

# BIostatISTICS, M.P.H.

The goal of the Master of Public Health degree in Biostatistics is to prepare students with prior public health experience, through quality lecture and field practice experiences and other research opportunities, to apply analytical and investigative biostatistical skills in a public health setting.

## Learning Outcomes

- Students will evaluate a public health surveillance system and identify salient gaps and methods to address them.
- Students will determine the appropriate study designs for a given public health problem and context.
- Students will compare and contrast the strengths and limitations of epidemiologic study designs (randomized trials and observational studies), including biases and methods to minimize bias.
- Students will formulate a research question and manage and analyze data from public health administrative or surveillance data or electronic health data repositories.
- Students will develop appropriate data collection protocols for a given public health issue and context.
- Students will critically evaluate epidemiologic scientific literature.

## Admission Requirements for Biostatistics

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.

### Masters Admission Requirements

Departmental courses are sequenced so that students should begin their program of study in the fall semester. However, applications for spring admission will be accepted.

Applicants to the Master of Science in Public Health (M.S.P.H.) program must have a baccalaureate degree in arts, science or medicine. Applicants should also have completed with a B or greater Calculus-2 and Matrix or Linear Algebra. Prior professional work experience is considered an asset but is not a requirement.

Students admitted to the M.S.P.H. program who do not have academic or professional experience that provides a strong understanding of the biological basis of public health are strongly encouraged to select courses that will provide this understanding.

‡\*Note: Master of Science in Public Health degrees in biostatistics will undergo a name change. Effective Fall 2021, the new name for the degree program is Master of Science (M.S.). The curriculum remains the same.

## Degree Requirements (45 Hours)

A minimum of 45 credit hours is required for the Master of Public Health with a major in Biostatistics. Students are required to have two

semesters of calculus or will be expected to make up the deficit beyond the minimum program of study. Additional courses may be required to meet prerequisites or to accommodate electives. All department core courses must be passed with a grade of "B" or better. Failure to do so will necessitate repeating the course; these courses can only be repeated once. Course requirements are given below.

### School of Public Health Core (9 Hours)

Course	Title	Credits
ENHS 660	Concepts of Environmental Health Science	3
HSPM 700	Approaches and Concepts for Health Administration	3
HPEB 700	Concepts and Methods in Health Promotion	3
<b>Total Credit Hours</b>		<b>9</b>

### Department Core (18 Hours)

Course	Title	Credits
BIOS 701	Concepts and Methods of Biostatistics	3
EPID 701	Concepts and Methods of Epidemiology	3
BIOS 757	Intermediate Biostatistics	3
EPID 741	Intermediate Epidemiologic Methods	3
EPID 745	Seminar in Epidemiology	1-2
BIOS 745	Seminar in Biostatistics	1-2
BIOS 710	Effective Data Management for Public Health	3
<b>Total Credit Hours</b>		<b>17-19</b>

### Major Courses (12 Hours)

Course	Title	Credits
BIOS 758	Advanced Linear Models in Biostatistics	3
BIOS 759	Theory and Methods of Discrete Data Analysis	3
STAT 512	Mathematical Statistics	3
Select one of the following:		3
BIOS 751	Health Data Systems	
BIOS 752	Vital Record and Health Survey Data Analysis	
BIOS 760	Biostatistical Methods in Clinical Trials	
BIOS 765	Research Design in the Biomedical Sciences	
BIOS 770	Applied Longitudinal Data Analysis	
BIOS 775	Biostatistical Aspects of Bioinformatics	
BIOS 805	Categorical Data Analysis	
BIOS 808	Environmetrics	
BIOS 809	Environmetrics II	
BIOS 761	Survival Analysis	
BIOS 815	Generalized Linear Models	
BIOS 820	Bayesian Biostatistics and Computation	
BIOS 825	Multivariate Biostatistics	
STAT 513	Theory of Statistical Inference	
STAT 518	Nonparametric Statistical Methods	
STAT 519	Sampling	
<b>Total Credit Hours</b>		<b>12</b>

### Practice (6 Hours)

Course	Title	Credits
BIOS 798	Public Health Practice	6
<b>Total Credit Hours</b>		<b>6</b>

### Practicum Requirements for the M.P.H.

Public Health in the United States is practiced in diverse settings that include both public and private agencies. Regardless of the type of agency in which it is practiced, public health includes a philosophy of social justice, concepts of community, and population perspectives. The range of public health activities in populations include preventing epidemics and the spread of disease, protecting against environmental hazards, preventing injuries, promoting and encouraging healthy behaviors, responding to disasters and assisting communities in recovery and assuring quality and accessibility of health services (Public Health in America, APHA, 1995). For epidemiologists and biostatisticians, one important aspect of public health practice is learning to bridge the gap between data collection/analysis and decision-making in addressing the goals of public health.

#### Prerequisites

Minimum course prerequisites for the practice experience: completion of at least one of the School of Public Health core courses and the department core. Students must pass the progression examination before beginning the practice.

#### Selection of Appropriate Practice Setting, Mentor and Faculty

A variety of public agencies offer practice opportunities for students. Mentors for the practice experience are in most instances individuals whose daily activity focuses primarily on public health practice, such as those who develop, manage, or evaluate programs at the SC Department of Health and Environmental Control. Faculty research projects are not appropriate for the practice experience. Faculty with joint appointments in the School of Public Health and a practice setting may serve as Mentors as long as the practice experience is clearly situated in the practice setting and has a practice focus, and the Mentor is functioning, for the purposes of the student's practice experience, primarily in his or her practice capacity. See 7 below: Developing a Work Task. Assistantships will not be offered to satisfy any academic requirements, including practice requirements and thesis/dissertation research.

#### Academic Credit

Students in the M.P.H. program must satisfactorily complete a total of six credit hours in Public Health Practice. Practice can be taken in more than one semester, and credit hours assigned are variable depending upon the nature and extent of the work tasks undertaken. Three hours of practice work in a regular semester (Fall or Spring terms) requires an average of 10 hours of actual work each week including writing the final report, or 20 hours per week for six credits. In a summer term, three hours of credit would require 20 hours per week and six hours of credit would require 40 hours per week.

#### Ethics and Professional Standards

Public Health Practice combines the accomplishment of a task with intentional learning on the part of a student. In Public Health Practice, students are responsible for initiating their work and establishing learning objectives. In Public Health Practice, the student's work is for the host organization's benefit, and must not be used outside its purview without specific permission, usually in writing. The results of this work are "controlled" by the host organization or its representative.

Professional conditions of confidentiality are to be honored according to prevailing practice of the sponsoring organization. In general, information received from an individual or organization belongs to that individual or organization and recipients (i.e., students) are not free to pass along this information to other parties without the consent of the individual or organization.

All practice projects 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 ([https://sc.edu/about/offices\\_and\\_divisions/research\\_compliance/irb/](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 agency review committee at which the practicum is conducted. Any necessary approvals must be obtained prior to beginning work on the defined practicum tasks. Some practicum 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 practicum advisor; in most situations, notification of the IRB of a change in protocol is sufficient.

### Financial Support

If financial resources are required for doing a Public Health Practice activity, the responsibility for negotiating these arrangements rests with the sponsoring agency and the student. These costs and responsibilities for coverage are included in the practice proposal. Responsibilities of a graduate assistantship cannot be used to satisfy practice requirements.

### Participant Roles in BIOS 798

Students are expected to:

- Take initiative and responsibility in defining competence to be developed, arranging or selecting an appropriate setting for practice activity, developing clear work and learning objectives and completing work and learning tasks by the dates agreed upon.
- Arrange appropriate meetings with Faculty Advisor and Mentor, including the final oral presentation.

Faculty Advisors are expected to:

- Advise students in developing work and learning proposals.
- Advise students regarding ethics review required of the practice project.
- Participate in meetings with student and Mentor at the location of student's practice.
- Provide ongoing expert advice and guidance as needed or requested.
- Assess learning outcomes and assign pass/fail grade at appropriate times.
- Attend final oral presentation by student.

Mentors are expected to:

- Assist SPH staff and students to define short-term tasks of potential use to his or her organization.
- Review student's "proposal" for usefulness to organization, determine limits of Mentor's role with student, and provide on-site direction to the work component of the practice.
- Provide student logistical support (arranging space, equipment, use of phones, use of computer and/or computer software, secretarial

help, making introductions, providing data or helping gain access to it, and general advice within the organization.

- Attend the student's required final oral presentation.
- Assist with assessment of student's work and growth in competence during the practice.

### Developing a Work Task

For some students, a work task may be defined and negotiated for a practice activity prior to establishing specific learning objectives. In this case, discovering the learning potential of a given work task is required. For others who have developed and articulated learning objectives, the requirement is to locate and determine experiences that will enable the student to develop the specified skills.

There is no single proper way to find the "right" setting and task. The challenge is to locate something that needs to be done that some organization and persons within the organization care about, and then determine if that task can be done in the time you have available and if it allows you to pursue your learning objectives.

Experience with organizations that have sponsored SPH students suggests that if six major conditions are present, a sound practice activity can be developed. The conditions are:

- An organization wants or needs something done, and it "controls" or "owns" the work results.
- The student has some previously developed competence or experience that indicates the potential for contributions to the organization and citizenry. This includes knowledge gained in prerequisite courses.
- The student has well thought out and communicated learning objectives that can be pursued in the framework of doing the task.
- The student demonstrates a comprehensive understanding of what is to be done and is able to identify a supportive network of people.
- A Mentor is identified who both wants the work done and wants to assist the student in pursuing the designated learning objectives.
- The student seeks advice and monitoring from his/her Faculty Advisor.

The draft Work Task Proposal contains a minimal checklist of items that are considered important in preparing a work task proposal for Public Health Practice. Complete this draft first and discuss it with your Practice Faculty Advisor. The Public Health Practice Agreement form should be completed before the start of the practicum.

Individual sessions should be arranged by the student as needed with the Faculty Advisor or Mentor. It is recommended that the student schedule regular conferences with the Faculty Advisor.

### Final Report and Oral Presentation

The student must write a final report on his/her practice experience and give an oral presentation based on this report. The report should address the objectives set down in the student's practice plan. The faculty and the Mentor must approve the final version of the Practice Report. The student should provide a spiral bound copy of the report to the faculty, Mentor, and the department (a formal copy is not submitted to the Graduate School).

The student is responsible for arranging the time and place of the oral presentation. The Faculty Advisor and Mentor must be present at the presentation. The student should make a general announcement in the

School of Public Health at least a week before the presentation so that anyone who wishes can attend the oral presentation.