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Welcome to the Department of Biostatistics at the University of Nebraska Medical Center College of Public Health! The Student Handbook outlines the requirements, policies, and procedures for the operation of our graduate programs. Please keep in mind that policies may change. The department will make every effort to communicate changes in requirements, procedures, or policies.

**CONTACT INFORMATION:**

For all inquiries, please contact Mary Morris, Department Assistant at:

mary.morris@unmc.edu  
Phone: 402-559-4112  
Fax: 402-559-7259

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POLICIES

All Biostatistics students are bound by the policies and regulations below. Students should consult the COPH Student Handbook, UNMC Student Handbook, and the UNMC Graduate Studies Bulletin for a complete listing of all policies and regulations.

Independent Development Plan (IDP)
Within 9 months after matriculation (12 months for part-time students), the student and his/her Supervisor (or temporary supervisor) must prepare and submit to the Graduate Studies Office a draft Program of Studies that includes designation of all required courses, options for electives (which may be TBD), and the general area of research for the dissertation (if applicable). Upon appointment of the Supervisory Committee, the student should confer with that group and his/her Supervisor regarding the draft Program of Studies. After incorporating any necessary revisions to the document, the Committee-approved Program of Studies must be submitted to the Graduate Studies Office within 13 months after matriculation (19 months for part-time students). The Program of Studies is considered to be a living document; however, any changes in the program or in the dissertation topic (if applicable) must be approved by the Supervisory Committee and the action reported to the Graduate Studies Office. As a supplement to the academic and career guidance provided by his/her Advisor and Supervisory Committee, each Ph.D. student must complete an IDP within 1 year after matriculation. The student should consult with the Graduate Program Director to identify the specific IDP that must be utilized. Documentation that the student has completed an IDP (e.g. Certificate of Completion, if using myIDP) must be submitted via Seguidor.

Academic Integrity
The University of Nebraska Medical Center has established a policy on academic integrity and professional conduct. This policy may be found in the UNMC Student Handbook. All graduate students are expected to adhere scrupulously to this policy. Cheating, academic misconduct, fabrication, and plagiarism are viewed as serious matters and will lead to disciplinary action as described in the Student Handbook under Procedural Rules Relating to Student Discipline. Additional materials related to Responsible Conduct in Research can be found in the Student Handbook.

Disabilities
Students with disabilities are encouraged to contact the coordinator of each course for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University to provide flexible and individualized accommodation to students with documented disabilities; however, faculty are not required to provide accommodation without prior approval. To be eligible to receive reasonable accommodation, students must be registered with the Services for Students with Disabilities (SSD) office. Once the request has been approved, an individualized accommodation plan will be formulated and an official “Letter of Disability Accommodation” will be issued to the student. To register, contact Kelly Swoboda, LMPH at 402-559-5962 or kelly.svoboda@unmc.edu.

Nondiscrimination
The University of Nebraska Medical Center (UNMC) is committed to creating a diverse and inclusive work and learning environment free from discrimination and harassment. UNMC is dedicated to creating an environment where everyone feels valued, respected and included. UNMC does not
discriminate based on race, color, ethnicity, national origin, sex, pregnancy, sexual orientation, gender identity, religion, disability, age, genetic information, veteran status, marital status, and/or political affiliation in its programs, activities, or employment. UNMC complies with all local, state and federal laws prohibiting discrimination, including Title IX, which prohibits discrimination on the basis of sex. The following persons have been designated to handle student inquiries:

**Discrimination or Disability Inquiries:** Cheryl Bagley Thompson, Ph.D., RN, Assistant Vice-Chancellor Academic Affairs/Student Affairs, Student Life Center – Office# 2036, Telephone: 402-559-2792, Email: cbthompson@unmc.edu

**Title IX Inquiries:** Carmen Sirizzotti, MBA, Title IX Coordinator, Administrative Building (ADM), Office# 2010, Telephone: 402-559-2717, Email: csirizzotti@unmc.edu
BACKGROUND

Biostatistics is the science that applies statistical theory and methods to the solution of problems in the biological, biomedical and public health sciences. The main areas of effort for biostatisticians include collaborative research and consulting, methodological research, and education. In collaborative research, biostatisticians work on research studies with experts in the biological and health sciences. The biostatisticians' responsibilities include analysis of data and interpretation of results. Equally important, however, is the responsibility to assist in the designing and conducting of the study to ensure consistency with good statistical practice. Methodological research, such as developing mathematical models to describe biological and public health phenomena, is conducted to enhance the existing bodies of knowledge in theoretical and applied biostatistics. Biostatisticians educate others about biostatistics through the teaching of graduate and continuing education courses, seminars, collaborative research and consulting activities.

Upon enrolling in a biostatistics Ph.D. program, students take courses in statistical methods and theory. The methods courses focus on ways to select and apply statistical techniques that are appropriate for different types of problems from biomedicine and public health. The theory courses provide rigorous instruction in the formal mathematical structure underlying the statistical techniques. Heavy use is made of computers in most biostatistics courses. Required and elective courses from other public health or biomedical fields are also included in the program of study.

ADMISSION

The Ph.D. in Biostatistics degree program is for students with a strong background in mathematics and a genuine interest in biology and public health. The program emphasizes statistical theory and methods so that students are prepared to be effective statistical collaborators in interdisciplinary studies; lead the design and execution of studies; and develop biostatistics methodology.

The Ph.D. students must apply to UNMC Graduate Studies Office. Prospective students should visit the Graduate Studies admissions page for admission requirements and the Department of Biostatistics admissions page for department specific admission requirements. Ph.D. candidates normally complete graduation requirements in four to five years.

PROGRAM COMPETENCIES

Please refer to the COPH Student Handbook.
PROGRAM REQUIREMENTS

Students enrolled in the Ph.D. program in Biostatistics are required to complete a minimum of 60 credit hours in course work, of which at least 48 credits of non-dissertation classes and a Ph.D. dissertation (at least 12 credits) in order to graduate. The student may request a transfer of no more than 50% of the course requirements (other than dissertation) from an accredited graduate program. The residency requirement is that at least 50% of the course requirements (other than dissertation) be completed within a consecutive 18-month period, with the further provision that the courses be taken after receipt of the Master’s degree or equivalent. After the student is enrolled in the biostatistics Ph.D. program at University of Nebraska Medical Center (UNMC), the transfer request will be reviewed by the graduate program director or, if already formed, the student’s Supervisory Committee. (Often, but not always, the graduate program director will serve as the chair of the student’s Supervisory Committee, until the student passes the qualifying exam and eventually makes changes to his/her Supervisory Committee.) A recommendation for approving or rejecting the request for credit transfer will be made on a case-by-case basis. The student who received an approval for credit transfer, will need to take additional courses as recommended by their Supervisory Committee to satisfy the 60-credit hour requirement (see link). In addition to the required coursework, the student will be required to pass the qualifying and comprehensive exams of the department. A detailed description of these exams is presented below.

Upon enrollment into the program, the student will develop, in consultation with the graduate program director, a draft program of studies (POS), which will be subsequently discussed and eventually approved by student’s Supervisory Committee. In addition to these courses, when appropriate, the student may register for the course BIOS 996 Directed Reading or Research, in order to prepare for the dissertation research. The course work comprises courses of two types – a) the six core courses that are required before the student can become eligible for the qualifying exam, and b) additional ones that include the two required general public health courses as well as those in the student’s cognate area and elective courses required to improve the student education and learning in their area of focus in Biostatistics. Although some of the courses can be taken in any order, the student is advised to complete first the six core courses that are required for the qualifying exam. After the student passes the qualifying exam, they will choose a Ph.D. dissertation adviser (who may or may not be their initial academic advisor) and eventually make changes to his/her Supervisory Committee; in particular, their dissertation adviser will become the new chair of their Supervisory Committee. In order for the student to become eligible for the comprehensive exam, the student needs to complete the majority of the graded didactic courses required by the department and additional courses recommended by their Supervisory Committee. The majority of coursework is defined as all but one didactic course. The student may take the comprehensive exam during the semester while they are completing their last didactic course. For more details, please refer to the UNMC Graduate Studies Bulletin. After passing the comprehensive exam, the student is considered to have advanced to candidacy. The student may register for the course BIOS 999 Biostatistics Dissertation Research after they become a candidate. The preparation for the Ph.D. dissertation work can begin anytime during their studies and the student should register for the course BIOS 996 Directed Reading or Research for the dissertation preparation and other relevant research work approved by their Supervisory Committee.

In addition to the requirements specified by the Biostatistics Ph.D. program, the student must satisfy other requirements specified by the College of Public Health (COPH) and the UNMC Graduate Studies Program. These requirements are described in the COPH Student Handbook and UNMC Graduate Studies Bulletin.
COURSEWORK

Core Biostatistics Courses Required for the Qualifying Exam (Total 18 credits)
- BIOS 918 Biostatistical Linear Models: Theory & Applications (3 credits)
- BIOS 924 Biostatistical Theory & Models for Survival Data (3 credits)
- BIOS 925 Theory of Generalized Linear & Mixed Models in Biostatistics (3 credits)
- STAT 980 Advanced Probability Theory (3 credits)
- STAT 982 Statistics Theory I (3 credits)
- STAT 983 Statistics Theory II (3 credits)

Additional Required Courses (Total at least 12 credits)
- EPI 820 Epidemiology in Public Health (3 credits)
- HPRO 830 Foundations of Public Health (3 credits)
- at least 6 graduate credits in a cognate area (other than biostatistics, statistics, and mathematics)

Elective Courses (Total at least 18 credits from the following, non-exhaustive list*)
- BIOS 935 Semiparametric Methods for Biostatistics (3 credits)
- BIOS 921 Advanced Programming for SAS (3 credits)
- BIOS 941 Essentials of Biostatistical Consulting (2 credits)
- BIOS 996 Directed Reading or Research (1-9 credits)
- BIOS 970 Seminar (1 credit)
- BIOS 998 Special Topics in Biostatistics: Doctoral Students (1-3 credits)
- EPI 910 Research Grant Proposal Development (2 credits)
- EPI 941 Epidemiologic Methods in Applied Clinical Genetics I (1 credit)
- EPI 941 Epidemiologic Methods in Applied Clinical Genetics II (1 credit)
- EPI 945 Epidemiologic Research Methods (4 credits)
- STAT 950 Computational Statistics I (3 credits)
- STAT 951 Computational Statistics II (3 credits)
- STAT 973 Theory of Multivariate Analysis (3 credits)
- STAT 974 Nonlinear Regression Analysis (3 credits)
- STAT 981 Advanced Probability Measures (3 credits)
- STAT 984 Asymptotics and Applications (3 credits)
- BIOS 810 Intro to SAS Programing (3 credits)
- BIOS 818 Biostatistical Methods II (3 credits)
- BIOS 823 Categorical Data Analysis (3 credits)
- BIOS 824 Survival Data Analysis (3 credits)
- BIOS 825 Correlated Data Analysis (3 credits)
- BIOS 835 Design of Medical Studies (3 credits)
- BMI 810 Intro to Biomedical Informatics (3 credits)
- GSBA 815 Tools and Algorithms in Bioinformatics (3 credits)

* The Biostatistics (BIOS) courses at 800-level (Master’s) are normally taken only when a deficiency or a prerequisite is to be met; in all other cases, a student should take 900-level (PhD) courses. Non-BIOS Master’s level courses are taken as electives or to cover the cognate area requirement.
COURSE DESCRIPTIONS

Please refer to the COPH Student Handbook.

TYPICAL 4-YEAR COURSE SCHEDULE
The core courses are in bold font.

TYPICAL COURSE SCHEDULE (4-Year Cycle)
Fall Semester, Year 1
STAT 982 Statistical Theory I
STAT 980 Advanced Probability Theory
EPI 820 Epidemiology in Public Health

Spring Semester, Year 1
STAT 983 Statistical Theory II
BIOS 818 Biostatistical Methods II
BIOS 825 Correlated Data Analysis

Summer Session, Year 1
BIOS 996 Directed Reading & Research
HPRO 830 Foundations in Public Health

Fall Semester, Year 2
BIOS 918 Biostatistical Linear Models: Theory & Applications
BIOS 925 Theory of Generalized Linear & Mixed Models in Biostatistics
BIOS 921 Advanced Programming for SAS

Spring Semester, Year 2
BIOS 924 Biostatistical Theory & Models for Survival Data
BIOS 835 Design of Medical Studies
BIOS 935 Semiparametric Methods for Biostatistics

Summer Session, Year 2
Qualifying Exam
BIOS 996 Directed Reading & Research

Fall Semester, Year 3
BIOS 999 Doctoral Dissertation

Spring Semester, Year 3
BIOS 999 Doctoral Dissertation
QUALIFYING EXAMINATION

The qualifying exam is designed to test the student’s ability to integrate, synthesize, and apply major Biostatistics concepts and methodology commonly needed to develop a dissertation in biostatistics. A student is eligible to take the qualifying exam after completing the six core courses. The qualifying exam is a written exam that will be offered every year in the second half of July and, if necessary, again in January. Students are not eligible to take the qualifying exam until they have completed all six core Biostatistics Ph.D. courses with an average grade no lower than a "B," and normally take it immediately after their fourth semester in the program.

The objective of the qualifying examination is to test the knowledge of basic statistical methodology commonly needed to develop a dissertation in biostatistics. The exam consists of questions from the core Ph.D. courses BIOS 918 (Biostatistical Linear Models: Theory & Applications), BIOS 924 (Biostatistical Theory & Models for Survival Data), and BIOS 925 (Theory of Generalized Linear & Mixed Models in Biostatistics).

The examination will be four hours in duration. There will be two questions from each of the three areas (BIOS 918, BIOS 924, and BIOS 925). Students will be required to answer three out of the six questions subject to the restriction that they answer at least one from each of the three areas. If a student answers more than three questions, they will need to clearly designate which three questions should be graded.

The Biostatistics Department will assign a qualifying examination committee (“exam writers and graders”) comprising three faculty members (normally including those who teach the courses BIOS 918, BIOS 924, and BIOS 925) to write the qualifying exam questions and grade each question. The qualifying exam questions will be reviewed and approved by the examination committee before the exam questions are finalized, to ensure absence of any ambiguity or misunderstanding. Each question will be graded on a 0-100 scale, and all graded exam questions will have equal weights.

The qualifying examination committee will review each student's performance and will issue one of two scores: "Pass" or "Fail" (see Table 1 below).

Table 1. Possible outcomes for the overall exam grade

<table>
<thead>
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<th>Outcome</th>
<th>Criteria</th>
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| Pass    | An overall mean score of 70% or more on the 3 graded questions  
and  
No score on any one of the 3 graded questions that is less than 60% |
| Fail    | A mean score on all questions that is less than 70%  
or  
One or more questions with scores less than 60% |

Students who do not pass the qualifying exam the first time will need to wait at least a semester before retaking it. Students who also fail to pass their second attempt will be suspended from the Biostatistics Ph.D. program and must petition the Biostatistics Graduate Program Committee to remain in the program.
COMPREHENSIVE EXAMINATION

The *comprehensive* exam will assess the student’s readiness to undertake the Ph.D. dissertation research. The student who completed the majority of didactic coursework and have also passed the *qualifying* exam are recommended by their Supervisory Committee is eligible to take this exam.

The objective of the *comprehensive* exam is to test the student's ability to

- comprehend statistical research literature;
- write technical material in a style suitable for publication in standard journals of biostatistics or statistics; and
- to propose new areas for dissertation research.

Students should conduct a thorough literature review of the research area selected for their dissertation and prepare a written report which both summarizes the literature and identifies a well-defined research problem. Students are also expected to present some ideas for solving the research problem in this report. There is no absolute limit on the length of the written report. However, it is suggested that the length be kept modest, say, between 10 and 15 double-spaced pages, excluding references.

The *comprehensive* examination shall be administered by the Supervisory Committee, once the student is ready to take it. There will be two phases to this examination, written and oral. In Phase 1, the Supervisory Committee will examine the written dissertation proposal draft submitted by the student. The full proposal should include the following sections: specific aims, research strategy (significance, innovation, and approach), a timeline, and references. Approximately no less than two weeks after the student submits the full proposal, a supervisory committee meeting will be convened for the oral examination (Phase 2) to discuss the student’s performance. The committee will evaluate the novelty of the proposed study, the quality of writing, and the soundness of the scientific principles. The committee will also determine if the student was able to satisfactorily answer the committee’s questions, some of which may be written and provided to the student before the oral examination. Objectives of these questions are to assess concepts and knowledge covered in the dissertation research. The oral defense consists of a student presentation of their dissertation proposal and a Q & A session. The committee votes to pass or fail or assign a conditional pass at this meeting. It only takes one non-affirmative vote to fail the student, or conditionally affirmative to conditionally pass. The committee is expected to provide students with detailed feedback shortly after the oral examination meeting. Students are responsible for scheduling the oral examination, and it is suggested that at least two hours be reserved for this purpose. The assignments for the conditional pass need to be satisfactorily completed within 3 months of the oral defense. The student who failed the *comprehensive* exam will have one more opportunity to take the exam within 6 months. Students will be recommended as a candidate for the Ph.D. degree to the Graduate School if their performance on the oral examination is judged to merit a pass. After the student passes the *comprehensive* exam, the student is considered a candidate.
DOCTORAL DISSERTATION

The doctoral dissertation must be an original and significant piece of biostatistics methodology research that makes a contribution to the field. Dissertation research will be carried out under the guidance of a research advisor who chairs a Supervisory Committee of at least 4 members of the graduate faculty. The Supervisory Committee will be assembled by the advisor, reviewed by the Biostatistics Department Graduate Program Committee, and approved by the Biostatistics Department Chair. For the preparation of the dissertation proposal, the student may register for the course BIOS 996 Directed Reading or Research. Depending on the progress of the dissertation research, the student may take more than 12 credit hours but 12 credits are minimum to satisfy the graduation requirement. Before the oral defense of the dissertation, the student needs to submit a written dissertation paper to the Supervisory Committee. This document normally consists of three main chapters preceded by a comprehensive literature review chapter and followed by an integrative concluding chapter. The student must have prepared or submitted at least one paper to peer-reviewed journals before the oral defense. Following review of the dissertation draft by the Supervisory Committee, the dissertation must be presented orally and successfully defended before the Supervisory Committee. The dissertation is complete when the Supervisory Committee has approved both the written dissertation and the oral defense after the student makes the final corrections/editing requested by the Supervisory Committee.