unconditional ability to conduct independent research. Most doctoral dissertations will be based on an unanswered, original question and the student will collect most or all related data. In some cases, a doctoral research project will be approved using already collected data.

Original Data Collection Requirement

Because of the importance in epidemiologic research of planning for and collection of original data to answer questions, the student will be required to document that such experience has been obtained. The experience may not be obtained in a formal course or involve academic credit. The chairperson of the Dissertation Committee will determine when this requirement has been met; approval of the Program Director is required.

Procedures

The following steps are intended to assure that the student's dissertation work is reviewed incrementally and systematically by the faculty so that any difficulties can be attended to early and progress can be sustained by the student as the work moves from the

General Research Plan (Epidemiology/ Molecular Epidemiology Tracks only; also referred to as the pre-proposal) to a Dissertation Proposal and then to the Dissertation

1. Choose a topic and an initial research plan for the dissertation with the advice and consultation of the academic advisor, other faculty and others knowledgeable in the subject area. Identify and obtain approval of a dissertation advisor who will chair the dissertation committee.
2. Assemble the Dissertation Committee following the membership requirements of the Graduate School and the GPILS PhD program.

The doctoral examination committee must have between five and seven members, including the chair, and all members must hold a doctoral-level degree. The chair of the committee and two additional members must be Regular members of the Graduate Faculty. At least one committee member must be from outside the program or department. The department strongly recommends that one member be a biostatistician and that at least one member have expertise in epidemiologic methods.

3. Prepare the General Research Plan (Epidemiology tracks only). The purpose of the General Research Plan is to assure that the proposed project appears to be feasible and at an acceptable standard in the initial stages of the project so that large amounts of time and effort are not invested in a potentially unproductive direction. Therefore, the drafting of a General Research Plan is intended to require the minimum time necessary to delineate the basic substance and form of the proposed research. The faculty review of the General Research Plan, through the GPC will judge whether the student should pursue development of the proposed research or should re-evaluate the area of interest. Membership of the student's proposed research committee is also subject to the approval of the GPC.

Format the General Research Plan for Dissertation using the template available on the academic Web page.

4. Submit the General Research Plan along with the names *and signatures* (to indicate their approval of the research plan and willingness to work with the student) of recommended members for the dissertation committee to the academic coordinator for presentation to the GPC for its approval at least one week prior to the committee meeting. The GPC will notify the student of its approval or disapproval of the General Research Plan and of any change in dissertation committee membership from that proposed by the student.
5. Develop and defend the full Dissertation Proposal working with the dissertation committee and using the recommended dissertation proposal guidelines below. When the student's dissertation committee agrees that the proposal is ready, the student may schedule the Dissertation Proposal Defense (Examination #2).

Dissertation Proposal

The student writes the Dissertation Proposal under the direction of his/her dissertation committee. The full Dissertation Proposal is intended to convey essential information about the student's doctoral dissertation research. It should succinctly identify the problem to be addressed, review relevant background, state the significance of the problem, and describe the methods to be used in carrying out the project. The proposal is an important document outlining the student's dissertation research, and its acceptance implies that the faculty and student agree on the plan of study. While important, the proposal is not an end in and of itself and should be viewed as a preliminary document detailing a research plan. The final documentation of the importance of the project, its methodology, and the results and implications is to be reserved for the doctoral thesis.

Proposal Format

The format for the Dissertation Proposal is modeled after the Public Health Service grant application format for research proposals. The dissertation proposal will ordinarily be 25 or more pages in length, and should be in the hands of the student's dissertation committee at least two weeks before the Proposal Defense.

Dissertation Proposal Defense

When the dissertation committee agrees that the full proposal is complete, the student will arrange to conduct a defense of the proposal. The defense is open to all departmental faculty and graduate students; however, the members of the student's dissertation committee, the GPC Chair and at least two members of the GPC must be present at the Proposal Defense. *The two GPC members are in addition to any GPC members who may be on the student's dissertation committee.* All committee members must sign the face page of the Dissertation Proposal to indicate that they have read and that they approve of the full proposal. With this approval, the dissertation committee is also signifying its agreement that the proposal is of sufficient scope and that the student may proceed to the Proposal Defense.

At least two weeks prior to the proposal defense, the student will provide copies of the proposal to all members of the dissertation committee. The student will provide the academic program coordinator with a signed copy of the face page of the Proposal. The academic program coordinator will schedule a room and distribute announcements to faculty and students.

The Dissertation Proposal Defense is conducted as an oral defense of the dissertation proposal and is administered and graded by the student's dissertation committee. The defense is conducted in a workshop format to provide constructive criticism for the proposed dissertation work while there is still opportunity to make modifications or to even change the topic or research design before an undue investment of effort has been made by the student. The defense is graded on a pass/fail basis (*Appendix E*). The dissertation committee will advise the student of any changes that must be made before the student can proceed to work on the dissertation.

The student will work with the Dissertation Committee, as needed, to assure the completion of the dissertation. It is the student's responsibility to contact the Dissertation Committee regularly to discuss progress and plans related to the dissertation, to keep them informed and seek their input as well as that of other faculty members to strengthen the work and obtain adequate guidance to complete a defensible dissertation.

Manuscript-Based Dissertations

As an alternative to the traditional dissertation format, doctoral students have the option of submitting a manuscript-based dissertation. The manuscript-based dissertation must meet the following criteria: (1) It must include a minimum of two manuscripts, linked to a common theme; (2) The student must be first author on both manuscripts; (3) The dissertation may not include a paper published prior to the General Research Plan being submitted to the Graduate Program Committee; (4) The manuscripts must be suitable for publication in a peer-reviewed scientific journal, as determined by the student's dissertation committee; and (5) The dissertation must meet all criteria (except those related to presentation format) specified elsewhere in the Student Handbook.

The dissertation must be organized as follows:

- A. The first chapter should be a comprehensive critical literature review.
- B. The second chapter should be a complete and detailed description of the study methods.
- C. The third, fourth, and possibly later chapters should be the manuscripts, with a transitional short chapter relating them to each other and to the overall theme.
- D. The final chapter should integrate and discuss the findings reported in the manuscripts. It should include a discussion of the conclusions drawn from the research, and should make recommendations for further studies.
- E. The dissertation should include an appendix that includes all tables and results deemed necessary to fully understand the data.

Prior to submission for publication, manuscripts must be reviewed and approved by the Readers and Chair of the dissertation committee. The student is expected to have submitted the manuscripts for publication to peer-reviewed journals to fulfill the requirement. Submission of the manuscripts is not required prior to the defense, but students are very strongly encouraged to submit them before they graduate.

If more than two manuscripts are included in the dissertation, at least two of them must be submitted for publication.

COURSE DESCRIPTIONS with PREREQUISITES

Key to Course Offerings

Course Preface	Location
GERO	UMB School of Medicine, Graduate Programs in Life Sciences
GPLS	UMB School of Medicine, Graduate Programs in Life Sciences
PH	UMB School of Medicine, MPH Program
PHAR, PHSR	UMB School of Pharmacy
PREV	UMB School of Medicine, Graduate Programs in Life Sciences
HGEN	UMB School of Medicine, Graduate Programs in Life Sciences

Course Descriptions

Epidemiology and Preventive Medicine Courses

PREV 600 Principles of Epidemiology [3]

presents a comprehensive treatment of the concepts and methods of chronic disease epidemiology. Topics include the classification of statistical associations and methods of distinguishing between causal and non-causal associations. Case-control, cohort and experimental studies are considered in detail. There are also presentations by students of epidemiological papers, including those linking lung cancer to cigarette smoking. *Prerequisites: PREV 620 previously or concurrently and consent of instructor.*

PH 610 Foundations of Public Health [3]

This course examines the complex set of factors that are associated with the health and disease of diverse populations including the individual, organizational, community and population. The course highlights the social and behavioral sciences, communication and informatics sciences and public health ethics. We will go beyond the individual risk factor approach to health and disease, applying multi-disciplinary models which elucidate the economic, sociocultural, political and behavioral context and processes underlying health care access and decision making. *Prerequisites: none.*

PREV 611 Disease Modeling in Epidemiology [3]

Mathematical models are an important tool for understanding infectious disease epidemics. Each student in the course will develop and analyze a basic mathematical model on a system of their choice. In addition, we will introduce students to the core theory for infectious diseases, teach some basic skills needed to read a theory paper, and cover special topics selected by the students. *Prerequisites: PREV 600 and PREV 620.*

PREV 616 Introduction to Clinical Research at UMB [2]

This is a one-week, two-credit course providing an overview of the basic skills, attitudes and resources needed for designing and implementing a clinical or translational research project. The emphasis will be on how to obtain these skills and resources on the UMB campus.

PREV 617 Design and Implementation of Research Studies (Grant Writing) [2]

During the semester students will select a research topic, develop a research plan, and write a grant application in appropriate format for submission to a funding agency. Grant sections, as they are written, will be presented to the class by the students for critique and discussion. As part of this process, students will consider research strategy and requirements of funding agencies; gain familiarity with various grant formats; discuss ethical issues in study design; and consider the practical aspects of data management. Student evaluation is based on class presentations and the final grant application. *Prerequisites: Enrollment limited to MS Clinical Research track students.*

PREV 619 Biostatistical Computing [2]

provides the student with comprehensive experience in the application of epidemiological and biostatistical methods available in the Statistical Analysis System (SAS). Hands-on experience in weekly workshops is gained by conducting analyses of existing data designed to answer a research question. *Prerequisites: PREV 620 previously and PREV 720 concurrently, or consent of the instructor.*

PREV 620 Principles of Biostatistics [3]

is designed to develop an understanding of statistical principles and methods as applied to human health and disease. Topics include: research design; descriptive statistics; probability; distribution models; binomial, Poisson, and normal distribution; sampling theory and statistical inference. *Prerequisites: Knowledge of college algebra required. Calculus recommended.*

PREV 625 Community-based Participatory Research Methods [3]

The course provides a comprehensive understanding of the ways in which social scientists, health professionals and community members can collaborate to address public health problems through research that leads to improvements in health and quality of life and organizational or community change. Students and faculty from multiple scholarly disciplines will examine the approaches to community-based participatory research that go beyond the domain of any one discipline. Students will receive training in the skills and knowledge needed to apply mixed methods (qualitative

and quantitative) approaches in designing, implementing and evaluating public health programs and community-based participatory research. Attention will be given to the scholarly debates and practical-logistical issues in conducting community-based participatory research. Ethical principles of social justice will be applied to public health program planning and evaluation which uses community-based participatory methodology.

PREV 627 Vaccinology [2]

Vaccinology is an emerging science that deals with all aspects of the development and implementation of vaccines and vaccination programs. The Center for Vaccine Development at the University of Maryland is world famous research center that creates vaccines in the laboratory, then tests these vaccines at all levels, including pre- and post-licensure field studies. This course is taught by the faculty of the Center for Vaccine Development and experts from other institutions. The full range of issues in vaccinology is covered, including the current status of vaccines and vaccination programs. There is particular emphasis on policy in vaccine implementation. *Prerequisites: none.*

PREV 633 Legal and Regulatory Issues in Clinical Research [1]

The course will be co-taught by faculty from the School of Medicine and the School of Nursing. The course is required for the Master of Science in Clinical Research in the School of Medicine and the Master of Science in Clinical Research Management in the School of Nursing. This mixture of students will promote the multidisciplinary interactions integral to successful clinical research. *Prerequisites: Health professional degree and clinical research experience.*

PREV 637 Ethical Issues in Clinical Research [3]

This course begins with the birth of contemporary bioethics in famous research scandals and ends with some current problems on the cutting edge of scientific research ethics. In between, we shall examine the regulatory structure designed to curb the abuse of patient/subjects; specifically, this will consist of the role and functions of institutional review boards (IRBs). The approach will be primarily philosophical but with attention to history and regulation. Many of the great cases (such as the Nazi Doctors' Trial, the Tuskegee syphilis study, Willowbrook, Milgram's authority experiments, and the recently revealed U.S. government-sponsored radiation studies) will be examined with an eye both to historical detail and to ethical analysis. The course will emphasize controversies concerning the ethical design of research studies (e.g., randomization, placebos, informed consent, coercive inducements, gauging risk and benefit, etc.) as well as problems posed by specific "subject populations" such as medical students, prisoners, developing-world subjects, and cognitively impaired patients. Throughout the course, we will have practical experiences in the ethical review of research protocols.

Prerequisites: None.

PREV 638 Ethical Issues in International Research [3]

This course will examine the ethical and philosophical issues raised by research on human subjects, particularly as such research is conducted in an international setting. The course assumes that the student has had at least some elementary acquaintance with basic concepts in research ethics. (This acquaintance may consist of prior or concurrent study of research ethics or some experience in conducting or assessing human subject research. The student should contact the instructor if further clarification is needed.) *Prerequisites: None*

PREV 639 Institutional Review Boards [2]

The development of Institutional Review Boards (IRBs) has played an integral role in the protection of research subjects and has also served as an important regulatory mechanism in the review and conduct of research. This course will explore the history that brought about the development of IRBs as well as the purpose, structure, and function of IRBs. Accordingly, the course will examine the necessary elements of standard operating procedures, including constitution of membership, elements of review, and issues involved with conflicts of interests. Other lectures will explore mechanisms of expedited and exempt reviews, elements of a waiver of consent, the continuing review process the dynamics of IRB decision-making, and different models for the review of research, e.g., local versus centralized IRBs. The course will explore the relationship between members of the research team and the IRBs and explore Good Clinical Practice Guidelines. Practical exercises will include submission of an FWA, review of consent forms, and mock IRB exercises. Each class participant will obtain pre-meeting IRB materials and observe the conduct of four IRB meetings. *Prerequisites: None*

PREV 640 Ethics of Globalization [1]

This seminar course is designed to introduce students in the identification and evaluation of moral dilemmas in the context of changes and development in an increasingly globalized world. Students will be introduced to the spectrum of prominent moral theories, and their application to critical development challenges in developing countries. The course will also ask how the leaders of tomorrow can ethically face the challenges globalization poses for the common life of the future. The course will also focus on the relative inability of moral theory to penetrate development analyses, theory, and practice may be changing, a premise that warrants close scrutiny from the outset of the course and repeated consideration in the weeks that follow. This course adopts a global perspective towards and examines the social consequences of contemporary economic, social and spatial restructuring and examines how globalization is associated with widening social and spatial inequalities. *Prerequisites: None*

PREV 645/LAW 648B Critical Issues in Health Care [3]

This interdisciplinary course is open to students from the Schools of Law, Medicine, Social Work, Nursing, Pharmacy, Dentistry and the graduate schools at UMB and UMBC. The course is designed to: (1) provide students with an opportunity to reflect on the legal, ethical and policy issues surrounding a number of health care delivery problems; (2) expose participants to the basic skills necessary to analyze problems from a legal, ethical and policy perspective; and (3) offer participants from different disciplines an opportunity to interact and share information and perspectives about their professions with one another. A variety of teaching techniques, including case studies, simulations, and panel discussions will be used to explore such topics as medical malpractice, rights of patients to refuse treatment, informed consent and substituted consent in medical decision making, confidentiality v. duty to disclose medical information, regulation of experimental drugs, and health care reform. During the course, students will have an opportunity to work in multidisciplinary teams to analyze a particular health care problem and develop a position paper on a health care policy issue. *Prerequisites: none.*

PREV 648 Introduction to the Health System, Health Policy and Management [3]

Lectures, seminars, readings, and small group discussions are designed to convey an understanding of health care systems, their structure, function, and effectiveness. Topics include: principles of management; municipal, state, national, and foreign organizational systems; HMOs; health care costs; cost containment and quality; regulations; planning and evaluation; health manpower, and applied problem solving. Available as a two-hour lecture course with an option to take an additional hour which provides in-depth exposure to a selected topic in health care administration and evaluation resulting in a paper. *Prerequisites: none.*

PREV 649 Introduction to Preventive Medicine [2]

A seminar course which emphasizes the applications of epidemiology, statistical reasoning, and preventive medicine to clinical practice. The role of the physician and other health professionals in the primary and secondary prevention of disease is discussed. Topics include relationships among physicians, hospitals, nursing homes, regulatory agencies, third party payers and the law. *Preventive Medicine residents only. Prerequisites: PREV 600 and PREV 620 and consent of instructor.*

PREV 650/PHSR 670 Principles of Health Education and Health Promotion [3]

Presents a scientific process designed to achieve voluntary behavioral change to improve health status. Health promotion utilizes health education to promote health and prevent disease. The analytical process used to explore health problems, the identification of factors associated with them, and the development and evaluation of interventions are covered. *Prerequisites: none.*

PREV 652 Health Economics [3]

This course provides an analysis of health as an economic good. Using microeconomic theories we will examine the behavior of health care providers, consumers, markets and firms. The underlying assumptions applicable to market economics are critically examined within the context of the health economy. Special problems of health economics are considered including assumptions of market competition, the demand and supply of medical care and health insurance, the role of government and equity.

PREV 659 Observational Studies in Epidemiology [3]

This course will build on the students' basic knowledge of the principles of epidemiology, providing a more in-depth understanding of the design, conduct and critical review of cross-sectional, cohort and case-control studies. Other types of research studies used in epidemiology will be introduced, including: ecologic/hierarchical studies,

surveillance, infectious disease modeling, geographic/ spatial studies, quasi-experimental studies, case-crossover designs and meta-analysis. For all types of studies, a major consideration will be comparison of strengths, limitations, biases, implications of the results, and current uses. Critical review of the current scientific literature will be emphasized. Prerequisites: PREV 600.

PREV 664 Critical Issues in Global Health [3]

A series of seminars, lectures and reading assignments designed to give students an overview of the global health problems facing the world today and equip them with tools to navigate the world of international health. The course focuses on teaching students about the global burden of disease and pattern of disease variations between and within countries. It addresses cross cutting issues such as poverty, environmental degradation and the impact of globalization on health. Topics include maternal and child health, gender and violence, nutrition, water and sanitation.

Prerequisites: none.

PREV 668 Environmental and Occupational Health [3]

Course surveys the effects of the environment on human health. Topics include occupational exposures; toxicology of environmental pollutants; occupational epidemiology; industrial hygiene; legal and regulatory aspects; role of the physician and nurse in the workplace; control of exposures; and health education relating to the worker. Instruction by lectures, seminars, and field trips to sites of interest. *Prerequisites: none.*

PREV 670 Psychiatric Epidemiology [2]

Reviews the methods and major substantive issues in psychiatric epidemiology. Topics include epidemiology of schizophrenia, depression and dementia and possible etiologic significance of socioeconomic status, stressful life events, social supports, crowding and housing. The course covers study designs in conducting psychiatric epidemiological research through lectures, seminars and readings. Prerequisites: PREV 600 or consent of instructor.

PREV 681/GERO 681 Epidemiology of Aging [3]

Involves students in learning how the principles and methods of epidemiology and preventive medicine can be applied to the study of aging. There is a review of health assessment techniques which are potentially useful for conducting epidemiological studies of older persons; the epidemiology of selected diseases common to old age; primary, secondary and tertiary prevention, as applied to older persons, focusing on psychosocial and environmental aspects of health; differing conceptions of long-term care, and its role in the prevention, intervention, and treatment of illness in older persons. Students learn how to critically evaluate and present research in a specific area of gerontological epidemiology with faculty supervision. *Prerequisites: PREV 600 or consent of instructor.*

PREV 700 Cardiovascular Disease Epidemiology & Prevention [3]

Taught in a seminar format in which each student, with faculty guidance, chooses a current problem in cardiovascular epidemiology and, following a presentation of the problem, outlines an approach to the problem that is discussed in class. After incorporating relevant feedback, the student gives a formal presentation and submits a term paper that represents a comprehensive review of the topic. Prerequisites: PREV 600 and PREV 620 or consent of instructor.

PREV 701 Cancer Epidemiology [3]

Involves students in learning how the principles and methods of epidemiology and preventive medicine can be applied to the study of cancer. The course includes lectures on the epidemiology of major cancers, their risk factors, known causes, and treatments. Prerequisites: PREV 600 or consent of instructor.

PREV 702 Advanced Quantitative Methods in Epidemiology [2]

Students will discuss each session one or two papers related to an advanced quantitative method in epidemiology. Discussion will be lead by either a student or faculty member. Students will write a 7-15 page paper on the topic that they lead. *Prerequisites: PREV 620 and PREV 720.*

PREV 703 Complex Disorders Seminar [2]

This seminar series includes speakers from both inside and outside the University of Maryland Baltimore. The individual speakers focus on topics including the difficulties of defining phenotypes, the problems involved in identifying genetic variation, and the statistical issues involved in correlating multiplicity of genotype data with that of phenotypic data. Speakers address these topics by discussing their research including leukodystrophies, bipolar disorder, prostate cancer, and eye diseases. Faculty-led discussions follow seminars.

PREV 704 Molecular Epidemiology Practicum (Lab Rotation) [3]

The course involves three, three-month assignments across the nine month school year and should be taken after completion of the first year of coursework. *Prerequisites: Completion of first year courses.*

PREV 705/PHSR 704 Pharmacoepidemiology [3]

An introduction to the field of pharmacoepidemiology using quantitative research methods to examine the benefits or risks of marketed medications. The course is intended to offer techniques to medical and health researchers who wish to assess the utilization, effectiveness and safety of marketed drug therapies. *Prerequisites: none.*

PREV 706 Research Informatics: Data Management in Research [2]

Clinical research frequently requires the efficient collection, storage and manipulation of data sets of varying sizes. Researchers must be adept at selecting and using appropriate computer-based tools to aid in this process. Further, researchers must be able to make use of and manage computer programmers and technical support staff hired to support research projects. *Prerequisites: PREV 600, PREV 620 previously or concurrently or with permission of the course master.*

PREV 707 Cost-Effectiveness in Prevention and Treatment [3]

A 3-semester hour graduate course for Masters and Doctoral students in the Health Sciences. This course is a component in the core methods for public health sciences, especially focusing on the preventive measures in healthcare. Cost-effectiveness analysis is an integral part of the design and development of interventions, so that optimal decisions can be made in selecting the alternative to be implemented. Additionally, the evaluation of outcomes should include an empirical cost-effectiveness analysis to improve the body of knowledge available to future work. These techniques are also applied in randomized clinical trials. This course examines principles and techniques of Cost-Effectiveness Analysis (CEA) in healthcare from a prevention perspective. Participants learn key elements of the economist's analysis of costs, and effect, in order to achieve a comparative and incremental cost-effectiveness analysis. Student projects design and conduct a hypothetical and empirical CEA. *Prerequisites: PREV 600, PREV 720 or the equivalent.*

PREV711 Human Genetics Epidemiology [3]

will provide the student with an overview of basic methods in genetic epidemiology, with application to common complex diseases such as coronary heart disease, type 2 diabetes and obesity. The course will begin with a review of basic human genetics and then proceed to a description of methods used to dissect the genetic contribution to human disease and to map genes. Topics include: assessment of familial aggregation, heritability analysis, segregation and linkage analysis, genetic association studies, and linkage disequilibrium mapping. *Prerequisites: PREV 600, PREV 619, PREV 620 or their equivalents, or consent of instructor. Background in basic human genetics helpful.*

PREV 715 Injury Epidemiology and Prevention [2]

Helps students understand basic models of injury causation, principles of injury prevention and control, how to design epidemiologic studies of risk factors for injury and how to evaluate public health interventions designed to address the problem of injuries. 2 credits *Prerequisites: PREV600*

PREV 716 Chronic Disease Epidemiology [3]

The present course addresses chronic disease burden and its implications, and the best practices to prevent and control them. It is a three-credit hour course, taught once per week, over one semester. Consists of didactic lectures, in class discussions, and student presentations. *Prerequisites: PREV600*

PREV 720 Statistical Methods in Epidemiology [3]

Provides instruction on the specific statistical techniques used in the analysis of epidemiological data. Topics include: treatment of stratified and matched data, detection of interaction, conditional and unconditional logistic regression, survival analysis, and proportional hazards models. *Prerequisites: PREV 600, PREV 620 and consent of instructor.*

PREV 721 Regression Analysis [2]

Covers basic principles and theory of regression techniques. Topics include simple and multiple linear regression,

robust regression, regression diagnostics, logistic and poisson regression analysis. The emphasis of this course is on learning the biomedical research application and interpretation of regression techniques.

Prerequisites: PREV 720 or consent of instructor.

PREV 723 Survival Analysis [2]

Examines methods of analysis for time to event data, including non-parametric methods, Kaplan-Meier analysis, log-rank and Wilcoxon tests, Cox proportional hazards models, time-dependent covariates, discrete time models; parametric methods. *PREV 720 or consent of instructor*

PREV 747 Research Practicum I [3]

Provides guided experience in epidemiologic research over two semesters. Students are expected to complete a database project that includes analysis of data and preparation of manuscript to report findings. Prerequisites: PREV 619, PREV 720 (or concurrent enrollment) and PREV 600 previously.

PREV 748 Research Practicum II [2]

Provides guided experience in epidemiologic research over two semesters. Students are expected to complete a database project that includes analysis of data and preparation of manuscript to report findings. Prerequisites: PREV 619, PREV 720 (or concurrent enrollment) and PREV 600 previously.

PREV 749 Infectious Disease Epidemiology [3]

Consists of lectures, seminars and reading assignments designed to promote an understanding of infectious disease epidemiology, with particular emphasis on modes of transmission--contact, contaminated vehicles, vector-associated and airborne; interventions and approaches to disease control--smallpox, measles, typhoid, influenza, hospital infections; infections of public health of importance in Maryland and use of the laboratory in infectious disease epidemiology. *Prerequisites: A basic knowledge of medical microbiology.*

PREV 758 Health Survey Research Methods [3]

Leads students through the steps in survey research from developing a survey questionnaire, to administering it and analyzing the data. The final results of the survey are presented in a paper. *Prerequisites: PREV 620 or consent of instructor.*

PREV 780 Molecular Epidemiology [3]

Covers the theoretical framework of the discipline of molecular epidemiology but focuses on the practical application of a basic knowledge of the field which will enable students to critically read the literature and to incorporate the techniques into epidemiological research. Students should have at least a limited background in biological sciences, although those with more advanced training will find the course of interest. *Prerequisites: none.*

PREV 789 Special Studies and Research in Preventive Medicine [1-6]

This individually-planned and closely-supervised course provides experience in the epidemiology of significant preventive medicine topics. *Prerequisites: PREV 600 and 620 or equivalent.*

PREV 801 Longitudinal Data Analysis [3]

Analysis of Longitudinal and Clustered Data includes topics in matrix algebra, longitudinal data analysis including the multivariate linear model, marginal and mixed effects general linear models, residual analysis and diagnostics, generalized linear models, including marginal (GEE methods) and mixed effects models for repeated measures and other clustered data. *Prerequisites: PREV 720 and PREV 721 or consent of instructor.*

PREV 802 Statistics for Molecular Biology [2]

Three topics are covered in this course: statistical design and analysis of experiments; DNA or protein sequence alignment; and analysis of gene expression data from microarray experiments. *Prerequisites: PREV 720 and 721 or permission of instructor.*

PREV 803 Clinical Trials and Experimental Epidemiology [3]

Presents a rigorous overview of the experimental method as applied in therapeutic evaluations, and demonstrates causal associations between risk factors and clinical outcomes. The history of the experimental method and its clinical

applications are studied in detail. Guest speakers of unique expertise and experience in clinical trials also are drawn upon. *Prerequisites* PREV 600 or equivalent and at least one semester of biostatistics.

PREV 808 Topics in Epidemiology [3]

Is an individual program of study undertaken with faculty supervision in one or more substantive areas of epidemiology. Through assigned reading and critical discussion, the student becomes knowledgeable in a specialized area of epidemiology, with particular emphasis on recent advances. Preparation of a critical review of the literature suitable for publication is required. *Prerequisites: Instructor consent.*

PREV 898 Pre-Candidacy Research [1-8]

PREV 899 Doctoral Dissertation Research in Epidemiology [12]

consists of substantial epidemiological investigations undertaken by Ph.D. candidates following departmental approval and leading to doctoral dissertations worthy of publication in appropriate scientific journals. The research must be designed to test relevant hypotheses and employ the most appropriate epidemiological and biostatistical methods.

Prerequisites: Departmental approval.

Human Genetics Courses

HGEN 601 Basic Human Genetics I [4]

Students learn basic genetic principles as they relate to the study of human health and disease. Topics include an overview of human genetics in Mendelian genetics, cytogenetics, population genetics, molecular cytogenetics, oncocytenetics, clinical applications of principles, and the importance and implications of genetic disease at the levels of the population and individual families.

HGEN 602 Basic Human Genetics II [4]

Introductory material in basic genetic principles, with emphasis on biochemical and molecular approaches to the study of human health and metabolic disease will be provided. Primary genetic defects underlying a diversity of disorders will be discussed. Subjects will include molecular and biochemical genetics, immunogenetics, cancer genetics, neurogenetics and developmental genetics. Clinical applications of metabolic and molecular studies will be discussed.

Prerequisite: Biochemistry.

HGEN 608 Human Genetics Seminar [1]

Graduate students, faculty and guests participate in the presentation and critical review of current topics and interests in the field of human genetics.

(Prerequisites: Consent of the program director)

HGEN 701 Human Cytogenetics [2]

Designed for advanced students interested in clinical and research aspects of human cytogenetics, this course provides a comprehensive approach to the normal human karyotype, chromosome identification methods, numerical and structural abnormalities and their clinical correlates, X-chromosome gene action, chromosomes and cancer, human population cytogenetics, gene mapping, and karyotype evolution. Students are required to give a seminar on a pertinent topic.

(Prerequisite: HGEN 601 or equivalent)

HGEN 711 Genetic Epidemiology [3] (cross-listed as PREV 711)

Qualitative and quantitative traits are used to discuss some of the genetic and epidemiologic factors affecting normal and abnormal variation within and between populations. Traditional and modern methods of family data analysis will be discussed, including segregation and linkage analysis. The underlying assumptions of each method (including Hardy Weinberg equilibrium) will be presented and discussed. Recent papers are used to illustrate the steps in each analysis, and computer programs will be discussed.

(Prerequisites: HGEN 601 or equivalent, introductory biostatistics, and some basic computer experience)

HGEN 720 Genetics and Metabolism [2]

Topics of this course include the study of mechanisms of gene action as illustrated by inherited human biochemical defects. Fundamental aspects of the function and malfunction of enzymes, vitamins and structural and regulatory proteins will be discussed at the biochemical and molecular levels. Clinical features of metabolic diseases, differential diagnosis and laboratory follow-up will be reviewed.

(Prerequisites: HGEN 601 and HGEN 602 or equivalent)

HGEN 728 Clinical Genetics I [2]

Topics in this course include collection and interpretation of pedigree information and an introduction to genetic nosology. Normal prenatal and pediatric development and embryology will be reviewed to give the student a better understanding of the disease process. In addition, medical terminology, components of medical charts and physical examinations, and the organizations and administration of medical centers will be covered.

HGEN 731 Clinical Genetics II [2]

This course is designed to complement HGEN 728, and covers all clinical aspects of genetic disease. This lecture series will cover specific genetic disorders and birth defects, organ systems, and both metabolic and dysmorphic syndromes.

HGEN 760 Clinical Cancer Genetics [2]

This course is designed to introduce the principles and practice of genetic counseling for hereditary cancer syndromes. Cancer epidemiology, terminology and pathology; current prevention, surveillance, and treatment options; clinical characteristics of common and rare hereditary cancer syndromes; genetic risk assessment and testing; and the psychosocial aspects of genetic counseling for hereditary cancer syndromes will be covered.

Other Courses of Interest

GPLS 601/602/603 Mechanisms in Biomedical Sciences [8]

Mechanisms in Biomedical Science is a comprehensive overview of current knowledge in cellular, molecular, and structural biology. This course provides the background necessary for subsequent specialized studies in biomedical research in a concentrated program. The GPLS Core Course is organized into 10 sections that span molecular biology, genetics, proteins, pharmacology, metabolism, membranes and organelles, protein processing, membrane signaling, cell signaling, immunobiology and development.

GPLS 716 Genomics and Bioinformatics

Course is under development

GPLS 717 Molecular Genetics and Development in Model Organisms [2]

Experimental research on fundamental biological problems is conducted in model organisms. Therefore, it is important to learn about current approaches that take advantage of different models. This course covers advanced topics on cell and molecular biology, such as epigenetics, embryogenesis, and differentiation, with an emphasis in different model organisms, including the widely-used mouse, frog, zebrafish, fly, worm, and yeasts, as well as less-common models such as jawless fish, cartilaginous fish, Dictyostelium and Archaea, which are preferred to study specific processes.

GPLS 750 Topics in Molecular Medicine [2]

This course is aimed at developing skills necessary for understanding and discovering how changes in gene function cause human disease. The course revolves around a series of topics that use inherited disease processes to illustrate the physiological consequences of molecular, cellular, genetic phenomena. Recent breakthroughs in the identification of disease-related genes are presented and extended to a discussion about their impact on cell and organ function. Critical reading and discussion of landmark and/or timely papers are stressed. In this way, students learn interesting state-of-the-art material while developing skills and expertise in integrative biology and molecular medicine. Topics change yearly, but have included: paralysis, malignant hyperthermia, cardiac arrhythmias, congestive heart failure, glomerulitis-Alport's, cystic fibrosis, Liddle's syndrome, hyperinsulinemia of infancy, type II diabetes mellitus, influenza, migraine headache and neurogenic inflammation, and Duchenne dystrophy. Two or three one-hour classes per topic consist of interactive discussions following assigned readings and brief lectures.

BIOL 626 Approaches to Molecular Biology (UMBC; requires cross-registration)

This course will focus on the molecular biology of eukaryotic cells and will include such topics as the sequence organization of DNA and genes, chromosome structure, messenger RNA synthesis and processing, messenger RNA translation and the regulation of the expression of genetic information.

(Prerequisite: consent of instructor)

CIPP 909 Responsible Conduct of Research [1 or 2]

A campus-wide course that prepares students for the ethical responsibilities of research. Topics include scientific integrity; research ethics and the ethical decision-making process; data handling and management; authorship; peer review; conflicts of interest; defining, identifying, and handling fraud and misconduct; animal and human research; genetics and reproduction; ownership of data and intellectual property; and the role of scientist in society. The course includes lectures, seminar discussions, and class exercises. Grading is based on class participation and a written paper.

Program in Epidemiology & Human Genetics

at the University of Maryland, Baltimore



Graduate Program in Epidemiology and Human Genetics

660 W. Redwood Street

Baltimore, MD 21201

(410) 706-8492

FAX: (410) 706-4425

<http://epidemiology.umaryland.edu/>

Program Director: Patricia Langenberg, Ph.D.

Leader, Track in Epidemiology: Mona Baumgarten, Ph.D.

Leader, Track in Molecular Epidemiology: Jon Furuno, Ph.D.

Leader, Track in Human Genetics and Genomic Medicine: Braxton Mitchell, Ph.D., M.P.H.,

Program Coordinator: Robin Moore