

BIostatISTICS, Ph.D.

The Doctor of Philosophy prepares students, through quality lecture and practical experiences and other research opportunities, for involvement in teaching and independent and collaborative biostatistical research; and trains researchers to teach and to pursue original research on analytical approaches to investigating health conditions, and to develop novel biostatistical approaches. The following objectives are premised upon having successfully met all of the objectives delineated previously that are common to the M.P.H. and M.S. degrees.

Learning Outcomes

1. Students will display a mastery of advanced biostatistical techniques.
2. Students will demonstrate the ability to teach topics in biostatistics in a formal classroom setting.
3. Students will demonstrate the ability to consult with clients outside of the university setting and provide them with statistical assistance on a health-related problem.
4. Students will demonstrate the ability to finish a dissertation and communicate the results.

Admissions

Applicants for a graduate degree in Biostatistics must have a degree from an approved college or university. Applicants must meet all requirements of The Graduate School for admission and be recommended to the Graduate School for acceptance by the Department of Epidemiology and Biostatistics.

When we make our admissions decisions, we evaluate the applicant's entire file in relation to the pool of applicants that year. We also evaluate whether the applicant's needs and goals fit well with our department's strengths and resources.

The admission criteria for all degree programs follow those of The Graduate School and the Arnold School of Public Health. Before you can be considered for admission, you must submit an Online Application via <http://www.sophas.org>. Your application must include:

- Completed Application submitted through SOPHAS – <http://www.sophas.org>
- At least two letters of recommendation for the MPH and MSPH programs and at least three letters of recommendation for the PhD program
- An updated Résumé or CV
- Official transcripts for all undergraduate and graduate work previously undertaken
- Official copies of Graduate Record Examination (GRE) scores
- A personal statement that addresses research or practice interests and long-term objectives

Candidates for all graduate programs in Biostatistics must demonstrate proficiency in communicating in English, working with mathematical concepts, and in thinking analytically. While we do not set absolute cut points for grade point average and GRE scores (in part because of variability in test-taking ability that may not reflect competence to do well in the programs, and the fact that the percentile scores vary by year) we value their ability to provide us with global comparative criteria.

Therefore, we provide the following as a general guideline for all our programs:

- Grade point average of 3.0
- GRE Verbal score > 151 (International students whose GRE Verbal score is > 146, and whose TOEFL score is at least the minimum defined below, will also be considered)
- GRE Quantitative score > 157 for the M.S.P.H. program and > 161 for the Ph.D. program

Committee members review the entire files carefully. Clear demonstration of competence in one or more domain(s) can supersede specific GRE score(s)

An electronic application packet should be submitted to **SOPHAS** as early as possible, and will not be processed until all the required credentials have been received and verified. Electronic applications can be submitted online. For information on how to apply electronically see the Arnold School of Public Health's admissions website.

International applicants whose native language is not English and who have not earned a degree in an English-speaking country are also required to submit a satisfactory score on the **Test of English as a Foreign Language (TOEFL)** or the University of Cambridge's **International English Language Testing System (IELTS)** Academic Course Type 2 exam. The minimum acceptable score on the TOEFL is 230 (computer-based) or 570 (paper-based) or 75 (Internet-based). The minimum acceptable overall band score on the IELTS Academic Course Type 2 exam is 6.5. Proficiency in English sufficient to undertake graduate study is expected upon entry. Students who do not meet proficiency levels established by The Graduate School and the department will be expected to take additional work to raise their level of performance. Also, any transcript from a non-US institution will need to be verified by **World Education Services (WES)**. WES is an organization that provides international credential evaluation and checks documents for validity and accuracy. WES also offers an analysis of an individual's degrees and transcripts and will provide equivalents for each credential. For more information contact WES at <http://www.wes.org> or 212-219-7330.

Doctoral Admission Requirements

Departmental courses are sequenced so that students may begin their program of study in the fall or spring semester. Applications for summer admission will also be accepted.

For the Doctor of Philosophy (Ph.D.) program, preference for admission is given to applicants with breadth and depth of academic preparation in Biostatistics, Statistics, or a closely related field. Applicants must have a master's degree in one of these areas, or a master's degree in some other field and experience in these areas. Applicants should also have completed with a B or greater Vector Calculus and Matrix or Linear Algebra.

Degree Requirements (53 Hours)

(42 Post-Masters Hours)

Coursework (3 Hours)

| Course | Title | Credits |
|---------------------------|-------------------------------|----------|
| PUBH 700 | Perspectives in Public Health | 3 |
| Total Credit Hours | | 3 |

Courses in Statistics (9 Hours)

| Course | Title | Credits |
|---------------------------|----------------------------|----------|
| STAT 712 | Mathematical Statistics I | 3 |
| STAT 713 | Mathematical Statistics II | 3 |
| STAT 714 | Linear Statistical Models | 3 |
| Total Credit Hours | | 9 |

Seminar and Practica (5 Hours)

| Course | Title | Credits |
|---------------------------|---|----------|
| BIOS 845 | Doctoral Seminar (1 credit per semester for 2 semesters) ¹ | 2 |
| BIOS 890 | Independent Study ((Teaching, Consulting or Grant Writing Practicum) | 3 |
| Total Credit Hours | | 5 |

¹ One credit hour of EPID 845 may be substituted.

Department Core (12 Hours)

| Course | Title | Credits |
|--|--|-----------|
| BIOS 825 | Multivariate Biostatistics | 3 |
| or BIOS 820 | Bayesian Biostatistics and Computation | |
| Select three 800-level, 3-credit biostatistics courses | | 9 |
| Total Credit Hours | | 12 |

Cognate (3 Hours)**Electives (9 Hours)**

| Course | Title | Credits |
|--------------------------------|--|----------|
| Select three of the following: | | 9 |
| BIOS 758 | Advanced Linear Models in Biostatistics | |
| BIOS 759 | Theory and Methods of Discrete Data Analysis | |
| BIOS 760 | Biostatistical Methods in Clinical Trials | |
| BIOS 761 | Survival Analysis | |
| BIOS 765 | Research Design in the Biomedical Sciences | |
| BIOS 770 | Applied Longitudinal Data Analysis | |
| BIOS 775 | Biostatistical Aspects of Bioinformatics | |
| BIOS 780 | Introduction to Quantile Regression | |
| BIOS 794 | Selected Topics in Biostatistics | |
| BIOS 811 | Survival Analysis II | |
| BIOS 815 | Generalized Linear Models | |
| BIOS 820 | Bayesian Biostatistics and Computation | |
| BIOS 822 | Statistical Methods in Spatial Epidemiology | |
| BIOS 825 | Multivariate Biostatistics | |
| BIOS 890 | Independent Study | |
| BIOS 894 | Selected Topics in Biostatistics | |
| Total Credit Hours | | 9 |

Dissertation (12 Hours)

| Course | Title | Credits |
|---------------------------|--------------------------|-----------|
| BIOS 899 | Dissertation Preparation | 12 |
| Total Credit Hours | | 12 |

Note: With the exception of Master's core courses (EPID 701, BIOS 701, BIOS 710, and BIOS 757, and their equivalents), up to 12 hours may be

transferred from previous graduate coursework, with the approval of the student's advisor and the Graduate Director.

To fulfill the Graduate School's requirement that all doctoral programs have a minimum of 60 hours post-baccalaureate, an additional 9 hours must appear on the program of study. These may include the Master's core courses listed above.

The requirement to take PUBH 700 may be waived with Graduate Director approval if a student has taken a similar course during his/her master's degree program. If this requirement is waived, the student will be required to take 3 additional Biostatistics/Statistics credit hours to replace this course.

Dissertation Requirements for the Ph.D.**Dissertation Proposal**

All doctoral students must complete a research project culminating in a dissertation. The dissertation must be based on original research, typically addressing a basic research problem. The first step in that process is the development of the dissertation proposal, and its oral defense before the student's doctoral committee. The committee must approve the proposal in writing before the student can proceed with the research.

Ethics and Professional Standards

All dissertation research involving human subjects must be reviewed and approved by the appropriate ethics review committee. Research qualifying for exemption (typically secondary data analysis of existing data, observational studies with adults, or evaluation of service/public activities) can be approved by the University Institutional Review Board. The IRB application must be completed online at http://www.orc.research.sc.edu/eIRB_migration_info.html (https://sc.edu/about/offices_and_divisions/research_compliance/irb/). It will be necessary to register the first time you enter the site. Some projects must also be approved by the review committee at the agency where the dissertation research is conducted. Any necessary approvals must be obtained prior to beginning work on the defined research. Some dissertation activities related to an ongoing research project may be covered under that project's IRB approval; this should be discussed with the project PI and/or dissertation advisor; in most situations, notification of the IRB of a change in protocol is sufficient.

Deadlines

The dissertation must be read, critically evaluated, and approved by all members of the Dissertation Committee. In accordance with graduate School guidelines, the following deadlines must be met. The specific dates for a semester are available on the U.S.C. Graduate School home page <http://www.gradschool.sc.edu>.

1. The first complete draft of the dissertation must be in the hands of the Dissertation Committee at least 60 days before the end of the semester (Graduate Studies Bulletin); the approximate dates are October 15, March 15, and June 15 for fall, spring and summer sessions respectively. This is approximately six weeks before the filing date for the dissertation, and should be at least one month before the scheduled defense. The dissertation defense should be scheduled at this time; the Graduate Director must approve the scheduled time (see guidelines for scheduling in section 4 below).
2. The final copy is to be submitted to each committee member at least 30 days prior to the end of the semester (Graduate Studies Bulletin) or at least one week prior to the dissertation defense, whichever is earlier.

3. The dissertation defense must be held at least one week before the Graduate School filing date, which is 20 days before the end of the semester.
4. The student must file the final dissertation, with the designated number of copies, by the filing date. The Graduate Director of the student's program, or the administrative assistant for education, will give preliminary approval to title page and general format. Final approval is given by the Graduate School when the thesis is filed at a scheduled appointment.

Dissertation Defense and Examination

1. The candidate must publicly present the dissertation in a 45-60 minute presentation. Announcements of this presentation should be posted and sent to the EPID-BIOS listserv at least one week before the defense; at least one announcement must be posted on the seminar bulletin board outside the Department Office. The dissertation defense should be scheduled in an available classroom and not during the scheduled class time of any department core course. Department faculty are strongly encouraged to attend dissertation defenses.
2. . The dissertation defense should be scheduled in an available classroom and not during the scheduled class time of any department core course. Department faculty are strongly encouraged to attend dissertation defenses.
3. The candidate must pass an oral comprehensive examination that shall be administered immediately following the presentation and evaluated by his/her Dissertation Examination Committee. This examination will focus on the technical and scientific aspects and the scholarly delineation of the dissertation topic, and may cover any other subject matter relevant to the student's field of study.

Final Version and Copies

All Dissertation Committee members must approve the final version of the dissertation and sign the title page before the student submits it to the Graduate School. The student should provide each Dissertation Committee member a copy of the dissertation as submitted to the Graduate School, bound in a manner acceptable to the committee. These copies are in addition to the minimum number required by the Graduate School and any personal copies. Students are responsible to make sure the dissertation meets the Graduate School requirements (see: <http://gradschool.sc.edu/thesisdissertation/dissertation.htm>).