Biostatistics, PhD

Learning Outcomes
Students will:
• describe current statistical theory, methods, and practices used in health sciences;
• analyze data from experimental and observational studies;
• design new statistical methods;
• communicate research findings to various audiences in writing and though oral presentation; and
• Interpret analytical results from health science studies.

Requirements
The Doctor of Philosophy program in biostatistics requires a minimum of 79 s.h. of graduate credit, including credit from a master's degree. Students must maintain a cumulative grade-point average of at least 3.00. Those who receive a grade of C on 7 s.h. of coursework may be dismissed from the program.

All students must successfully complete a comprehensive examination and a dissertation. The research topic and content, which vary depending on the program of study, must be approved by a student's dissertation committee. Other degree requirements include approved electives chosen from Department of Biostatistics and other University of Iowa courses.

The PhD with a major in biostatistics requires the following work.

Master of Science Background
PhD students must take the following courses required for the Master of Science in biostatistics. Students who have completed equivalent coursework at other institutions may request waivers and/or transfers of credit. Students who earned a Master of Science with a major in biostatistics at the University of Iowa automatically receive credit for these courses.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>This sequence:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAT:5100- STAT:5101</td>
<td>Statistical Inference I-II</td>
<td>6</td>
</tr>
<tr>
<td>All of these:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOS:5510</td>
<td>Biostatistical Computing (taken twice for 2 s.h. each; topics should be programming with R and programming with SAS)</td>
<td>4</td>
</tr>
<tr>
<td>BIOS:5710 &amp; BIOS:5720</td>
<td>Biostatistical Methods I-II</td>
<td>8</td>
</tr>
<tr>
<td>BIOS:5730</td>
<td>Biostatistical Methods in Categorical Data</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:6610</td>
<td>Statistical Methods in Clinical Trials</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:7500</td>
<td>Preceptorship in Biostatistics</td>
<td>3</td>
</tr>
<tr>
<td>EPID:4400</td>
<td>Epidemiology I: Principles</td>
<td>3</td>
</tr>
</tbody>
</table>

Public Health Requirement
Course # | Title | Hours
This course: CPH:6100 Essentials of Public Health 2

Responsible Conduct of Research Training
Course # | Title | Hours
This course: BIOS:7270 Scholarly Integrity in Biostatistics 1

Core Courses
Course # | Title | Hours
All of these: BIOS:6810 Bayesian Methods and Design 3
BIOS:7110 Likelihood Theory and Extensions 4
BIOS:7210/ STAT:7570 Survival Data Analysis 3
BIOS:7250 Theory of Linear and Generalized Linear Models 4
BIOS:7310 Longitudinal Data Analysis 3

Electives
With approval of their advisor, students choose 16–23 s.h. of courses according to their interest in biostatistics, statistics, genetics, computing, public health, or in other areas. No more than 5 s.h. in nonquantitative courses (e.g., epidemiology, environmental health) may count toward the electives requirement. Courses required for the MS that are not listed above also may be used to satisfy the electives requirement, although BIOS:7800 Independent Study in Biostatistics does not generally count as an elective. At least 6 s.h. of elective coursework must be taken with grades awarded.

These courses are recommended, but other coursework may be selected; students should consult their advisor.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS:6420</td>
<td>Survey Design and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:6650</td>
<td>Causal Inference</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:6720</td>
<td>Statistical Machine Learning for Biomedical and Public Health Data</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:7230</td>
<td>Advanced Clinical Trials</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:7240</td>
<td>High-Dimensional Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:7330</td>
<td>Advanced Biostatistical Computing</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:7410/ STAT:7510</td>
<td>Analysis of Categorical Data</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:7600</td>
<td>Advanced Biostatistics Seminar (topics include model selection, spatial biostatistics, statistical methods in genetics/genomics, analysis of network data) 1-3</td>
<td></td>
</tr>
<tr>
<td>STAT:6560</td>
<td>Applied Time Series Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>
Dissertation

Students must enroll in the following dissertation course for at least two semesters in residence.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS:7900</td>
<td>Thesis/Dissertation</td>
<td>6-13</td>
</tr>
</tbody>
</table>

Combined Programs

PhD/MD

Students may work toward the Doctor of Medicine degree and a PhD in biostatistics in a combined degree program offered by the Carver College of Medicine and the College of Public Health. Applicants must be admitted to both programs before they may be admitted to the combined degree program. See the Medical Scientist Training Program (Carver College of Medicine) in the catalog.

Admission

Applicants to the PhD program in biostatistics must apply through the Schools of Public Health Application Service (SOPHAS). After the SOPHAS application is verified, the applicant pays a supplemental Graduate College admission fee to the University of Iowa Office of Admissions. For detailed application information, visit Requirements and How to Apply to Biostatistics on the Department of Biostatistics website.

The biostatistics faculty considers several factors when evaluating applications for admission, including grade-point averages, letters of recommendation, intent, and motivation for graduate study, and research interests.

All applicants must hold a bachelor's degree and have a cumulative grade-point average of at least 3.00.

Applicants whose first language is not English must submit official test scores to verify English proficiency. Applicants can verify English proficiency by submitting official test scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). They must score at least 100 (internet-based) on the TOEFL. Applicants with lower scores are not considered for admission. In place of TOEFL scores, the department accepts IELTS scores of 7.0 or higher, with no subscore below 6.0, and the Duolingo English Test (DET) with a score of at least 105. For waiver eligibility of this requirement, visit English Proficiency Requirements on the Graduate Admissions website.

All biostatistics applicants are required to have strong written and oral communication skills.

Completion of an MS program in statistics or biostatistics generally is required for admission to the PhD program. However, full consideration is given to baccalaureate degree recipients.

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website.

PhD application deadlines are posted on the Department of Biostatistics website. Application deadline is Dec. 1. Visit Requirements and How to Apply to Biostatistics on the department's website.

Financial Support

A limited number of teaching and research assistantships are available. Assistantships offer financial support and tuition assessed at the resident tuition rate along with a tuition scholarship. They also provide valuable on-the-job training experience.

For information on financing education through jobs, grants, and loans, contact the university's Office of Student Financial Aid.

Career Advancement

The program prepares students for professional and academic careers in biostatistics, especially for positions that emphasize developing and applying statistical methodology to solve important biological and public health problems.

Academic Plans

Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

Biostatistics, PhD

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT:7400</td>
<td>Computer Intensive Statistics</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissertation</td>
<td>6-13</td>
</tr>
</tbody>
</table>

Financial Support

A limited number of teaching and research assistantships are available. Assistantships offer financial support and tuition assessed at the resident tuition rate along with a tuition scholarship. They also provide valuable on-the-job training experience.

For information on financing education through jobs, grants, and loans, contact the university's Office of Student Financial Aid.

Career Advancement

The program prepares students for professional and academic careers in biostatistics, especially for positions that emphasize developing and applying statistical methodology to solve important biological and public health problems.

Academic Plans

Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

Biostatistics, PhD

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT:7400</td>
<td>Computer Intensive Statistics</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS:7900</td>
<td>Thesis/Dissertation</td>
<td>6-13</td>
</tr>
</tbody>
</table>

Combined Programs

PhD/MD

Students may work toward the Doctor of Medicine degree and a PhD in biostatistics in a combined degree program offered by the Carver College of Medicine and the College of Public Health. Applicants must be admitted to both programs before they may be admitted to the combined degree program. See the Medical Scientist Training Program (Carver College of Medicine) in the catalog.

Admission

Applicants to the PhD program in biostatistics must apply through the Schools of Public Health Application Service (SOPHAS). After the SOPHAS application is verified, the applicant pays a supplemental Graduate College admission fee to the University of Iowa Office of Admissions. For detailed application information, visit Requirements and How to Apply to Biostatistics on the Department of Biostatistics website.

The biostatistics faculty considers several factors when evaluating applications for admission, including grade-point averages, letters of recommendation, intent, and motivation for graduate study, and research interests.

All applicants must hold a bachelor's degree and have a cumulative grade-point average of at least 3.00.

Applicants whose first language is not English must submit official test scores to verify English proficiency. Applicants can verify English proficiency by submitting official test scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). They must score at least 100 (internet-based) on the TOEFL. Applicants with lower scores are not considered for admission. In place of TOEFL scores, the department accepts IELTS scores of 7.0 or higher, with no subscore below 6.0, and the Duolingo English Test (DET) with a score of at least 105. For waiver eligibility of this requirement, visit English Proficiency Requirements on the Graduate Admissions website.

All biostatistics applicants are required to have strong written and oral communication skills.

Completion of an MS program in statistics or biostatistics generally is required for admission to the PhD program. However, full consideration is given to baccalaureate degree recipients.

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website.

PhD application deadlines are posted on the Department of Biostatistics website. Application deadline is Dec. 1. Visit Requirements and How to Apply to Biostatistics on the department's website.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS:7210</td>
<td>Survival Data Analysis (e) or Bayesian Methods and Design</td>
<td>3</td>
</tr>
<tr>
<td>or BIOS:6810</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOS:6610</td>
<td>Statistical Methods in Clinical Trials (c)</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:7310</td>
<td>Longitudinal Data Analysis (e, f, g)</td>
<td>3</td>
</tr>
<tr>
<td>BIOS:7250</td>
<td>Theory of Linear and Generalized Linear Models (e, h)</td>
<td>4</td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS:7310</td>
<td>Longitudinal Data Analysis (e, f, g)</td>
<td>3</td>
</tr>
<tr>
<td>PhD Elective Course (f, g)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>PhD Elective Course (f, g)</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Third Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS:7900</td>
<td>Thesis/Dissertation (i)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Fourth Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS:7900</td>
<td>Thesis/Dissertation (i)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Fifth Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS:7900</td>
<td>Thesis/Dissertation (i)</td>
<td>1 - 4</td>
</tr>
</tbody>
</table>

**Total Hours** 79-85

---
a Students must complete specific requirements in the University of Iowa Graduate College after program admission. Refer to the Graduate College website and the Manual of Rules and Regulations for more information.
b Complete two sections of BIOS:5510, Programming in R and Programming in SAS.
c To fulfill MS degree requirements by the end of 4th semester, an approved PhD elective may substitute for BIOS:6610 or BIOS:7500. The substituted MS requirement would transfer to a PhD requirement. Contact the Grad Program Administrator to pursue this option.
d Course may also be completed in spring of second year.

---
e Required BIOS PhD Core Course. Additional information can be found in the General Catalog and department website.
f Refer to the Biostatistics Student Handbook, PhD in Biostatistics section, for sequencing of PhD elective courses.
g 16-23 s.h. of biostatistics, statistics, genetics, computing, public health, etc. courses; no more than 5 s.h. of credit in non-quantitative courses; 6 s.h. of electives must be taken for a letter grade; work with faculty advisor to determine appropriate graduate level electives and sequence.
h Typically this course is offered in spring semesters only. Check MyUI for course availability since offerings are subject to change.
i Must register for at least two semesters; minimum of 6 s.h. required overall.