

# DOCTOR OF PHILOSOPHY IN THE FIELD OF BIOSTATISTICS

Program Director and Academic Advisor: H. Liang (CCAS)

The doctor of philosophy (PhD) degree program in biostatistics provides doctoral training in the theory of probability, statistics focusing on biostatistical methodology. The 72-credit degree program is jointly administered by the Department of Statistics (<https://statistics.columbian.gwu.edu/>) in the Columbian College of Arts and Sciences (CCAS) and the Department of Biostatistics and Bioinformatics in the Milken Institute School of Public Health (<http://publichealth.gwu.edu/>) (SPH) and its associated research facility, The Biostatistics Center. The program is accredited by the Middle States Commission on Higher Education through CCAS and by the Council on Education for Public Health through the Milken Institute SPH. Regulations and requirements for the graduate degree are compatible with the policies and scholarship requirements of both CCAS and SPH. The degree is conferred by CCAS.

Visit the program website (<https://statistics.columbian.gwu.edu/phd-biostatistics/>) for additional information.

## ADMISSIONS

Admission to this program is not being offered at this time. Related programs in the field are offered by the Milken Institute School of Public Health (<http://bulletin.gwu.edu/public-health/biostatistics-bioinformatics/phd-health-and-biomedical-data-science-applied-biostatistics-concentration/>).

Visit the Milken Institute School of Public Health website (<https://publichealth.gwu.edu/>) for additional information about academic programs and information about GWSPH. Graduate admissions information, including application requirements and deadlines, can be found on the GWSPH Graduate Admissions website (<https://publichealth.gwu.edu/admissions/graduate-admissions/>).

## REQUIREMENTS

The following requirements must be fulfilled:

The general requirements stated under Columbian College of Arts and Sciences, Graduate Programs (<https://bulletin.gwu.edu/arts-sciences/#degreeregulationstext>).

The requirements for the Doctor of Philosophy Program (<https://bulletin.gwu.edu/arts-sciences/#doctoralstext>).

### Required preparatory courses

Code	Title	Credits
Undergraduate course requirements (or equivalents to these GW courses) for admission consideration:		
MATH 1231	Single-Variable Calculus I	
MATH 1232	Single-Variable Calculus II	

STAT 2118	Regression Analysis
MATH 2233	Multivariable Calculus

Code	Title	Credits
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### Additional course requirements\*

Orr equivalents to these GW courses:

MATH 2184	Linear Algebra I
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One of the following courses:

PUBH 6853	Use of Statistical Packages for Data Management and Data Analysis
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STAT 2183	Intermediate Statistics Lab/Packages
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\*Applicants lacking these courses (or equivalents to these GW courses) will be considered for admission, but, if admissible, will be admitted conditionally with the expectation that these courses will be satisfactorily completed within two semesters following matriculation in the program. These credits do not count as credit toward the 72-credit graduation requirement nor are grades earned in additional courses reflected in the overall grade-point average.

### Doctoral program requirements

The following requirements must be fulfilled: 72 credits, including a minimum of 52 credits in required and elective courses and a minimum of 6 credits in dissertation research; successful completion of the general and final examinations; and completion of the professional enhancement requirement. See below for additional information.

Code	Title	Credits
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### Required

#### Statistics core (30 credits)

PUBH 6866	Principles of Clinical Trials
PUBH 8877	Generalized Linear Models in Biostatistics
STAT 6201	Mathematical Statistics I
STAT 6202	Mathematical Statistics II
STAT 6210	Data Analysis
STAT 6213	Intermediate Probability and Stochastic Processes
STAT 6218	Linear Models
STAT 6227	Survival Analysis
STAT 8226	Advanced Biostatistical Methods

STAT 8263	Advanced Statistical Theory I
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### Public health core (11 credits)

PUBH 6003	Principles and Practices of Epidemiology
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PUBH 6007	Social and Behavioral Approaches to Public Health
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PUBH 6247	Epidemiologic Methods I: Design of Health Studies
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PUBH 6899	Topics in Biostatistics and Bioinformatics
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### Electives (9 credits)

Approved statistics electives (at least 3 credits must be selected from the following):

STAT 6214	Applied Linear Models
or STAT 6231	Categorical Data Analysis
or STAT 8262	Nonparametric Inference

6 credits in electives from the following approved lists of STAT and PUBH courses.

STAT 6207	Methods of Statistical Computing I
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STAT 6208	Methods of Statistical Computing II
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STAT 6215	Applied Multivariate Analysis I
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STAT 6216	Applied Multivariate Analysis II
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STAT 6217	Design of Experiments
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STAT 6223	Bayesian Statistics: Theory and Applications
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STAT 6242	Modern Regression Analysis
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STAT 6287	Sample Surveys
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STAT 6289	Topics in Statistics
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STAT 8257	Probability
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STAT 8258	Distribution Theory
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STAT 8263	Advanced Statistical Theory I
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STAT 8264	Advanced Statistical Theory II
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STAT 8265	Multivariate Analysis
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STAT 8273	Stochastic Processes I
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STAT 8274	Stochastic Processes II
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STAT 8281	Advanced Time Series Analysis
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STAT 8288	Topics in Sample Surveys
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BIOS 8998	Advanced Reading and Research (see advisor)
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Approved public health electives:

PUBH 6242	Clinical Epidemiology and Public Health: Reading the Research (recommended)
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PUBH 6244	Cancer Epidemiology
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PUBH 6245	Infectious Disease Epidemiology
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PUBH 8419	Measurement in Public Health and Health Services
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### Consulting (2 credits)

Consulting courses may be waived by the Biostatistics Program Director, based on written documentation of prior equivalent coursework or relevant work experience. Waiver of the consulting course increases the total number of elective to be taken by the number of consulting credits waived.

PUBH 8283	Doctoral Biostatistics Consulting Practicum
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PUBH 6869	Principles of Biostatistical Consulting
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### Dissertation research (6 to 24 credits)

BIOS 8999	Dissertation Research
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## General and final examinations

The general examination is given in two parts:

- Part I is the qualifying exam, a written comprehensive examination based on the course content of STAT 6201, STAT 6202 (administered by faculty of the Department of Statistics), and PUBH 8877 (administered by the faculty of the Department of Epidemiology and Biostatistics).
- The qualifying examination is given over a two-day period in the beginning of the fall semester of every academic year and consists of one four-hour theory exam and one two-hour biostatistical methods/applications exam. Students are expected to take the comprehensive examination within 24 months from the date of enrollment in the program. A student who fails to pass the comprehensive examination may, with the approval of the faculty, repeat the examination the following year. Failure on the second attempt results in termination from the PhD program.
- All examination questions focus on material that a person seeking a PhD in biostatistics is expected to know, regardless of subsequent specialization. The examination encompasses material in core mathematical statistics—STAT 6201 and STAT 6202—and biostatistical methods courses—PUBH 8877—in the PhD program in biostatistics.

- 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 are encouraged to identify a dissertation advisor and a topic of research. The written dissertation proposal is then submitted to the student's Dissertation Research Committee, and the student makes an oral presentation of their proposal to the Committee. The Committee determines 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 coursework and both parts of the general examination, the candidate is generally recommended to the Associate Dean for Graduate Affairs of the Columbian College of Arts and Sciences (CCAS) for promotion to PhD candidacy—the dissertation research. A candidate must file an approved dissertation research plan with CCAS before being admitted to PhD candidacy. Prior to completion of the general examination, a student may register for at most 6 credits of BIOS 8999.

Consult with the Biostatistics Program Director or academic advisor for dissertation guidelines.

### **Professional enhancement requirement: 8 hours**

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, which are often held at the Milken Institute School of Public Health (SPH) and in the metropolitan Washington, DC, area. Examples of conference sponsors include the National Academy for State Health Policy, the Pan American Health Organization, the American Public Health Association, the American College of Healthcare Executives, the Area Health Education Center, the American College of Sports Medicine, and the National Athletic Trainer's Association. Opportunities for professional enhancement are regularly publicized via the SPH Listserv and through the department or the biostatistics academic advisor.

Students must submit documentation of professional enhancement activities to the biostatistics academic advisor, which includes a prior approval, a description of the program agenda, and proof of attendance before applying for graduation.