Biostatistics is the science that applies statistical theory and mathematical principals to research in medicine, biology, environmental science, public health, and related fields. Biostatisticians working in the area of public health develop and use mathematical and scientific methods to:

1. determine risk factors for disease and injuries, and
2. identify health trends within communities.

Biostatisticians working in the area of medicine develop and use mathematical and scientific methods to design and analyze:

1. clinical trials to investigate new therapies for treating acute and chronic illness,
2. observational studies to understand disease onset and progression,
3. basic science studies to determine the mechanisms of disease, and
4. human genetics studies to investigate the inherited susceptibility to disease.

Career opportunities are available in universities, academic medical centers, government, and private industry. The demand for individuals with graduate-level degrees in biostatistics is extremely high.

### Admission Requirements

Applicants apply for admission to the program via the Graduate School application for admission (http://gradschool.psu.edu/prospective-students/how-to-apply/). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (http://gradschool.psu.edu/graduate-education-policies/).

The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants. See GCAC-305 Admission Requirements for International Students (http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-305-admission-requirements-international-students/) for more information.

Applicants must complete prior to admission:

1. A two-semester graduate-level course in applied statistics from a recognized graduate program. The comparable courses offered by the Department of Statistics are STAT 511 and STAT 512.
2. A two-semester graduate-level course in mathematical statistics from a recognized graduate program. The comparable courses offered by the Department of Statistics are STAT 513 and STAT 514.

Prospective applicants must demonstrate:

3. For admission to the Graduate School, all applicants must have received from a regionally accredited institution a baccalaureate degree earned under residence and credit conditions substantially equivalent to those required by Penn State. International applicants must hold the equivalent of an American four-year baccalaureate degree.

4. Results from one of the following standardized tests taken within the past five (5) years:
   a. Graduate Record Examination (GRE)
   b. Graduate Management Admission Test (GMAT)
   c. Medical College Admission Test (MCAT)
   d. Law School Admission Test (LSAT)
   e. (This requirement is waived for applicants who have an advanced degree in a related field beyond the baccalaureate.)

5. Completion of the Graduate School application (http://gradschool.psu.edu/prospective-students/how-to-apply/), which includes three (3) letters of recommendation and a Curriculum Vitae or resume.

6. Payment of the application fee.

### Degree Requirements

#### Doctor of Philosophy

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (http://gradschool.psu.edu/graduate-education-policies/)

Each student in the Biostatistics Ph.D. program is expected to acquire knowledge in the disciplines of Biostatistics.

Each student must complete a total of 31 credits of graduate level course work, the majority of which are 500 level courses, specifically:

- 22 credits in required courses
- 6 additional credits in Epidemiology or Health Services Research
- 3 credits in elective courses, plus
- Dissertation

After the completion of the first year of course work, each student is required to take a qualifying examination, based on the coursework in PHS 523, PHS 524, PHS 525, PHS 526 and PHS 527. The decision to allow the student to continue in the program will be made by a committee of Graduate Faculty in the Biostatistics program. In addition, a comprehensive examination is administered at the completion of all course work, followed by the final oral examination in defense of the Ph.D. dissertation.

### Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHS 500</td>
<td>Research Ethics for Clinical Investigators</td>
<td>1</td>
</tr>
<tr>
<td>PHS 523</td>
<td>Multivariate Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PHS 524</td>
<td>Longitudinal Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PHS 526</td>
<td>Categorical Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PHS 527</td>
<td>Survival Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PHS 528</td>
<td>Bayesian Methods</td>
<td>3</td>
</tr>
<tr>
<td>PHS 580</td>
<td>Clinical Trials: Design and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 553</td>
<td>Asymptotic Tools</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Select 6 credits of the following:</td>
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<tr>
<td>PHS 535</td>
<td>Quality of Care Measurement</td>
<td>6</td>
</tr>
<tr>
<td>PHS 536</td>
<td>Health Survey Research Methods</td>
<td></td>
</tr>
</tbody>
</table>
PHS 550  Principles of Epidemiology
PHS 551  Advanced Epidemiological Methods
PHS 552  Molecular Epidemiology of Chronic Disease
PHS 570  Health Economics and Economic Evaluation

Electives
Select 3 credits of the following:  3
  PHS 516  Statistical Genetics
  STAT 561  Statistical Inference I
  STAT 562  Statistical Inference II

Total Credits  31

Student Aid
Graduate assistantships available to students in this program and other forms of student aid are described in the Tuition & Funding (http://gradschool.psu.edu/graduate-funding/) section of The Graduate School's website. Students on graduate assistantships must adhere to the course load limits (http://gradschool.psu.edu/graduate-education-policies/gsad/gsad-900/gsad-901-graduate-assistants/) set by The Graduate School.

Courses
Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Public Health Sciences (PHS) Course List (https://bulletins.psu.edu/university-course-descriptions/graduate/phs/)

Contact
Campus  Hershey Med Ctr
Graduate Program Head  Douglas L Leslie
Director of Graduate Studies (DGS) or Professor-in-Charge (PIC)  Arthur Steven Berg
Program Contact  Justine Elizabeth Shultz
PO Box 855
90 Hope Drive
Hershey PA 17033-0855
jes5437@psu.edu
(717) 531-0003
Program Website  View (http://med.psu.edu/biostatistics-phd/)