

<p>THE GEORGE WASHINGTON UNIVERSITY MEDICAL CENTER WASHINGTON DC</p>	<p><b>School of Public Health and Health Services Department of Epidemiology and Biostatistics</b></p> <p><b>Graduate Certificate</b></p> <p><b>Public Health Microbiology and Emerging Infectious Diseases 2010-2011</b></p> <p>Note: All curriculum revisions will be updated immediately on the website <a href="http://www.gwumc.edu/sphhs/">http://www.gwumc.edu/sphhs/</a></p>
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**Mission**

The mission of the Public Health Microbiology and Emerging Infectious Diseases Graduate Certificate is to train a new generation of public health professionals through expanded knowledge and expertise in the following areas: mechanisms of infectious diseases, with an emphasis on microbial pathogens; uses and applications of modern biotechnologies; and epidemiologic skills relevant to the prevention and control of problems in the community arising from infectious diseases. Students earning the graduate certificate will help meet a critical national demand for a trained workforce in biodefense and emerging infections, and an international demand for training in diseases that disproportionately affect developing countries.

This certificate program combines the strengths of two academic departments at the George Washington University Medical Center (GWUMC), one in the School of Public Health and Health Services (Department of Epidemiology and Biostatistics) and the other in the School of Medicine and Health Sciences (Department of Microbiology, Immunology, and Tropical Medicine).

**Goals**

The goals of the Graduate Certificate in Public Health Microbiology and Emerging Infectious Diseases are to ensure that graduates:

- Understand the biological complexities of microbial pathogens and the diseases they cause
- Recognize the major epidemiologic and clinical features of infectious diseases
- Understand how new biotechnologies (including genomics, proteomics, and bioinformatics) can be applied to the study of pathogens

These goals will be achieved through the completion of 24 credit hours of coursework including 12 required credits in Microbiology, Immunology, and Tropical Medicine, and 12 credits in Epidemiology and Biostatistics.

## Graduate Certificate Microbiology and Emerging Infectious Diseases

### Admissions Requirements

This 24-credit Graduate Certificate targets two groups of potential applicants:

- 1) Individuals who are not currently enrolled in or applying to a GW MPH program - These individuals may transfer up to 8 credits of equivalent graduate coursework toward required certificate courses or listed electives. The coursework must have been from an accredited institution and completed in the prior three years with a grade of B or better.

New applicants apply through the national, public health application service, SOPHAS ([www.sophas.org](http://www.sophas.org)) and the SPHHS Secondary Application ([www.gwumc.edu/sphhs/](http://www.gwumc.edu/sphhs/)).

- 2) Individuals currently enrolled in a GW MPH program or applying to a GW MPH program – These individuals may cross-credit up to 8 credits of equivalent graduate coursework toward required certificate courses or listed electives. These students enroll in the certificate as a “dual program,” meaning that applicants may enter either of the programs first, and graduate from them at different times.

Current GW MPH students in good academic standing may add the certificate through the standard petition process, including a page-long personal statement indicating goals and interests as they relate to this graduate certificate. New applicants should indicate on the SOPHAS application that they wish to pursue this certificate in addition to the MPH program of their choice.

The Admissions Committee requires students to have the following undergraduate prerequisites to be eligible to apply to this graduate certificate program:

- Biological Sciences other than Botany  $\geq 8$  Credits
- Chemistry  $\geq 3$  Credits
- Physics  $\geq 3$  Credits
- Mathematics or Computer Science beyond introductory level  $\geq 3$  Credits

### Certificate Requirements

1. Graduate Credit Requirement. 24 graduate credits are required
2. Course Requirements. 12 credits are required in Epidemiology and Biostatistics. 12 credits are required in Microbiology, Immunology, and Tropical Medicine.
3. Transfer Credit Policy. Up to 8 equivalent graduate credits may be transferred to the certificate. Credits must have been earned in the last 3 years from an accredited institution of higher learning with a grade point of 3.0 or better. Up to twenty-four credits may transfer from this Graduate Certificate to the MS degree in Public Health Microbiology and Emerging Infectious Diseases. (However, credits accepted in transfer to the graduate certificate that were also used for a previously earned degree will not transfer to the MS degree.)
4. Program of Study. Specific courses taken require the approval of the academic advisor.
5. Grade Point Requirement. A 3.0 (B average) overall grade point average is required.
6. Time Limit Requirement. The certificate must be completed within two and one-half years.

The curriculum sheet that follows describes the requirements for the Graduate Certificate in Public Health Microbiology and Emerging Infectious Diseases program.

Please note that because several courses in the Department of Microbiology, Immunology, and Tropical Medicine are offered during the daytime, it may not be practical for students to work full-time while pursuing this graduate certificate.

Graduate Certificate Microbiology and Emerging Infectious Diseases

THE GEORGE WASHINGTON UNIVERSITY MEDICAL CENTER <hr/> WASHINGTON DC	<b>School of Public Health and Health Services</b>  <b>Graduate Certificate</b> <b>Public Health Microbiology and Emerging Infectious Diseases</b>  <b>Program-at-a-Glance</b> <b>2010-2011</b>			
<b>Undergraduate Course Prerequisites</b>				<b>Credits</b>
Biological Sciences other than Botany				≥ 8
Chemistry				≥ 3
Physics				≥ 3
Mathematics or Computer Science beyond introductory level				≥ 3
<b>Certificate Course Distribution Summary</b>				
Required Public Health Credits				9
Public Health Elective Credits (select from list)				3
Required Microbiology Credits				12
Total Credits				24
<b>Public Health Required Courses</b>				
Course	Title	Credits	Semester Offered	Grade
PubH 6002	Biostatistical Applications for Public Health	3	Fall, Spring, Summer	
PubH 6003	Principles and Practice of Epidemiology	3	Fall, Spring, Summer	
PubH 6249	Use of Statistical Packages: Data Management and Data Analysis	3	Fall, Spring	
Total	Public Health Required Credits	9		
<b>Public Health Elective Courses</b>				
<b>Select 3 credits from this list</b>				
Course	Title	Credits	Semester Offered	Grade
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 6262	Introduction to Geographic Information Systems	1	Fall, Spring, Summer	
PubH 6263	Advanced Geographic Information Systems (GIS)	1	Fall	
PubH 6271	Disaster Epidemiology: Methods and Applications	1	Summer	
PubH 6274	Emerging Infectious Diseases for Public Health Professionals	2	Fall	
<b>Microbiology, Immunology, and Tropical Medicine Required Courses</b>				
<b>12 Credits</b>				
Course	Title	Credits	Semester Offered	Grade
Micr 6220	Biology of Parasitism	2	Spring	
Micr 6238	Public Health Laboratory Workshop	2	Summer	
Micr 6239	Interdisciplinary Medical Microbiology	3	Fall	
Micr 6292	Tropical Infectious Diseases	2	Spring	
Micr 8210	Infection and Immunity	3	Spring	
Total	Microbiology, Immunology, and Tropical Medicine Required Credits	12		

Updated November 10, 2010

**Graduation Requirements**

- **Graduate Credit Requirement.** 24 credits required
- **Course Requirements.** Successful completion of the required courses
- **Grade Point Requirements.** An overall GPA of 3.0 (B average).
- **Time Limit Requirement.** The degree must be completed within 2 ½ years
- **Transfer Credit Policy.** Up to 8 relevant credits that have not been applied to a previous graduate degree may be transferred to the Graduate Certificate program. Credits must have been earned from an accredited institution in the last 3 years with a grade point of 3.0 or better.

**Public Health Required Courses  
9 credits**

PubH (202)	6002	Biostatistical Applications for Public Health	3	Application of biostatistical principles to critical analysis of retrospective studies, prospective studies, and controlled clinical trials, as well as studies in the health services literature. Selection, basic calculations, and interpretation of statistical methods for detection of significant associations and differences. Summer, Fall, Spring
PubH (203)	6003	Principles and Practice of Epidemiology	3	General principles, methods, and applications of epidemiology. Outbreak investigations, measures of disease frequency, standardization of disease rates, study design, measures of association, hypothesis testing, bias, effect modification, causal inference, disease screening, and surveillance. Case studies apply these concepts to a variety of infectious, acute, and chronic health conditions affecting the population. Summer, Fall, Spring
PubH (249)	6249	Use of Statistical Packages: Data Management and Data Analysis	3	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. Prerequisite: PubH 6002. Fall, Spring

**Public Health Elective Credits  
Select 3 credits from this list**

PubH (245)	6245	Infectious Disease Epidemiology	2	The role and conduct of laboratory and field investigations in the epidemiology of infectious diseases. Prerequisite: PubH 6003. Spring
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Graduate Certificate Microbiology and Emerging Infectious Diseases

PubH (250)	6250	Epidemiology of HIV/AIDS	2	Methodological issues central to HIV/AIDS research. Biases peculiar to HIV/AIDS epidemiologic studies (both observational and experimental designs). The natural history of HIV, diagnosis, surveillance, vulnerable subpopulations, behavioral facets, and evaluation of epidemiologic studies with an emphasis on methodological considerations. Prerequisite, PubH 6003, Recommended 6002 Fall
PubH (259)	6259	Epidemiologic Surveillance in Public Health	2	Foundations of public health surveillance systems for communicable as well as chronic diseases. Outbreak investigation methods will be included, as well as surveillance data sources, data management, data analysis, ethical issues, surveillance system evaluation, and use of information for prevention. Surveillance systems for reportable diseases, nosocomial infections, bioterrorism events, cancer, environmental disease, vaccine-related adverse events, bovine spongiform encephalopathy, and military personnel will be discussed. Prerequisites: PubH 6003. Spring
PubH (262)	6262	Introduction to Geographic Information Systems	1	Geographic information systems (GIS) for mapping and display of health data. The course makes use of ArcGIS 8.3. The use of spatial statistics for the detection of clusters and patterns in the spread of diseases. Working with geodatabases, shape files, layers, query information from attribute tables, geocode addresses and customizing GIS applications. Summer, Fall, Spring
PubH (263)	6263	Advanced Geographic Information Systems (GIS)	1	Structured to provide mid to advanced level training in GIS for display and analysis of health data. Use software ArcGIS 9.3 and additional extensions such as Spatial Analyst and Geostatistical Analyst. Also uses GeoDa software. Emphasizes benefits of using GIS to do more than simply manage and map data. GIS supports a range of spatial analysis functions that enable researchers to extract additional meaning from manipulating geographic data. Learn to work with raster datasets and geodatabases to build spatial models for analyzing health data and evaluating spatial patterns of health events based on notion of distance. Prerequisite: PubH 6262. Fall, Spring
PubH (271)	6271	Disaster Epidemiology: Methods and Applications	1	Introduction to disaster epidemiology that elucidates the important role epidemiologists play in assessing the health and psychological effects of natural and man-made disasters and in identifying factors that contribute to these effects. Focus will be on applications of epidemiologic methods to the study of public health consequences of disasters, case studies from actual disasters used to illustrate various roles of epidemiologist in responding to these events and lessons learned. Highlight key skills that epidemiologists need to be part of a response and recovery. Identify methodological issues for future work. Prerequisites: PubH 6002, 6003. Summer
PubH (274)	6274	Emerging Infectious Diseases for Public Health Professionals	2	Focus on epidemiology of emerging infectious diseases of public health importance, including factors leading to their development, management of emerging infectious diseases from a public health and laboratory standpoint, including biosafety, and strategies for emergency preparedness from a national and international perspective. Course emphasizes the context of emerging infectious diseases and strategic approaches to their containment. Prerequisites: PubH 6003 or Micr 6292 or Instructor permission. Fall

Graduate Certificate Microbiology and Emerging Infectious Diseases

<b>Microbiology and Tropical Medicine Required Courses</b> <b>12 Credits</b>				
MICR (220)	6220	Biology of Parasitism	2	Exposes students to the strategies that parasites use to infect their hosts, how they survive and thrive within their host, and the developmental adaptations they use to ensure transmission of their offspring to the next host. Examines specific parasite life histories and mechanisms that represent the common themes of infection, survival and transmission. Specific parasite systems will focus primarily on, but not be limited to, multicellular parasites, and those with some understanding at the molecular and/or biochemical level. Topics will include modulation of host immunity, physiology and behavior, and developmental adaptations that increase transmission. Augments and builds upon traditional phylogeny-driven introductory parasitology course to provide the student with detailed, in-depth information about the host-parasite relationship. Open to graduate students in biomedical and biological science, public health, and students with an interest in the study of parasitism. Upper class undergraduates should have completed the course BiSc 2339 or its equivalent, or have permission of the instructor. Spring
MICR (238)	6238	Public Health Laboratory Workshop	2	Instructs students in the MS and Graduate Certificate in Public Health Microbiology and Emerging Infectious Diseases Program on laboratory test methods commonly performed at public health laboratories both in the USA and in developing countries. Focuses on the latest developments in quality assurance, laboratory management, health and bio-safety. Reinforces theoretical knowledge pathogens in important subject areas, and provide ample opportunity to enhance practical skill related laboratory knowledge. Advisor's Permission. Summer – Intensive two week course.
MICR (239)	6239	Interdisciplinary Medical Microbiology	3	Integrates topics in basic microbiology and clinical infectious diseases. Provides students with an understanding of the basic principles of medical microbiology including microbial pathogenesis, and clinical infectious diseases. This will also build on material from the first year Tropical Infectious Disease course as it relates to the pathogenesis of infectious diseases. The course will consist of classroom lectures. Prerequisites Micr 6292, or permission of the Microbiology Program Director. Fall Year 2
MICR (292)	6292	Tropical Infectious Diseases	2	Provides students with both comprehensive and selected detailed information on the natural history and epidemiology of the major infectious and parasitic diseases that occur in developing countries. Information presented will highlight the potential introduction of these infections, through global travel, into developed countries. Health-related issues of containment, treatment, and eradication through chemotherapy or vaccination will be discussed. Economic impact issues of trade and social development will be discussed. Students will acquire an understanding of the medical and social impact of tropical disease impact on the quality of life. No prior medical knowledge is required. Open to Graduate and Undergraduate students in any major, but with interest in the global health issues affecting developing countries. Spring
MICR (210)	8210	Infection and Immunity	3	Provides an introduction to basic concepts in the fields of immunology and microbiology. The immunology component will cover basic aspects of innate immunity, antigen processing and presentation, T and B lymphocyte effector function, autoimmunity and tumor immunology. The microbiology component will cover different aspects of viral and bacterial pathogenesis, virulence, parasite infections and vaccine design. Spring