

# Milken Institute School of Public Health

THE GEORGE WASHINGTON UNIVERSITY

Milken Institute School of Public Health  
Department of Biostatistics and Bioinformatics

Master of Public Health  
Biostatistics  
2022-2023

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

## Program Director

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## Mission Statement

The mission of the Biostatistics Program is to educate graduate students in developing the necessary methodological and quantitative skills to successfully apply statistical methods to the biological, biomedical and health services sciences. In addition to enhance students' capacity to think critically and creatively, we are determined to deepen their commitment to improving the public's health, to engaging in and promoting public service – qualities that are essential for future biostatisticians and public health practitioners.

## Goals

The goals of the Biostatistics Program are to ensure that graduates:

- ◆ Understand and adhere to high scientific standards for research;
- ◆ Understand how to apply statistical methods to biological/biomedical sciences and health services
- ◆ Understand and follow guidelines for ethical treatment of research participants;
- ◆ Communicate research findings to a lay audience; and
- ◆ Respect cultural diversity throughout all of the above.

## Course Requirements

The MPH degree program in biostatistics consists of 45 credits. These credits are based on a series of Core Courses (14 credits) and Program-Specific Courses (22 credits), and electives (7 credits). The total 45 credit program also includes a Culminating Experience (2 credits) where students apply their didactic education in a real-world setting.

As an accredited School of Public Health, students in all GWSPH MPH programs are also required to fulfill both an interprofessional team experience and an applied practice experience. GWSPH has incorporated these requirements into the curriculum as follows:

### **Interprofessional Education (IPE) Experience (PUBH 6023):**

MPH students are required to select an IPE experience from a host of options provided throughout enrollment to participate in a one-time, case-based or activity-based learning experience. The IPE experience is a way to actively participate in a supervised environment to work with people from other professions/programs outside of public health. Students are eligible to enroll in the IPE upon successful completion of most of the MPH core coursework including: PUBH 6002, 6003, 6007, 6011, 6012 and 6021. Students will have many opportunities to register for this zero-credit (no fee) IPE course (PUBH 6023- Interprofessional Education Experience) and will receive credit upon successful completion. See <https://publichealth.gwu.edu/content/interprofessional-education-gwsp>.

### **Applied Practice Experience (Practicum & EPR):**

The Applied Practice Experience (APEX) may be satisfied with either a practicum or, for experienced public health professionals, through an expedited portfolio review (EPR). The practicum is a planned, supervised, and evaluated practice experience that aims to provide students with an opportunity to synthesize, integrate, and apply practical skills, knowledge, and training learned through courses, to gain applied experience in a professional public health work

environment, and to work on public health practice projects that are of particular interest to you. Information about the Practicum will be introduced through school-wide Practicum Information Sessions held by the Office of Applied Public Health and through meetings with your department practicum staff and faculty. During the practicum, you will work at least 120 hours in the field under the supervision of the site preceptor who has agreed to directly supervise the work you are conducting. Students are required to fulfill all requirements of the 120-hour practicum to receive credit for PUBH 6000. If you have had prior work experience, then you will find that the practicum provides the opportunity to hone skills or to gain new experience in a different area. However, if you have substantial public health experience relevant to your department/track, including 5+ years of full-time public health work for students after receiving your undergraduate degree, or 3+ years of full-time work for students who already have a graduate degree prior to beginning the MPH, then you may be able to satisfy the APEx requirement through an EPR instead of doing the practicum, with advanced approval by your department's practicum team.

### **Program Prerequisites**

All applicants to the MPH Biostatistics degree program must have completed (a) two semesters of college level calculus through Calculus II with a grade of B or better or (b) one semester of college level calculus with a grade of B or better and enroll in a calculus refresher short course before or during the first term to be considered for admission.

### **Program-Specific Competencies**

The specialization in Biostatistics focuses on developing students' skills in the statistical analysis and interpretation of health research data. The following competencies were developed in concert with professors of biostatistics courses (at GWU as well as from other CEPH-accredited MPH programs), biostatistics textbooks, conversations with prospective employers likely to hire MPH-biostatistics graduates, and with experience teaching biostatistics courses to MPH students. ASPPH Education Committee competencies were also consulted.

Upon completion of the MPH in Biostatistics, students will demonstrate functional competence to:

- Enumerate and apply the underlying principles and methods to design, plan, and conduct public health and biomedical studies including cohort, case control, cross-sectional, and clinical trials. Relevant courses: PUBH 6899\*, 6866, 6869, 6862, 6864, 6865, and 6015.
- Conduct data analysis and interpret the results from public health and biomedical studies including cohort, case control, cross-sectional, and clinical trials. Relevant courses: PUBH 6899\*, 6850, 6851, 6852, 6853, 6869, 6862, 6864, 6868, 6865, 6015.
- Manipulate various databases from large scale epidemiological studies and clinical trials studies using statistical software, e.g. SAS<sup>®</sup>. Relevant course: PUBH 6899\*, 6850, 6851, 6852, 6853, 6864, 6869, 6862, 6865, 6015.
- Use theoretical biostatistical concepts in an applied setting to identify the appropriate data analysis methods for public health and biomedical studies including cohort, case control, cross-sectional, and clinical trials. Relevant courses: PUBH 6853, 6869, 6862, 6864, 6868, 6865, 6015.
- Synthesize data and relevant literature and interpret findings from statistical analyses in a causal framework, in order to prepare manuscripts and make oral presentations for both professional and lay audiences. Relevant courses: PUBH 6899\*, 6853, 6869, 6862, 6864, 6868, 6865, 6015.
- Work as a member of a multidisciplinary research team and recognize and appropriately respond to ethical issues that arise in research. Relevant courses: PUBH 6899\*, 6866, 6853, 6869, 6862, 6864, 6865, 6015.
- Provide biostatistical advice as a member of a team of researchers engaged in a biomedical or epidemiological research project. Relevant courses: PUBH 6899\*, 6853, 6869, 6862, 6864, 6865, 6015.
- Apply biomedical and epidemiological concepts in identifying and describing the determinants and the distribution of disease in human populations which is the necessary background for successful participation in studies of health and disease. Relevant courses: PUBH 6866, 6862, 6864, 6865, 6015.

- Identify and assess patterns of emerging diseases to postulate hypotheses and to propose appropriate strategies in order to quantitatively evaluate the impact of health problems. Relevant courses: PUBH 6899\*, 6866, 6853, 6869, 6862, 6864, 6865, 6015
- Comprehend basic ethical and legal principles pertaining to the collection, maintenance, use and dissemination of biomedical and epidemiologic data. PUBH 6866, 6869, 6862, 6864, 6865, 6015

\*Selected biostatistics topics/electives

### **Sample Special Project Topics**

- Longitudinal Assessment of Disease Severity Markers in Renal Patients
- Analysis of USDA Data Trends on Toxic Residues in Animal Food Sources
- Alternative Methods for Analyzing Knee Surgery Outcome Data
- Correlates of Cerebral Spinal Fluid Substances in HIV Patients
- Development of a Prediction Model for Mortality in ICU Patients

### **Sample Culminating Experience Topics**

#### **Cancer:**

- Inflammatory Breast Cancer
- Disparities in Cancer Diagnosis and Treatment
- Associations between Behavioral Factors and Cancer

#### **HIV/AIDS:**

- Use of Technology in the Care of HIV
- Infected Individuals
- Care of Pediatric and Adolescent HIV-Infected Patients
- Adherence to Antiretroviral Medications
- Development of Resistance to Antiretroviral Medications

#### **Infectious Disease:**

- Listeria at Meat Packaging Plants
- Food Contamination and Surveillance

#### **Other:**

- Racial/Ethnic Disparities in Low Birth Weight
- Use of Standardized Case Definitions in Adverse Events following Immunization Surveillance

# Graduation Requirements

## MPH, Biostatistics

1. **Graduate Credit Requirement:** 45 graduate credits are required.
2. **Course Requirements:** Successful completion of the Core Courses and the Program-Specific Courses are required.
3. **Practicum Requirement:** Students are required to fulfill all requirements of the Applied Practice Experience.
4. **Interprofessional Education Experience (IPE):** Students are required to enroll, participate and complete an authorized IPE activity (PUBH 6023).
5. **Grade Point Requirement:** A 3.0 (B average) overall grade point average is required.
6. **Time Limit Requirement:** The degree must be completed within five years.
7. **Transfer Credit Policy.** Up to 12 graduate credits that have not been applied to a previous degree may be transferred to the MPH upon approval. External credits must have been earned from an accredited institution in the last 3 years with a grade of 3.0 (B) or better. SPH Graduate Certificate students can transfer as many credits as meet program requirements, up to 18 credits, to the MPH. Graduate Certificate students wishing to transfer to a degree program may apply to do so via the online change of concentration petition after completion of 3 or more courses and a cumulative GPA of 3.0 or better. A grade of B or better is required for a course to be eligible for transfer.
8. **CITI Training requirement:** All students are required to complete training regarding human subject protection regulation and the Health Insurance Portability and Accountability Act of 1996 (HIPAA). To fulfill this requirement, you must complete the Collaborative IRB Training Initiative (CITI) Course in The Protection of Human Research Subjects.
9. **Integrity Quiz & Plagiarism requirement:** All students are required to review the George Washington University Code of Academic Integrity and take the quiz within their first semester of study. The Code of Integrity and step-by-step instructions can be found here: <http://publichealth.gwu.edu/integrity>
10. **Professional Enhancement requirement:** Students must participate in 8 hours per degree program Public Health-related lectures, seminars, and symposia, related to your field of study. Professional Enhancement activities supplement the academic curriculum and help prepare students to participate actively in the professional community. Opportunities for professional enhancement are regularly publicized via the Milken Institute SPH Listserv and through your department or advisor. Students must submit documentation of Professional Enhancement activities to the Office of Student Records. The documentation consists of the Professional Enhancement Form <http://publichealth.gwu.edu/academics/forms> (which includes a prior approval signature from the student's advisor, a description of the program agenda, and proof of attendance. Remember to submit your documentation before you apply to graduate!

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

*Begin Planning Your Applied Practice Experience During Year 1*

<b>Required Core Course (16 credits)</b>		<b>Credits</b>	<b>Semester Offered</b>
PUBH 6000	MPH Applied Practice Experience	0	All
PUBH 6003	Principles & Practice of Epidemiology	3	Fall, Spring Summer 10 weeks
PUBH 6007	Social & Behavioral Approaches to Public Health	2	Fall, Spring, Summer I
PUBH 6009	Fundamentals of Program Evaluation	2	Fall, Spring, Summer I
PUBH 6011	Environmental & Biological Fundamentals of Public Health	3	Fall, Spring, Summer 10 weeks
PUBH 6012	Fundamentals of Health Policy	2	Fall, Spring, Summer I
PUBH 6021	Essentials of Public Health Practice & Leadership 1: Leading Self and Teams in Public Health	1	Fall, Spring, Summer I
PUBH 6022	Essentials of Public Health Practice & Leadership 2: Managing Organizations and Influencing Systems in Public Health	1	Fall, Spring, Summer I
PUBH 6023	Interprofessional Education Experience	0	Fall, Spring Summer
PUBH 6015	Culminating Experience	2	See Advisor
<b>Required Departmental Courses (22 credits)</b>			
PUBH 6850	Introduction to SAS for Public Health Research	1	Fall
PUBH 6851	Introduction to R for Public Health Research	1	Fall
PUBH 6852	Introduction to Python for Public Health Research	1	Fall
PUBH 6853	Use of Statistical Packages: Data Management and Data Analysis	3	Fall, Spring
PUBH 6862	Applied Linear Regression Analysis for Public Health Research	3	Fall
PUBH 6864	Applied Survival Analysis for Public Health Research	3	Spring
PUBH 6865	Applied Categorical Data Analysis for Public Health Research	3	Spring
PUBH 6866	Principles of Clinical Trials	3	Spring
PUBH 6868	Quantitative Methods	3	Spring
PUBH 6869	Principles of Biostatistical Consulting	1	Spring
<b>Electives (7 credits)</b>			
PUBH 6xxx	Any SPH (PUBH, HSML, EXNS) graduate level course	7	Fall, Spring, Summer
<b>Course Distribution</b>		<b>Credits</b>	
Public Health Core Courses		14	
Culminating Experience		2	
Required Departmental Courses		22	
School of Public Health Electives		7	
<b>Total Degree Credits</b>		<b>45</b>	

**NOTE: Always see your advisor for course scheduling and sequencing strategies, but remember that proper course selection, fulfilling requirements, and on-time graduation are your responsibilities.**

The Master of Public Health (MPH) curriculum consists of four types of courses:

- Required Core Courses
- Required Program-Specific Courses
- Electives
- Required Practicum and Culminating Experience

The MPH core courses are designed to provide students with a broad public health context as well as a critical foundation for subsequent coursework. Early completion of these core courses ensures that students will have the base of knowledge to successfully complete the program specific courses and to get as much as possible out of them. As such, entering students are expected to enroll in MPH core courses in accordance with the following guidelines:

- We expect MPH students to complete the MPH core courses in their first year following their admission into the program (fall/spring/summer).
- Students may take core courses in any order.

Part-time students (who generally take 5 to 7 credits per semester) will typically concentrate on taking just core courses in their first year, and then take program-specific courses in their second and third years.

In order to help assure that all students complete core courses in the first year of study, GW SPH will offer all core courses during all three semesters (fall, spring, and summer). This will allow students who wish to complete their MPH degree within two years to do so, and will allow every student to make steady progress toward completing the MPH degree. Most of the MPH Biostatistics program specific courses are offered twice in each academic year (fall/spring semesters).

We recognize that there may be exceptional circumstances that make it difficult for a student to complete core courses in the first year as outlined above. Any such student should discuss this situation with his or her academic advisor.

For additional information and resources regarding registration, course descriptions, schedule of classes, advising, etc. follow this link: <http://publichealth.gwu.edu/academics>

Table 1 (full time students) and Table 2 (part time students) present sample course schedules that students admitted to the MPH program in biostatistics can use as a guideline to structure their program of studies. It is noteworthy that in either sample course schedule a fully 45 credits are required to complete the degree, including core courses (14 credits), program specific courses (22 credits), public health electives (7 credits) and the culminating experience (2 credits). See below.

**Milken Institute School of Public Health  
MPH in Biostatistics (45 cr)**

**Sample Schedule for 2-Year Completion (Summer start)**

Semester	Cr	Course #	Course Name
<b>Summer 1<sup>st</sup> year</b> 5 credits	2	PUBH 6007	Social & Behavioral Approaches to Public Health
	3	PUBH 6011	Environmental and Biological Fundamentals
<b>Fall 1<sup>st</sup> year</b> 9 credits	2	PUBH 6012	Fundamentals of Health Policy
	1	PUBH 6021	Essentials of Public Health Leadership & Practice 1
	1	PUBH 6850	Introduction to SAS for Public Health Research
	1	PUBH 6851	Introduction to R for Public Health Research
	1	PUBH 6852	Introduction to Python for Public Health Research
	3	PUBH 6862	Applied Linear Regression Analysis for Public Health Research
<b>Spring 1<sup>st</sup> year</b> 9 credits	3	PUBH 6853	Use of Statistical Packages: Data Management and Data Analysis
	3	PUBH 6866	Principles of Clinical Trials
	3	PUBH 6868	Quantitative Methods
<b>Summer 2<sup>nd</sup> year</b> 5 credits	2	PUBH 6009	Fundamentals of Program Evaluation
	3	PUBH 6xxx	PUBH Electives
<b>Fall 2<sup>nd</sup> year</b> 8 credits	3	PUBH 6003	Principles and Practice of Epidemiology
	4	PUBH 6xxx	PUBH Elective
	1	PUBH 6022	Essentials of Public Health Leadership & Practice 2
	0	PUBH 6000	MPH Applied Practice Experience
<b>Spring 2<sup>nd</sup> year</b> 9 credits	3	PUBH 6864	Applied Survival Analysis for Public Health Research
	3	PUBH 6865	Applied Categorical Data Analysis for Public Health Research
	1	PUBH 6869	Principles of Biostatistical Consulting
	2	PUBH 6015	Culminating Experience
	0	PUBH 6023	Interprofessional Education Experience

**Milken Institute School of Public Health  
MPH in Biostatistics (45 cr)**

**Sample Schedule for 3-Year Completion (Fall start)**

Semester	Cr	Course #	Course Name
<b>Fall 1<sup>st</sup> year</b> 5 credits	2	PUBH 6007	Social and Behavioral Approaches to Public Health
	1	PUBH 6850	Introduction to SAS for Public Health Research
	1	PUBH 6851	Introduction to R for Public Health Research
	1	PUBH 6852	Introduction to Python for Public Health Research
<b>Spring 1<sup>st</sup> year</b> 7 credits	2	PUBH 6009	Fundamentals of Program Evaluation
	2	PUBH 6012	Fundamentals of Health Policy
	3	PUBH 6866	Principles of Clinical Trials
<b>Summer 1<sup>st</sup> year</b> 4 credits	3	PUBH 6011	Environmental and Biological Fundamentals
	1	PUBH 6xxx	PUBH Elective
<b>Fall 2<sup>nd</sup> year</b> 7 credits	3	PUBH 6853	Use of Statistical Packages: Data Management and Data Analysis
	3	PUBH 6862	Applied Linear Regression Analysis for Public Health Research
	1	PUBH 6021	Essentials of Public Health Leadership & Practice 1
<b>Spring 2<sup>nd</sup> year</b> 6 credits	3	PUBH 6864	Applied Survival Analysis for Public Health Research
	3	PUBH 6868	Quantitative Methods
	0	PUBH 6023	Interprofessional Education Experience
<b>Summer 2<sup>nd</sup> year</b> 3 credits	3	PUBH 6xxx	PUBH Electives
<b>Fall 3<sup>rd</sup> year</b> 7 credits	3	PUBH 6003	Principles and Practice of Epidemiology
	1	PUBH 6022	Essentials of Public Health Leadership & Practice 2
	0	PUBH 6000	MPH Applied Practice Experience
	3	PUBH 6xxx	PUBH Electives
<b>Spring 3<sup>rd</sup> year</b> 6 credits	3	PUBH 6865	Applied Categorical Data Analysis for Public Health Research
	1	PUBH 6869	Principles of Biostatistical Consulting
	2	PUBH 6015	Culminating Experience