Milken Institute School of Public Health
THE GEORGE WASHINGTON UNIVERSITY

PhD Epidemiology
2017-2018

Note: All curriculum revisions will be updated immediately on the website
http://publichealth.gwu.edu

Application Due Date: December 1st

Program Director
Sean D. Cleary, PhD, MPH
950 New Hampshire Avenue, NW
Washington, DC 20052
Tel: 202-994-5757
Email: sdcleary@gwu.edu

MISSION

The mission of the Epidemiology PhD program in the Milken Institute School of Public Health of the George Washington Institute is to prepare students for a career in epidemiologic research in an academic, government, or industry setting.

PROGRAM GOALS

The goals of the PhD program are to ensure graduates:

- Gain knowledge across a wide range of epidemiologic and biostatistical theories and methods;
- Gain specific knowledge of epidemiology in one or more of the following areas: infectious disease, chronic disease, environmental and occupational health, or physical activity; Understand general and specialized advanced epidemiologic concepts;
- Understand how to apply statistical methods to biological/biomedical sciences and health services;
- Understand and abide by guidelines for ethical treatment of research participants;
- Conduct and analyze data from a research study;
- Disseminate research findings to scientific and lay audiences.

PROGRAM REQUIREMENTS

Doctoral students are required to pass a written comprehensive examination and complete a dissertation. For the comprehensive examination the student must demonstrate advanced knowledge of epidemiologic and biostatistical methods. For the dissertation, the student must design and execute an original research study that contributes new knowledge to the field and demonstrates proficiency in using advanced analytic methods.

PhD, Epidemiology students may choose to follow one of two tracks. Option A is more quantitative and requires an additional semester of calculus for admission. This allows students to take more advanced quantitative/statistical courses offered by the Department of Statistics.

COMPETENCIES

At the completion of the doctoral program in epidemiology students will be able to:

- Demonstrate understanding of general and specialized epidemiologic concepts: Demonstrate knowledge of advanced epidemiologic concepts with specialized knowledge in a specific area of epidemiology (e.g., methods, infectious diseases, chronic diseases, environmental and occupational, or physical activity); apply

knowledge of disease pathogenesis to a study proposal; discuss major public health problems; and exhibit knowledge of ethical issues in research.

- Develop a research proposal: Produce a structured proposal of a research study including the background, study hypotheses, design, methodology, and contribution to the field; synthesize and identify gaps and/or limitations of published research and present appropriate hypotheses to address gaps; develop a research protocol that includes identification of data sources and evaluation of appropriate instruments for data collection, the advantages and disadvantages of different epidemiologic study designs, and sources of potential bias.

- Conduct and analyze data: demonstrate proficiency in data collection, data cleaning, primary or secondary data analysis, summarizing statistical analyses and results, and evaluating potential for bias.

- Disseminate research findings: communicate dissertation results to lay and scientific communities through presentations at conferences and publications in the peer-reviewed literature.

ADMISSIONS REQUIREMENTS

Applicants must hold an undergraduate degree from an accredited institution of higher learning. Although not required, most admitted students have completed a master degree prior to admission. Applicants should have academic backgrounds of excellence, usually with majors, or equivalent, in the fields in which they intend to study for advanced degrees. In general, a minimum of a B average (or equivalent) in undergraduate and/or graduate coursework from an accredited college is required. With evidence of special promise, such as high Graduate Record Examination (GRE) scores, an applicant whose academic record falls short of a B average may be accepted on a conditional basis. **All applicants are required to submit current GRE scores (within 5 years of matriculation date)**. Meeting the minimum requirements does not assure acceptance. The number of spaces available for new students limits the number of applicants accepted. Applicants must provide evidence of the completion of their undergraduate and/or graduate work before registration in Milken Institute SPH is permitted. Applicants should be aware that graduate courses taken prior to admission while in non-degree status may not be transferable into those programs. Students completing a master's degree prior to admission to the PhD degree program may transfer up to 24 credits towards the PhD coursework requirements. In this instance a minimum of 27 additional credit hours of coursework is required in addition to required consulting and dissertation research credits.

All applications are submitted through SOPHAS.org. Information about Milken Institute SPH Admissions and policies are available online at http://publichealth.gwu.edu/admissions/graduate-admissions. **For reporting GRE general test scores use the following institutional code: 5268.**

Required Courses for Admission Consideration (or equivalents to these GW courses)

The courses listed below (or equivalents) are required for admission consideration, and **MUST** clearly appear on an undergraduate or graduate transcript by name and with a letter grade.

BISC	1111	Introductory Biology: Cells and Molecules	4	Lecture (3 hours), laboratory (1 credit/3 hours). Cellular and developmental biology, genetics, and molecular biology.
BISC	1112	Introductory Biology: Biology of Organisms	4	Lecture (3 hours), laboratory (1 credit/3 hours). Concepts and methods in the study of whole organisms. Evolutionary theory; population biology; diversity of animals, fungi, and microorganisms; ecology and behavior; and animal structure and function.
MATH	1231	Single-Variable Calculus I	3	Limits and continuity. Differentiation and integration of algebraic and trigonometric functions with applications.

MATH	1232	Single-Variable Calculus II	3	The calculus of exponential and logarithmic functions. L'Hopital's rule. Techniques of integration. Infinite series and Taylor series. Polar coordinates. Prerequisite: Math 1231
		THE FOLLOWING PREREQUISITE IS FOR OPTION A ONLY:		
MATH	2233	Multivariable Calculus	3	Partial derivatives and multiple integrals. Vector-valued functions. Topics in vector calculus, including line and surface integrals and the theorems of Gauss, Green, and Stokes. Prerequisite: MATH 1232

Prerequisite Courses for Admission Consideration (or equivalents to these GW courses)

The courses listed below are additional prerequisite course requirements. Applicants lacking these courses (or equivalents to these GW courses) will be considered for admission, but will only be admitted conditionally with the expectation that these courses will be completed within the first semester following matriculation in the program. Credits for these courses do not count toward the 72-credit graduation requirement, or are grades earned in these additional courses reflected in the overall grade-point average.

MATH	2184	Linear Algebra I	3	Linear equations, matrices, inverses, and determinants. Vector spaces, rank, eigenvalues, and diagonalization. Applications to geometry and ordinary differential equations. Prerequisite: MATH 1231
STAT *-or-*	2183	Intermediate Statistical Laboratory: Statistical Computing Packages	3 *-or-*	Application of program packages (e.g., SAS, SPSS) to the solution of one-, two- and k-sample parametric and nonparametric statistical problems. Basic concepts in data preparation, modification, analysis and interpretation of results. Prerequisite: an introductory statistics course.
PUBH	6249	Use of Statistical Packages: Data Management and Data Analysis	3	This course familiarizes the student with one of the most widely used database management systems and statistical analysis software packages, the SAS System, operating in a Windows environment. Throughout the course, several database management system techniques and data analytical strategies for the appropriate analysis of datasets obtained from a variety of studies will be presented. Statistical techniques covered include linear regression, analysis of variance, logistic regression, and survival analysis.

PHD EPIDEMIOLOGY DEGREE REQUIREMENTS

Course Distribution Summary	**Credits-Option A**	**Credits-Option B**
Core Courses • Public Health (16 Credits) • Statistics (Option A: 15 Credits) (Option B: 12 credits)	31	28
Approved Elective Courses • Public Health • Statistics	17 (minimum)	20 (minimum)
Consulting Note: May be waived by the Epidemiology Program Director, based on written documentation of prior equivalent course work or relevant work experience.	3	3
Dissertation Research	12-21	12-21
Total Credits	**72**	**72**

The General Examination

Part I is a written comprehensive examination consisting of one examination in the field of biostatistics and three in the field of epidemiology. The epidemiology examinations are based on the course content of PUBH 6247 Design of Health Studies, PUBH 6252 Advanced Epidemiological Methods, and PUBH 8419 Measurement in Public Health and Health Services The biostatistics examination is based on the course content of PUBH 8366 Biostatistical Methods and is administered by the faculty of the Department of Epidemiology & Biostatistics. Students are expected to take the comprehensive examination within 24 months from the date of enrollment in the program. In addition, students are required to make up any deficiencies prior to taking the examination, e.g., by enrolling in appropriate master's-level courses as needed. The doctoral comprehensive examination is administered once per year in late August. A student who fails to pass the comprehensive examination may, with the approval of the faculty, repeat all or portions of the examination. Failure on the second attempt will result in termination from the PhD program.

Part II, the research proposal, consists of an oral examination based on a written dissertation research proposal. As soon as feasible after successful completion of the comprehensive exam, students work with the Program Director to identify a dissertation advisor and committee members from the Department of Epidemiology & Biostatistics, and a topic of research. The written dissertation proposal is then submitted to the student's Dissertation Research Committee, and the student will make an oral presentation of his or her proposal to the Committee. The Committee will determine the student's readiness to pursue and successfully complete the proposed research, in addition to the appropriateness of the specific problem for dissertation level research.

Upon successful completion of the required course work and both parts of the General Examination, the candidate will be recommended for promotion to PhD **Candidacy:** the dissertation research. Prior to completion of the general examination, Part II, a student may register for at most 6 credit hours of Dissertation Research (PUBH 8999).

Professional Enhancement Requirement (Two Days)

Professional enhancement activities supplement the academic curriculum and help prepare students to participate actively in the professional community. They enhance practical knowledge and awareness of public health issues – either in general or in a student's specific area of study.

Students can fulfill this requirement by attending workshops, seminars, or other relevant professional meetings, some of which are held at Milken Institute SPH and in the metropolitan Washington, DC area. Examples of conference sponsors include the Society for Epidemiologic Research, American College of Epidemiology, National Academy for State Health Policy, the Pan American Health Organization, and the American Public Health Association. Opportunities for professional enhancement are regularly publicized via the Milken Institute SPH and EPI-BIO department listservs and through the department or advisor.

Students must submit documentation of Professional Enhancement activities to the Epidemiology Program Director for approval prior to the conference. Proof of attendance must also be submitted to fulfill this requirement before applying for graduation.

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Program-at-a-Glance 2017-18

Required Core Courses (28-31 Total Credits)				
Required Public Health Core Courses (16 Credits)		**Credits**	**Semester Offered**	**Grade**
PUBH 6003	Principles and Practice of Epidemiology ***(Residential Delivery Only)***	3	Summer, Fall, Spring	
PUBH 6247	Design of Health Studies ***Basis for PhD General Comprehensive***	3	Fall, Spring	
PUBH 6252	Advanced Epidemiologic Methods ***Basis for PhD General Comprehensive***	3	Fall, Spring	
PUBH 8419	Measurement in Public Health and Health Services ***Basis for PhD General Comprehensive***	3	Spring (alternate years)	
	And either combination of the following for a total of 4 credits:			
PUBH 6299	Topics (*Elective courses*)	2	Summer, Fall, Spring	
	And either:			
PUBH 6004	Environmental & Occupational Health in a Sustainable World **-or-**	2	Summer, Fall, Spring	
PUBH 6007	Social & Behavioral Approaches to Public Health	2	Summer, Fall, Spring	
	-OR-			
PUBH 6299	Topics (*Elective course*)	1	Summer, Fall, Spring	
	And			
PUBH 6006	Management and Policy in Public Health	3	Summer, Fall, Spring	
Required Statistics Core Courses (12 - 15 Credits)		**Credits**	**Semester Offered**	**Grade**
STAT 6210	Data Analysis	3	Fall, Spring	
PUBH 8365	Design of Medical Studies	3	Spring	
PUBH 8366	Biostatistical Methods ***Basis for PhD General Comprehensive***	3	Fall	
	OPTION A ONLY:			
STAT 6201	Mathematical Statistics I	3	Fall, Spring	
STAT 6202	Mathematical Statistics II	3	Fall, Spring	
	OPTION B ONLY:			
PUBH 8364	Quantitative Methods	3	Spring	

Elective Courses (17 - 20 Credits Minimum)
Any SPH or STAT graduate level course *(all prerequisites must be met)*
(Other courses required advanced advisor approval)

Public Health Elective Courses – Sample list below:		**Credits**	**Semester Offered**	**Grade**
	*These courses may be taken for 3 credits by adding a 1-credit PUBH 82xx *Doctoral Topics* course that goes by the same name as the 2-credit course at the PUBH 62xx level.			
PUBH 6299	Topics in Epidemiology and Biostatistics	1-2	Summer, Fall, Spring	
PUBH 6123	Toxicology: Applications for Public Health Policy	3	Spring	
PUBH 6124	Problem Solving in Environ & Occupational Hlth	3	Summer	
PUBH 6242*	Clinical Epidemiology and Decision Analysis	2	Spring	
PUBH 6244*	Cancer Epidemiology	2	Spring	
PUBH 6245*	Infectious Disease Epidemiology	2	Spring	
PUBH 6250*	Epidemiology of HIV/AIDS	2	Fall	
PUBH 6259*	Epidemiologic Surveillance in Public Health	2	Spring	
PUBH 6260	Advanced Data Analysis-Public Health	3	Fall, Spring	

PUBH 6262	Introduction to Geographic Information Systems	1	Summer, Fall, Spring	
PUBH 6263	Advanced GIS	1	Fall, Spring	
PUBH 6267	Time Series Applications in Public Health	1	Spring	
PUBH 6268	Advanced SAS	1	Summer	
Varies	OTHER ELECTIVES AS APPROVED, IN ADVANCE, BY PROGRAM DIRECTOR	varies		
Statistics Elective Courses – OPTION A ONLY		**Credits**	**Semester Offered**	**Grade**
STAT 6213	Intermediate Probability and Stochastic Processes	3	Spring, alternate years	
STAT 6215	Applied Multivariate Analysis I	3	Alternate academic yrs	
STAT 6216	Applied Multivariate Analysis II	3	Alternate academic yrs	
STAT 6217	Design of Experiments	3	Fall, alternate years	
STAT 6223	Bayesian Statistics (Theory and Applications)	3	Spring, alternate years	
STAT 6227	Survival Analysis	3	Fall	
STAT 8226	Advanced Biostatistical Methods	3	Spring	
Consulting (3 Credits) Note: May be waived by the Epidemiology Program Director, based on written documentation of prior equivalent course work or relevant work experience. Waiver of the consulting course increases the total number of electives by the number of consulting credits waived.				
PUBH 6258	Advanced Topics in Biostatistical Consulting	1	Spring	
PUBH 6283	Consulting Practicum	2	Summer, Fall, Spring	
Dissertation Research (12-21 Credits)				
PUBH 8999	Dissertation Research for PhD Epidemiology Students	Taken in units of 3 credits	Summer, Fall, Spring	

Course Descriptions and Registration information can be found on the website:
http://publichealth.gwu.edu/academics/