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/#doctoraltext).

Required preparatory courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1231</td>
<td>Single-Variable Calculus I</td>
<td></td>
</tr>
<tr>
<td>MATH 1232</td>
<td>Single-Variable Calculus II</td>
<td></td>
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</tbody>
</table>

Undergraduate course requirements (or equivalents to these GW courses) for admission consideration:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 2118</td>
<td>Regression Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 2233</td>
<td>Multivariable Calculus</td>
<td></td>
</tr>
</tbody>
</table>

Additional course requirements *

Orr equivalents to these GW courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>MATH 2184</td>
<td>Linear Algebra I</td>
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</table>

One of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>PUBH 6853</td>
<td>Use of Statistical Packages for Data Management and Data Analysis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>STAT 2183</td>
<td>Intermediate Statistics Lab/Packages</td>
</tr>
</tbody>
</table>

*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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>PUBH 6866</td>
<td>Principles of Clinical Trials</td>
</tr>
<tr>
<td>PUBH 8877</td>
<td>Generalized Linear Models in Biostatistics</td>
</tr>
<tr>
<td>STAT 6201</td>
<td>Mathematical Statistics I</td>
</tr>
<tr>
<td>STAT 6202</td>
<td>Mathematical Statistics II</td>
</tr>
<tr>
<td>STAT 6210</td>
<td>Data Analysis</td>
</tr>
<tr>
<td>STAT 6213</td>
<td>Intermediate Probability and Stochastic Processes</td>
</tr>
<tr>
<td>STAT 6218</td>
<td>Linear Models</td>
</tr>
<tr>
<td>STAT 6227</td>
<td>Survival Analysis</td>
</tr>
<tr>
<td>STAT 8226</td>
<td>Advanced Biostatistical Methods</td>
</tr>
</tbody>
</table>
STAT 8263  Advanced Statistical Theory I

Public health core (11 credits)

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

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
STAT 6208  Methods of Statistical Computing II
STAT 6215  Applied Multivariate Analysis I
STAT 6216  Applied Multivariate Analysis II
STAT 6217  Design of Experiments
STAT 6223  Bayesian Statistics: Theory and Applications
STAT 6242  Modern Regression Analysis
STAT 6287  Sample Surveys
STAT 6289  Topics in Statistics
STAT 8257  Probability
STAT 8258  Distribution Theory
STAT 8263  Advanced Statistical Theory I
STAT 8264  Advanced Statistical Theory II
STAT 8265  Multivariate Analysis
STAT 8273  Stochastic Processes I
STAT 8274  Stochastic Processes II
STAT 8281  Advanced Time Series Analysis

STAT 8288  Topics in Sample Surveys
BIOS 8998  Advanced Reading and Research (see advisor)

Approved public health electives:

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

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
PUBH 6869  Principles of Biostatistical Consulting

Dissertation research (6 to 24 credits)

BIOS 8999  Dissertation Research

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.