# Table of Contents

1 INTRODUCTION ........................................................................................................................................................................5

2 GRADUATE GROUP IN EPIDEMIOLOGY AND BIOSTATISTICS ........................................................................................................6

2.1 OVERVIEW .............................................................................................................................................................................6

3 APPLICATION AND ADMISSION ....................................................................................................................................................6

3.1.1 Affirmative Action ...........................................................................................................................................................6

3.1.2 The Application Process: All GGEB Programs ...................................................................................................................7

3.1.3 Admission Requirements Specific to the Biostatistics Programs ......................................................................................8

3.1.4 Admission Requirements Specific to the PhD Program in Epidemiology ........................................................................8

4 FINANCIAL OBLIGATIONS AND SUPPORT ...................................................................................................................................9

4.1 FINANCIAL AID .........................................................................................................................................................................10

5 RESOURCES FOR STUDENTS .......................................................................................................................................................10

5.1 PENNCARD ..................................................................................................................................................................................10

5.2 PENNKEY ...................................................................................................................................................................................10

5.3 THE PENNPORTAL .................................................................................................................................................................10

5.4 BLACK KEY ...............................................................................................................................................................................11

5.5 HEALTH CARE COVERAGE .................................................................................................................................................11

6 ACADEMIC POLICIES ....................................................................................................................................................................11

6.1 CODE OF CONDUCT AND ACADEMIC INTEGRITY ..................................................................................................................11

6.1.1 Code of General Conduct ...............................................................................................................................................11

6.1.2 Code of Academic Integrity ........................................................................................................................................11

6.1.3 Code of Clinical Conduct ...............................................................................................................................................12

6.2 ACADEMIC STANDARDS ........................................................................................................................................................12

6.2.1 Course grades and Academic Probation ..........................................................................................................................12

6.2.2 Incompletes .......................................................................................................................................................................12

6.2.3 Individual Development Plans (IDPs) ..............................................................................................................................13

6.3 ADDITIONAL ACADEMIC REQUIREMENTS AND POLICIES ..........................................................................................13

6.3.1 Collaborative Institutional Training Initiative (CITI) Training Program ...............................................................................13

6.3.2 Health Insurance Portability and Accountability Act (HIPAA) training ........................................................................14

6.3.3 Responsible Conduct of Research ................................................................................................................................14

6.3.4 Course evaluations ........................................................................................................................................................14

6.3.5 Leaves of absence ............................................................................................................................................................14

6.3.6 Vacation and Time Away ................................................................................................................................................15

6.4 TRANSFER OF CREDIT ........................................................................................................................................................15

6.4.1 Transfer from other graduate groups .............................................................................................................................15

6.5 RESIDENCY, TIME LIMITS, AND FEES ................................................................................................................................15

7 GRADUATE TRAINING PROGRAMS IN BIOSTATISTICS ...........................................................................................................16

7.1 ELEMENTS COMMON TO MS AND PHD PROGRAMS .............................................................................................................17

7.1.1 Academic Advisor ..........................................................................................................................................................17

7.1.2 Non-Credit Requirements .............................................................................................................................................17

7.1.3 Transfer of Credit ..........................................................................................................................................................17

7.1.4 Auditing .........................................................................................................................................................................17

7.2 MASTER OF SCIENCE (MS) IN BIOSTATISTICS ....................................................................................................................17

7.2.1 Course Requirements ................................................................................................................................................18
8.2.1 Policy on advisors
8.3 COURSE REQUIREMENTS
8.3.1 Core courses
8.3.2 Electives
8.4 DOCTORAL SEMINAR
8.5 CONSULTING PROJECTS
8.6 COURSE PLANS
8.7 PhD EXAMINATIONS
8.8 PREPARING THE DISSERTATION
8.8.1 Dissertation advisor
8.8.2 Dissertation committee
8.8.3 Additional biostatistics support
8.8.4 Computing, programming, and database support
8.8.5 Frequency of dissertation committee meetings
8.8.6 Laboratory notebook
8.8.7 Content and format of the dissertation
8.9 NON-CREDIT REQUIREMENTS
8.9.1 Teaching practicum
8.9.2 Weekly seminar
8.9.3 Research rotations
8.10 GENERAL PROGRAM POLICIES
8.10.1 Exemptions and modifications
8.10.2 Terminal master's degree
8.10.3 Student memberships
8.10.4  Student travel .................................................................................................................. 51
8.11  FACILITIES ............................................................................................................................... 51
8.11.1  Program web-resource ........................................................................................................... 51
8.11.2  Student Space ........................................................................................................................... 51
1 Introduction

This handbook is intended as a reference manual for the graduate programs in biostatistics and the doctoral program in epidemiology at the University of Pennsylvania. It covers the entire graduate experience, from admission through required course work, examinations, and the MS thesis (biostatistics), and PhD dissertation in both programs. Faculty, staff, and potential and admitted students should consult it when seeking information on our program’s policies and procedures. This is a living document; readers should feel free to bring errors and omissions to the attention of the Chair of the Graduate Group in Epidemiology and Biostatistics, through the Chairs of the respective programs.

Many people made essential contributions to this handbook, most prominently Drs.; Harold Feldman (Chair of the Department of Biostatistics & Epidemiology); Stephen Kimmel (Director, Clinical Epidemiology Unit); J. Richard Landis (Director, Biostatistics Unit); and Ebbing Lautenbach, John Farrar, and Theoklis Zaoutis (members of the G Geb Epidemiology Educational Programs Committee), Drs. Daniel Heitjan, Phyllis Gimotty (the first Directors of Graduate Studies in Biostatistics), Kathleen Propert, Scarlett Bellamy and J. Richard Landis, Marissa Fox and Catherine Vallejo (coordinators of the biostatistics programs) and Jennifer Kuklinski and Gabrielle Ostapovich (coordinators of the epidemiology program), as well as Thomas Kelly, and Ann Facciolo, former administrators of graduate programs in the graduate group."

Many others contributed in ways large and small, not least the students in the doctoral program, whose many relevant questions and experiences have led us to review our policies, consider their implications, and write them down clearly. We thank them especially and wish them the best in all their endeavors, at Penn and beyond.

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2 Graduate Group in Epidemiology and Biostatistics

2.1 Overview

The Graduate Group in Epidemiology and Biostatistics (GGEB) is responsible for developing and administering the PhD degree programs in epidemiology and biostatistics as well as the MS program in biostatistics. The PhD programs train individuals to be rigorous and independent academic investigators, able to apply and extend the range of approaches available in epidemiology and biostatistics to address questions in biomedical research. The objective of the MS program in biostatistics is to train individuals in the basic theory and applications of statistical methods, especially as applied to problems in the health sciences.

The GGEB is a member of the Biomedical Graduate Studies Program (BGS) in the Perelman School of Medicine of the University of Pennsylvania. It is comprised of faculty from across the university with interests in biostatistics and epidemiology. The Graduate Group is closely affiliated with the Center for Clinical Epidemiology and Biostatistics (CCEB) and the Department of Biostatistics and Epidemiology (DBE). The Office of Biomedical Graduate Studies provides oversight and coordination for the GGEB and six other graduate groups offering PhD degrees in the biomedical sciences.

Biomedical Graduate Studies (BGS) was established in 1985 and serves as the academic home within the University of Pennsylvania for roughly 700 students pursuing a PhD in the basic biomedical sciences. Although BGS is housed within the School of Medicine, it is composed of more than 600 faculty members across seven Penn schools and several associated institutes. BGS provides training and administration through seven graduate groups, some of which have distinct sub-specialty areas. Each graduate group has its own training mission, leadership, and staff, but there is often significant overlap among the groups in respect to faculty membership, courses offered, policies, and procedures. BGS provides centralized support to the graduate groups for admissions, student fellowships, curricular oversight, record-keeping, and other operations.

Additional, up-to-date information about BGS is available at http://www.med.upenn.edu/bgs/.

3 Application and Admission

3.1.1 Affirmative Action

The GGEB values diversity and seeks talented students from all backgrounds. The GGEB does not discriminate on the basis of color, sex, sexual orientation, religion, national or ethnic origin, age, disability, or status as a disabled or Vietnam Era veteran in the administration of its educational policies, programs or activities, admissions policies and procedures, and
scholarship programs. Women and minorities are especially encouraged to apply to the GGE's educational programs.

3.1.2 The Application Process: All GGE Programs

Applicants must complete the standard BGS application form and submit three letters of recommendation. The application and letters should identify personal attributes, experiences, accomplishments, and goals relevant to success in graduate study in biostatistics or epidemiology, depending on the program. Applicants who are currently enrolled in a degree program must arrange for at least one letter of recommendation to be sent from a faculty member in that program. Only original letters of recommendation written on official university or business stationery will be accepted. Official transcripts from all undergraduate, graduate, and professional schools are also required. The transcripts must come directly from the institutions and must be originals.

3.1.2.1 Waiver of Fees for the Application

We regret that we cannot waive the application fee for international applicants. U.S. citizens and permanent residents may request a waiver in cases of documented financial hardship. To request a waiver, please email the admissions coordinator for BGS prior to submitting your application. (kevenson@mail.med.upenn.edu). Explain your situation and reasons for requesting a waiver of fees. The coordinator may ask for additional documentation e.g. documentation by the Financial Aid Officer from a relevant undergraduate institution, or, if not applicable, documentation of information about income, assets, family situation, etc.

3.1.2.2 Graduate Record Examination (GRE)

All applicants must take the Graduate Record Exam (GRE) General Test. We do not require the GRE subject test. GRE scores are valid for five years from the date taken. We must receive an official score report from the Educational Testing Service (ETS) by the application deadline. Students who have completed graduate or professional degrees at other schools are not exempt from the GRE requirement. Students who are currently enrolled in the Biostatistics MS program and who are applying for admission to the Biostatistics PhD program but do not have a currently valid GRE may request a waiver of the GRE requirement. Our ETS institution code is 2900. Please do not enter a separate department code. Test of English as a Foreign Language (TOEFL). All applicants whose native language is not English must arrange for ETS to submit an official TOEFL score as part of the application by the application deadline. The TOEFL requirement is waived for a student who has been enrolled in an English-speaking university for at least two years upon application. TOEFL scores are valid for two years.

3.1.2.3 Application Deadline and Notification

Students are admitted to the MS and PhD degree programs in Biostatistics or the PhD program in Epidemiology once per year, for the fall term. Information and application materials are available by October of the preceding year with an application deadline of December 1. After reviewing the files, the admissions committee recommends candidates for admission to the BGS admissions committee and the Chair of BGS. Students are usually notified of the decision of the Admissions Committee by the end of March.
3.1.2.4 Initiating an Application

Those interested in applying for admission to graduate study should contact the GGEB Coordinators specific to the programs at the following addresses:

**Biostatistics:**
Ms. Catherine Vallejo  
Coordinator, Biostatistics Graduate Program  
Perelman School of Medicine at the University of Pennsylvania  
627 Blockley Hall, 423 Guardian Drive  
Philadelphia, PA  19104-6021  
Tel: 215-573-3881  
E-mail: vallejo@mail.med.upenn.edu

**Epidemiology:**
Ms. Jennifer Kuklinski  
Coordinator, Doctoral Program in Epidemiology  
Perelman School of Medicine at the University of Pennsylvania  
926 Blockley Hall, 423 Guardian Drive  
Philadelphia, PA  19104-6021  
Tel: 215-573-2382  
E-mail: jkuklins@upenn.edu

3.1.3 Admission Requirements Specific to the Biostatistics Programs

Entering students must have completed at least one year of calculus (including multivariable methods), one semester of linear algebra, and have a working knowledge of a programming language. Previous experience with data analysis and statistical packages is desirable but not required. Advanced courses in mathematics are helpful, particularly for students who intend to pursue the PhD degree.

3.1.3.1 Applicants from the MS Program

Students in the Biostatistics MS program who seek admission to the PhD program must submit a complete application and take the Biostatistics written qualifying exam. Typically such students apply in the fall preceding their projected graduation with the MS. Results on the qualifying exam are considered in the admission decision (see the section on "Evaluations and Examinations").

3.1.4 Admission Requirements Specific to the PhD Program in Epidemiology

Applicants must demonstrate prior training and experience in epidemiology, clinical sciences, or a public health-related field. Degreed clinicians (MD, VMD, DMD, PharmD, MSN or doctorate in nursing, etc.) meet this requirement automatically. For non-clinicians, this requirement can be satisfied by having at least a Master’s degree in public health, epidemiology, biostatistics, or related field and at least one year of relevant work experience. It is anticipated that some non-clinicians will not possess strong clinical backgrounds. Individuals
admitted without clinical or other biomedical training will, in general, be required to take biomedical science courses in addition to the courses required for the PhD in Epidemiology. These courses will not count as electives and must be taken in addition to the required courses and credits. The Admission Committee will determine the need for additional courses at the time of acceptance.

The content of the additional courses required for those admitted without prior clinical or other biomedical training will be determined by a committee consisting of the student’s advisor and two additional epidemiologists who are members of the Graduate Group. The advisor will be responsible for identifying those two faculty members. At least one of the three members of this committee must hold a clinical doctorate and at least one member of the committee must hold a doctorate in epidemiology or a related field, without a clinical doctorate. This committee will identify specific courses to be taken on the basis of a review of the candidate’s academic record/transcripts and research interests, as well as interactions with the candidate. The candidate will be informed of the additional required courses prior to enrollment. It is likely that this additional coursework will increase the amount of time it takes for the candidate to successfully complete the PhD degree requirements.

Combined degree (MD-PhD, VMD-PhD, and DMD-PhD) applicants are exempt from this requirement since they will have had at least two years of relevant coursework in their professional degree program prior to starting coursework for the PhD.

3.1.4.1 Applicants from Penn’s MSCE program

Students in the Master of Science in Clinical Epidemiology (MSCE) program at the University of Pennsylvania who seek admission to the PhD program must submit a separate application; the MSCE application is not sufficient. Such students may apply at any time, but are officially admitted to the PhD program only for the beginning of the academic year. It is suggested that MSCE students wishing to pursue the PhD complete their MSCE degree first; typically, students apply in the fall preceding their projected graduation with the MSCE. Students wishing to transfer into the PhD program during their first year will need to submit their application by December 1 of that year in order to be considered for transfer. In both cases, performance in courses taken for the MSCE will be considered very strongly as part of the application decision. MSCE students who have taken the Comprehensive Examination for that program will be required to take the full sequence of examinations for the PhD (see Section 4.9 in this Handbook).

4 Financial Obligations and Support

Tuition costs are determined each year. The Trustees of the University of Pennsylvania reserve the right to increase tuition and fees and to otherwise amend the regulations concerning tuition and fees at any time and to make such changes applicable to students in the University at that time. Most PhD students receive financial support through one or more of the following sources: Assistantships supported by research grants, training grant fellowships, and fellowships from research institutions or private industry. These sources are described in more detail below. Students who receive full-time support may accept no additional employment during the period of the support. Support for
Biostatistics MS students depends on the availability of funds, with priority given to PhD students.

4.1 Financial Aid
The University’s Office of Student Financial Services provides information on student expenses and billing; processes financial aid applications, awards financial assistance; and administers the Penn Plan payment programs. Students may contact the Office directly at

Office of Student Financial Services  
University of Pennsylvania  
Room 100 Franklin Building  
3451 Walnut Street  
Philadelphia, PA 19104-6270  
Email: sfsmail@SFS.upenn.edu

5 Resources for Students

5.1 PennCard
PennCard is the official identification card of the University of Pennsylvania and is required for all students. The PennCard gives students access to many University facilities and services including PennCash, the Graduate Student Center, libraries, recreation centers, campus transit, residence halls, and more. The PennCard Center is located on the second floor of the Penn Bookstore, 3601 Walnut Street. A valid, government-issued photo i.D. will be required in order to pick up a PennCard. The first PennCard is free. Lost or stolen cards can be replaced for a fee of $25. Damaged cards can be replaced for a fee of $5. Information about the PennCard and its uses is provided at http://cms.business-services.upenn.edu/penncard/home.html.

5.2 PennKey
The PennKey name and password provides access to PennNet, a Penn e-mail account, and many other essential services managed through the PhD Program. All students are required to have a current, active PennKey and password. Students are issued a PennKey Setup Code when they pick up their PennCard.

5.3 The PennPortal
The PennPortal webpage bundles together links to important information for students. To access the PennPortal (https://portal.apps.upenn.edu/penn_portal/portal.php), students should log in with their PennKey name and password. If the “Graduate Students” tab does not automatically appear, students should click on the “My Tabs” button to add the “Graduate Students” tab from the available tabs.
5.4 **Black Key**

Blockley Hall and most of the floors in Blockley Hall are restricted to holders of the building-specific black key. Therefore, all PhD students are required to get a black key. Please contact the appropriate program coordinator for the necessary form. Keys can be picked up at the security office in the lobby of Stellar-Chance. *Please note:* The security office is only open for black key pickup from 11:00 a.m.-1:00 p.m.

5.5 **Health Care Coverage**

Penn students are automatically eligible for Penn Student Health Services and Chickering Health Insurance. Once a student is matriculated, the University will assume that this health coverage is needed and they will bill for the service. Students who wish to waive the Penn sponsored insurance should log onto PennPortal at [http://medley.iscseo.upenn.edu/penn_portal/portal.php](http://medley.iscseo.upenn.edu/penn_portal/portal.php) to do so. It is necessary that students watch their bill to ensure that no health insurance fee is incurred. If one is charged to the student account, the Office of Education Programs in the CEU should be notified.

6 **Academic policies**

Students in the PhD program are subject to academic policies of BGS ([http://www.med.upenn.edu/bgs/current_students_policies.shtml](http://www.med.upenn.edu/bgs/current_students_policies.shtml)) as well as the specific policies of the GGEB and PhD program as defined below.

6.1 **Code of conduct and academic integrity**

6.1.1 **Code of General Conduct**

All students of Biomedical Graduate Studies (BGS) must conduct themselves at all times in a mature and responsible manner. The rights and property of all persons are to be respected regardless of time or place. For dual degree students (MD-PhD, VMD-PhD), or graduate students who conduct research in a clinical venue, this also includes compliance with rules, procedures and accepted practices in the clinical setting. In addition, BGS students must comply with the University's code of general conduct and other University policies related to student conduct that are described in The Penn Book: Policies and Procedures Handbook of the University of Pennsylvania ([http://www.vpul.upenn.edu/osl/pennbook.html](http://www.vpul.upenn.edu/osl/pennbook.html)). These policies include, but are not limited to, policies on sexual harassment, acquaintance rape and sexual violence, open expression, drug and alcohol usage, and the drug-free workplace. The judicial charter contained within that document is not applicable to BGS students; rather, BGS students are subject to the Charter of Biomedical Graduate Studies Student Judicial System which can be found on the BGS website.

6.1.2 **Code of Academic Integrity**

The most fundamental value of any academic community is intellectual honesty; accordingly, all academic communities rely upon the integrity of each and every member. Students are responsible not only for adhering to the highest standards of truth and honesty but also for upholding the principles and spirit of the following Code. Violations of this Code include but are not limited to the following acts:
A. **Cheating:** using or attempting to use unauthorized assistance, material or study aids in examinations or any other academic work, or preventing, or attempting to prevent another from using authorized assistance, material, or study aids.

B. **Plagiarism:** using the ideas, data or language of another without specific and proper acknowledgment.

C. **Fabrication:** submitting contrived or altered information in any academic exercise.

D. **Multiple Submission:** submitting, without prior permission, any work submitted to fulfill another academic requirement.

E. **Misrepresentation of Academic Records:** misrepresenting or tampering with, or attempting to tamper with, any portion of one’s own or any other person’s transcripts or academic record, either before or after coming to the University of Pennsylvania.

F. **Facilitating Academic Dishonesty:** knowingly helping or attempting to help another violate provisions of this Code.

G. **Unfair Advantage:** attempting to gain unauthorized advantage over fellow students in an academic exercise.

Note that it is the policy of the GGBE that students may collaborate on homework/coursework solutions but must submit their own independent response to any homework assignment. Exceptions to this policy will be made explicitly and in writing by the course instructor.

The Penn library website has excellent resources on this topic. The links below provide resources on the specific topic of plagiarism:

http://gethelp.library.upenn.edu/PORT/documentation/plagiarism_policy.html
http://gethelp.library.upenn.edu/PORT/documentation/avoidingplagiarism.html

### 6.1.3 Code of Clinical Conduct

The relationship of modern biomedical research to the clinical setting may place BGS students in direct contact with patients, patient medical records, or health care workers. BGS students must behave with paramount concern for patients' welfare and with respect for the rights of patients. The expectations of BGS students' conduct in the clinical setting include the following:

A. adherence to appropriate standards of behavior in the presence of patients;

B. adherence to appropriate standards of confidentiality with respect to information about patients;

C. honesty in interactions with clinical colleagues and in recordkeeping;

D. respect for the limits of responsibility and activity set forth by supervisors;

E. appropriate interactions with colleagues and co-workers.

### 6.2 Academic standards

#### 6.2.1 Course grades and Academic Probation

Grades for all formal courses are assigned as follows: “A,” distinguished; “B,” good; “C,” unsatisfactory; “D,” poor; “F,” failure. Course directors may award pluses and minuses at their discretion. Grades of B− or above are considered acceptable; grades of C+ or below are unacceptable. A student who receives an unacceptable grade (C+ or lower) in any course is automatically placed on academic probation, an enrollment status that indicates an
unsatisfactory level of academic performance. A student who is on probation may take other courses and exams but may not graduate. The probation is automatically lifted when the student has made up the deficient work by receiving an acceptable grade. The student must arrange with the chair of the course in question a program of study that will accomplish this end. One option is to redo the assignments or exams that led to the unsatisfactory grade. Another is to take the course again during the next semester in which it is offered. In any event, a student who fails to redress the deficiency within one year of being placed on academic probation will be dismissed and considered ineligible for re-admission. If a student receives a second unacceptable grade in another course while already on academic probation, the Graduate Group Chair will convene a committee to review the case. The committee, which will consist of the student’s academic advisor and two other members of the Graduate Group faculty, is authorized to recommend either immediate dismissal or continuation of the probationary status, subject to approval by the Graduate Group Chair and BGS.

6.2.2 Incompletes

In order to graduate, students must satisfactorily complete their course work. There may be times when, for some reason, a student cannot complete the course work within the allotted time. In this case, the student must formally request, in writing, a grade of Incomplete (I) for the course. Requests for Incompletes are not automatically granted, and the course director must agree to enter the grade for that course. **Students and faculty should be aware that incompletes become permanent after a period of one year.** Thus, course requirements must be completed and a grade reported within one year or the student will not receive credit for the course even though tuition was paid. **If the incomplete is not resolved within the one-year period, then the student will be required to take an additional course to complete the requirements of the curriculum.** The student must obtain approvals for the replacement course from the advisor and the respective Program Chair prior to registering for it.

6.2.3 Individual Development Plans (IDPs)

BGS requires an annual IDP for all pre-doctoral students (PhD, MD-PhD, and VMD-PhD). The goals of the IDP are to make sure students and mentors are communicating openly and that students are working proactively toward developing the skills they will need to succeed in their program. Separate forms are used by pre-thesis and thesis level students. Please see [https://www.med.upenn.edu/bgs/idp.shtml](https://www.med.upenn.edu/bgs/idp.shtml) for specific requirements regarding the IDP and examples of completed IDP forms.

6.3 Additional Academic Requirements and Policies

6.3.1 Collaborative Institutional Training Initiative (CITI) Training Program

This program is mandatory for all School of Medicine faculty, clinical care associate physicians, physicians at affiliated hospitals, and research staff working with physicians who conduct patient-oriented research. Researchers conducting clinical studies with federal funding are also required to take human subjects research training. The Office of the Provost of Research has identified online training devices provided by the CITI program as the accepted standard for fulfilling the requirement for training certification in human.
research protections. Penn’s IRB requires that researchers conducting clinical trials complete patient-oriented research training, and the CITI program can also fulfill this requirement.

6.3.2 Health Insurance Portability and Accountability Act (HIPAA) training

HIPAA is a federal law that provides for the protection of the confidentiality of patient health records. All students must complete a University-approved course in HIPAA compliance.

6.3.3 Responsible Conduct of Research

Students are required to take training in the responsible conduct of research every academic year. First-year students satisfy this requirement by participating in an on-line Bioethics Symposium. Second-, third-, and fourth-year students attend small-group workshops in which relevant case studies are discussed. Students whose studies extend beyond four years must continue to participate in a yearly training session of their choice. Such students can satisfy the responsible conduct of research requirement by participating in various University-sanctioned bioethics courses and symposia or by serving as an assistant facilitator in a workshop for second-, third-, and fourth-year students.

6.3.4 Course evaluations

We take seriously what you say about a course and try hard to improve every year based on your feedback. So please take a few minutes to do this promptly and completely at the end of each course throughout your time here.

Also, please be aware that faculty promotions can be affected by how they are evaluated. This is not meant to dissuade you from being honest and honestly rating the course faculty. But please take this seriously and be thoughtful about how you rate the faculty’s effort, skill, and teaching abilities. Constructive criticism is helpful and truly appreciated by both faculty and the administrative group. Disparaging comments are not so helpful and I would discourage you from including them, but would rather advise that you find a different way to express what you think was wrong with the course or the instruction.

We thank you in advance for taking the time to fill out these short evaluations. The OASIS system may not be the most user friendly but it should not be hard and should not take more than a few minutes. Let the program staff know if you have problems with the system.

6.3.5 Leaves of absence

The University allows graduate students to take leaves of absence with the permission of the PhD program and BGS only during the period prior to dissertation status. Exceptions may be made for dissertation level students, most notably for medical reasons and for parental leave in association with the birth of a child (of up to one year). Student stipends are suspended during a medical leave period and are guaranteed upon return from leave under the conditions of the original award guarantee. A student who wishes to take a leave of absence must submit a written request to the Program Chair and the GGEB chair at least one month prior to the
beginning of the first semester of the proposed leave. If the leave is for medical reasons, the request should include a note from the student’s doctor. Leaves of absence are granted for no more than one year. The university’s leave of absence policy is provided in the Graduate Catalog Rules and Regulations: http://www.upenn.edu/VPGE/rules.html

6.3.6 Vacation and Time Away
Graduate fellowships provide tuition, fees, health insurance, and a stipend for eligible full-time doctoral students in residence who remain in good academic standing. A student who accepts a full-time funded position is expected to devote full time to graduate study. BGS and GGEB offer a 12-month annual training program for funded students. Although students are expected to work full-time toward the degree, they are entitled to take University and GGEB staff holidays and two weeks per year for personal vacation time. The timing of the vacation must be approved by the supervisor of either the training or research grant or contract that provides financial support for the student. Students who have not yet passed the candidacy exam (see below) should consult the Chair of GGEB with requests for any additional time away from the University. A student who has passed the candidacy exam may schedule time away only with the prior approval of his or her dissertation advisor, the individual who is supporting his or her assistantship or traineeship, the Program Chair and the GGEB Chair.

6.4 Transfer of credit
At least twelve course units must be completed while enrolled in a degree program at Penn; thus for the PhD degree, a maximum of eight units may be transferred from graduate work done at other institutions. Transfer of credit must be approved by the respective program Chair, Graduate Group Chair, and the BGS Chair.

6.4.1 Transfer from other graduate groups
Students who are currently enrolled in another graduate group within BGS may apply for transfer into the Graduate Group in Epidemiology and Biostatistics (GGEB) by submitting an application for admission to the GGEB. Students should clearly express their interest in joining the PhD Program in Epidemiology or the MS or PhD programs in Biostatistics in their personal statement. If determined to meet the admission standards for the program, the student will then meet individually with the respective program Chair to discuss any issues related to fulfilling the program course requirements. The Chair, in consultation with the respective Curriculum Committee and the Graduate Group Chair, will provide the student with a written statement of required course work. The student should have the chair of the former program sign a "Transfer of Graduate Group Form" to release the student from the former graduate group and then have the chair of the new program sign the same form to accept the student into the new graduate group. The GGEB will then request that the student’s academic file be transferred from the former graduate group office. A similar procedure will be used for students transferring from other graduate programs within the university.

6.5 Residency, time limits, and fees
Students must complete all course requirements, pass the required examinations, and complete the dissertation within ten years of matriculation. A student who fails to complete
the dissertation within the time limit must petition a committee — composed of the student’s academic advisor, the Director of Educational Programs (or a designated surrogate if the Director is also the advisor), and a third member of the faculty designated by the GGB Chair — to be recertified as a PhD candidate. The petition must name the student’s dissertation advisor and committee members, describe a plan to finish the research needed to complete the dissertation, and indicate an expected date for the defense and deposit of the dissertation. Should the committee support the petition, it will submit a detailed recertification plan for review and approval by the Director of BGS, as specified in the University-Wide Academic Rules for Graduate Degrees.

In addition, PhD candidates must complete the dissertation within five years of passing the Qualifications Examination or being admitted into the PhD program (the latter if admitted to the PhD program after passing the Qualifications Examination at the PhD level as an MS student). A student who does not complete the degree within five years must petition the GGB for an extension of the time limit. The petition must indicate a detailed plan for completing the PhD research, including anticipated dates for defending and depositing the dissertation. The petition will be considered by a committee that includes the student’s academic advisor, the Director of Educational Programs (or a surrogate as indicated above) and a third faculty member designated by the GGB Chair. A candidate who withdraws from the PhD program after reaching dissertation status and subsequently applies for re-admission must pay the dissertation fees that would otherwise have been due during the withdrawal period.

7 Graduate Training Programs in Biostatistics

Our educational programs are designed for students who wish to pursue a career in biostatistics. The GGB offers two degrees in biostatistics:

- A Master of Science (MS) in Biostatistics
- A Doctor of Philosophy (PhD) in Biostatistics

At Penn, biostatistics is housed within the Perelman School of Medicine, where biostatistics and epidemiology are integrated into a single department. Additional opportunities exist to interact with the statistics department. The Department of Biostatistics and Epidemiology is housed within Blockley Hall while the Department of Statistics in the Wharton School, whose offices and classrooms are in Huntsman Hall, is just a short walk away.

The goal of the MS program is to train students in the basic theory and application of statistical methods, especially as relevant to problems in health science. The MS program, which requires successful completion of a written qualifying exam and preparation of an MS thesis, can be completed in twenty-one months of full-time study.

The PhD program aims to train independent researchers in the development and application of biostatistical methods. The PhD program includes the courses for the MS program and at least one additional semester of advanced courses in statistical theory and
methods. PhD students also take two courses toward a minor in biomedical science, pass both written and candidacy examinations, and successfully complete a doctoral dissertation. The PhD program typically requires at least four to five years of full-time study.

7.1 Elements Common to MS and PhD Programs

7.1.1 Academic Advisor
Each incoming student is assigned an academic advisor who serves as the student's primary mentor, advising in course selection and related academic matters. The Program attempts to match students to advisors who have similar backgrounds and interests. A student may change advisors at any time by request to the Program Chair. A PhD student's dissertation advisor, once selected, assumes the role of academic advisor during the later years of study.

At the beginning of the academic year, each student, in collaboration with his/her advisor, prepares a proposed academic program including courses to be taken, courses to be transferred, and timelines for examinations and dissertation preparation.

7.1.2 Non-Credit Requirements
The Department conducts a weekly biostatistics research seminar that invites speakers from other universities, industry and government. These are opportunities for students to meet with biostatisticians from the broader community, and to be exposed to cutting-edge research. All students are expected to attend at least six seminars per semester. Other non-credit requirements include Responsible Conduct of Research, CITI, and HIPAA training. These requirements are described in detail in Section 4.3

7.1.3 Transfer of Credit
At least eight course units of the total program required for the MS degree must be completed while enrolled in a graduate program at the University of Pennsylvania. Because the MS program requires only twelve total course units, no more than four may be satisfied by transfer credit. Similarly, at least twelve course units of the twenty required for the PhD degree must be completed while enrolled in a degree program at Penn; thus for the PhD degree, a maximum of eight units may be transferred from graduate work done at other institutions. Transfer of credit must be approved by the Program Chair.

7.1.4 Auditing
Auditing a required course is routinely allowed for students who are transferring credit for that course. In all other cases, auditing of a course is strongly discouraged. If a student wishes to audit a course he/she must consult their academic or dissertation advisor and prepare a written request to the Program Chair explaining reasons for the proposed course audit.

7.2 Master of Science (MS) in Biostatistics
7.2.1 Course Requirements

Candidates for the MS degree must complete 12 units of course credit, pass the written qualifying exam, and prepare a Master’s thesis. Required courses cover probability, mathematical statistics, and statistical methods including categorical data analysis, linear models, multivariate methods, survival analysis, and applied data analysis. All students also take courses in epidemiology and human health and disease.

The MS in Biostatistics typically requires four semesters of formal course work. Students must complete nine units of required courses if matriculating after Fall 2013 and 10 units of required courses otherwise), three units of electives if matriculating after Fall 2013 and two units of electives otherwise, and the Biostatistics in Practice I and II requirements (see below). The required courses are described below. Note that BSTA 652 Categorical Data Analysis is not a required course for students matriculating after Fall 2013.

Methods:
- BSTA 630 Methods I (1 unit)
- BSTA 631 Methods II (1 unit)
- BSTA 651 Introduction to Linear Models & Generalized Linear Models (1 unit)
- BSTA 652 Categorical Data Analysis (1 unit) (only for students matriculating before Fall 2014)
- BSTA 653 Survival Analysis (1 unit prior to matriculation in 2014)
- BSTA 656 Longitudinal Data Analysis (1 unit)
- BSTA 659 Design of Biomedical Studies (1 unit) OR
- BSTA 657 Design of Biomedical Studies I (0.5 unit) AND
- BSTA 658 Design of Biomedical Studies II (0.5 unit)
- BSTA 670 Statistical Computing (1 unit matriculation after 2014)

Theory:
- BSTA 620 Probability (1 unit)
- BSTA 621 Statistical Inference I (1 unit)

Applications:
- BSTA 509 Introductory Epidemiology (0.5 unit)
- BSTA 510 Introduction to Human Health and Diseases (0.5 unit)

The courses in bold type are the “core” courses for the MS degree that are covered on the written qualifying examination.
7.2.1.1 Electives
Students choose three (two for students matriculating before Fall 2014) additional units from a list of advanced courses in Biostatistics and related topics. A partial listing appears under the section on Electives for the PhD program below. In addition to these electives BSTA 622 Inference II, and BSTA 653 Survival Analysis, which are required courses for the PhD program, may be used as an advanced electives for the MS program. In addition to this list, other courses offered by departments outside of Biostatistics and Epidemiology may be appropriate advanced electives. Courses not described here may be used as an advanced elective for the MS program upon receiving approval from the Program Chair.

7.2.2 Biostatistics in Practice and the MS Thesis
All MS students must participate in the Biostatistics in Practice I seminar and complete a Biostatistics in Practice II (BIP II) project, which serves as the MS thesis. The BIP II project consists of a comprehensive analysis of a dataset and a report of the results. The BIP II project may be completed in any semester. See the description of the Biostatistics in Practice seminars in Section 5.3.5

Typical Course Sequence for Full-Time Students in the MS Program:

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Required Credit Courses (units)</th>
<th>Required Non-credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1 Fall</td>
<td>BSTA 620 Probability (1)</td>
<td>HIPAA Certification</td>
</tr>
<tr>
<td></td>
<td>BSTA 630 Statistical Methods and Data Analysis I (1)</td>
<td>CITI Training</td>
</tr>
<tr>
<td></td>
<td>BSTA 509 Introductory Epidemiology (0.5)</td>
<td>Biostatistics in Practice I</td>
</tr>
<tr>
<td></td>
<td>BTA 510 Introduction to Human Health and Diseases (0.5)</td>
<td></td>
</tr>
<tr>
<td>Year 1 Spring</td>
<td>BSTA 621 Statistical Inference I (1)</td>
<td>On-Line RCR Symposium</td>
</tr>
<tr>
<td></td>
<td>BSTA 631 Statistical Methods and Data Analysis II (1)</td>
<td>Biostatistics in Practice I</td>
</tr>
<tr>
<td></td>
<td>BSTA 651 Introduction to Linear Models &amp; GLM (1)</td>
<td></td>
</tr>
<tr>
<td>Year 2 Fall</td>
<td>BSTA 670 Statistical Computing (1)</td>
<td>MS Thesis: Choose advisor, outline project</td>
</tr>
<tr>
<td></td>
<td>Advanced Electives (2)</td>
<td></td>
</tr>
<tr>
<td>Year 2 Spring</td>
<td>BSTA 656 Longitudinal Data Analysis (1)</td>
<td>MS Thesis: Complete and present</td>
</tr>
<tr>
<td></td>
<td>BSTA 657 Design of Biomedical Studies I (0.5)</td>
<td>RCR Workshop</td>
</tr>
<tr>
<td></td>
<td>BSTA 658 Design of Biomedical Studies II (0.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced Elective (1)</td>
<td></td>
</tr>
</tbody>
</table>

Written Qualifications Examination

Year 2 Spring
7.3 Doctor of Philosophy (PhD) in Biostatistics

7.3.1 Course Requirements

The PhD in Biostatistics typically requires five to six semesters of coursework and additional semesters devoted to dissertation research. This can be accomplished in four to five years of full-time study. The standard course sequence for PhD students consists of 17 units in core courses, electives and courses in the minor: 7 units in statistical methods (8 if matriculating before Fall 2014); 3 units in theory; 0.5 unit of anatomy/physiology and 0.5 unit of epidemiology, 2 units toward a minor and 4 (3 if matriculating before Fall 2014) units of electives in advanced theory and methods. A minimum of three units of credit including one unit of independent study (BSTA 999) and two units of guided research (BSTA 920 and BSTA 995) are required. These are the required core courses:

Methods:
- BSTA 630 Methods I (1 unit)
- BSTA 631 Methods II (1 unit)
- BSTA 651 Introduction to Linear Models & Generalized Linear Models (1 unit)
- BSTA 652 Categorical Data Analysis (1 unit) (if matriculating before Fall 2014)
- BSTA 653 Survival Analysis (1 unit)
- BSTA 656 Longitudinal Data Analysis (1 unit)
- BSTA 659 Design of Biomedical Studies (1 unit)
- OR
  - BSTA 657 Design of Biomedical Studies I (0.5 unit) AND BSTA 658 Design of Biomedical Studies II (0.5 unit)
- BSTA 670 Statistical Computing (1 unit)

Theory:
- BSTA 620 Probability (1 unit)
- BSTA 621 Statistical Inference I (1 unit) BSTA 622 Statistical Inference II (1 unit)

Applications:
- BSTA 509 Introductory Epidemiology (0.5 unit)
- BSTA 510 Introduction to Human Health and Diseases (0.5 unit)

The eight courses in **bold** type are PhD “core” courses that are covered on the written qualifying examination.

7.3.1.1 Electives and Independent Study

Students are required to take 3 (4 for students matriculating in Fall 2014 or later) additional advanced electives; a partial listing of such courses is given below. In addition to this list, other courses offered by departments outside of Biostatistics and Epidemiology may be appropriate advanced electives. Courses not described here may be used as an advanced
elective for the PhD program upon receiving approval from the Program Chair. Independent study, or reading courses (BSTA 999) are reserved for doctoral students who have passed the Qualifying Exam and are either discerning a dissertation topic or undertaking the early stages of dissertation research. BSTA 999 courses generally do not satisfy the advanced elective requirement.

- BSTA 751 Advanced Methods for Linear and Nonlinear Models (1 unit)
- BSTA 752 Categorical Data Analysis II (1 unit)
- BSTA 753 Survival Analysis II (1 unit)
- BSTA 754 Experimental Design II (1 unit)
- BSTA 755/STAT 925 Multivariate Analysis: Methods (1 unit)
- BSTA 756/STAT 926 Multivariate Analysis: Theory (1 unit)
- BSTA 770/STAT 915 Nonparametric Inference (1 unit)
- BSTA 771 Applied Bayesian Analysis (1 unit)
- BSTA 774 Statistical Methods for Evaluating Diagnostic Tests (0.5/1 unit)
- BSTA 775/STAT 920 Sample Survey Methods (1 unit)
- BSTA 798/799 Advanced Topics in Biostatistics (0.5/1 unit)
- BSTA 781 Asymptotic Theory with Biomedical and Psychosocial Applications (1 unit)
- BSTA 782 Statistical Methods for Incomplete Data (1 unit)
- BSTA 783 Multivariate and Functional Data Analysis (1 unit)
- BSTA 784 Analysis of Biokinetic Data (0.5 unit)
- BSTA 785 Statistical Methods for Genomic Data Analysis (1 unit)
- BSTA 786 Advanced Topics in Clinical Trials (1 unit)
- BSTA 787 Methods for Statistical Genetics in Complex Human Disease (1 unit)
- BSTA 790 Causal Inference in Biomedical Research (1 unit)
- STAT 530 Probability II (1 unit)
- BSTA 820/STAT 552 Statistical Inference III (1 unit)
- BSTA 852/STAT 910 Forecasting and Time Series (1 unit)
- BSTA 854/STAT 927 Bayesian Statistical Theory and Methods (1 unit)

### 7.3.2 Consulting Requirement, Equivalent of MS Thesis

All PhD students must participate in the Biostatistics in Practice I and complete a Biostatistics in Practice II project, a requirement that students typically satisfy during the first or second year. See the “PhD Practicum Requirement & MS Thesis” section for further detail.

### 7.3.3 Teaching Practicum

All students in the PhD program must provide teaching support for a Biostatistics course offered by the Department of Biostatistics and Epidemiology and equivalent to 1.0 course unit i.e., six to eight hours per week for one semester. A student will not be paid for teaching done to satisfy the practicum requirement unless it is part of his or her funding package for that year, as designated in the annual funding letter. After completing the
practicum, funded doctoral students may be required to teach. Typically the total time that a student teaches will not exceed five semesters (six hours per week for one semester in each year of the program). If this additional teaching is not part of the student’s funding package, the student will be eligible for additional compensation for this activity, subject to approval by the Program Chair, GGEB chair, and the BGS chair.

7.3.4 Minor
Students must complete a two-unit minor sequence in one or more areas of science relevant to biomedical research. Some possible subject areas for minor courses include epidemiology, genetics, psychology, and economics. Minor courses are typically taken outside of the Graduate Group, with the exception of advanced epidemiology courses (beyond BSTA 509), which may also be counted toward the minor.

7.3.5 Biostatistics in Practice and the PhD Consulting Requirement

Biostatistics in Practice I Workshop
Participation in Biostatistics in Practice I is required for both the MS and PhD degrees. This non-credit course covers practical aspects of utilizing biostatistics in multi-disciplinary research teams. Didactic lectures address both the substantive and communications aspects of consulting, with student participation in class discussions considered critical. In formal presentations, students review and comment on protocols for ongoing clinical trials and observational studies, discussing the rationale underlying design and analysis choices. The course intends to bridge the gap between theory and application and relies on real-world examples to illustrate the principles behind the theory. For PhD degrees, Biostatistics in Practice I will be waived if the student 1) has achieved an MS in Biostatistics or Applied Statistics and 2) can demonstrate exposure to an equivalent curriculum in their previous degree program.

Biostatistics in Practice II Project
The Biostatistics in Practice II project offers the student an opportunity to acquire and demonstrate proficiency in statistical collaboration and data analysis. The project is defined by several elements: A scientific question or hypothesis arising in medical research; the statistical methodology needed to address the question; the development of a study design and/or analysis of a relevant data set; and a summary of the results of these analysis. In most cases, a collaborating medical scientist provides the research question and the data. The student, under the supervision of a faculty instructor, identifies the appropriate statistical methods and conducts the analysis. The analysis should be sufficiently extensive and detailed to support a manuscript publishable in the medical literature.

Students complete the Biostatistics in Practice II project under the supervision of a member of the biostatistics faculty. The project consists of two parts. The first is a written report including: a description of the research question; a short statement of background and
significance; a description of the statistical methods applied; the results of the analysis; and a summary of the major findings and conclusions. The second is a short (15-minute) oral presentation of the project to the biostatistics faculty and students. For students wishing to use the Biostatistics in Practice II project as the Master’s Thesis (see below) the written report should describe the study in a format suitable for publication in a scientific journal. For students not pursuing the MS degree, slides used to accompany the oral presentation may be submitted as the written report.

Students register for Biostatistics in Practice II by indicating to the Administrative Program Coordinator that they intend to complete the requirement over the next two semesters (see https://dbe.med.upenn.edu/biostat---research/resources---educational for details). The project must be completed by the end of the following April for students who sign up in the fall semester, or by the end of the following August for students who sign up in the spring semester.

All data analyses done as part of the Biostatistics in Practice II project must have IRB approval. In most cases this requirement is satisfied if the research objectives are part of an existing protocol of the participating medical research collaborator, as long as the student is added to the protocol according to the standard modification procedures required by the IRB.

Typical Course Sequence for Full-Time Students in the PhD Program:

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Required Credit Courses (units)</th>
<th>Required Non-credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1 Fall</td>
<td>BSTA 620 Probability (1)</td>
<td>HIPAA Certification</td>
</tr>
<tr>
<td></td>
<td>BSTA 630 Statistical Methods and Data Analysis I (1)</td>
<td>CITI Training</td>
</tr>
<tr>
<td></td>
<td>BSTA 509 Introductory Epidemiology (0.5)</td>
<td>Biostatistics in Practice I</td>
</tr>
<tr>
<td></td>
<td>BTA 510 Introduction to Human Health and Diseases (0.5)</td>
<td></td>
</tr>
<tr>
<td>Year 1 Spring</td>
<td>BSTA 621 Statistical Inference I (1)</td>
<td>On-Line RCR</td>
</tr>
<tr>
<td></td>
<td>BSTA 631 Statistical Methods and Data Analysis II (1)</td>
<td>Symposium</td>
</tr>
<tr>
<td></td>
<td>BSTA 651 Introduction to Linear Models &amp; GLM (1)</td>
<td>Biostatistics in Practice I</td>
</tr>
<tr>
<td>Year 2 Fall</td>
<td>BSTA 653 Survival Analysis (1)</td>
<td>BIP II: Choose advisor,</td>
</tr>
<tr>
<td></td>
<td>BSTA 652 (1) (Fall 2014 only)</td>
<td>outline project</td>
</tr>
<tr>
<td></td>
<td>BSTA 670 Statistical Computing (1) (Fall 2015)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced Elective (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Written Qualifications Examination</strong></td>
<td></td>
</tr>
<tr>
<td>Year 2 Spring</td>
<td>BSTA 656 Longitudinal Data Analysis (1)</td>
<td>BIP II: Complete and</td>
</tr>
<tr>
<td></td>
<td>BSTA 657 Design of Biomedical Studies I (0.5)</td>
<td>present project</td>
</tr>
<tr>
<td></td>
<td>BSTA 658 Design of Biomedical Studies II (0.5)</td>
<td>RCR Workshop</td>
</tr>
<tr>
<td></td>
<td>Advanced Elective (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Dissertation Phase: Exploration</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Year 3 Fall | Advanced Elective (1)           | Teaching Assistantship

Graduate Group in Epidemiology and Biostatistics Handbook 2014-2015
### 7.4 Evaluation and Examinations

Evaluation for the MS degree is based on performance in the required and elective courses, successful performance on the Qualifying Examination, and completion of the MS thesis/Biostatistics in Practice II project. Evaluation for the PhD degree is based on these criteria plus ongoing interactions with the faculty advisor, performance on the Candidacy and Dissertation Examinations, and the dissertation itself.

#### 7.4.1 The Written Qualifying Examination (MS and PhD)

The following guidelines refer to the written qualifying examination required of all MS and PhD students in Biostatistics. The Qualifying Examination Committee (QEC) develops and administers the examination each year and presents the results to the full faculty.

Passing of the Biostatistics written qualifying examination is required for continuation in both the MS and PhD programs. This examination also satisfies the Penn examination requirements as outlined below. Students in both programs take the same exam.

#### 7.4.1.1 PhD Program Examination Requirements

The PhD program requires the successful passing of three examinations: the Qualifications Evaluation, the Candidacy Examination, and the Dissertation Examination. Later sections outline the procedures for the Candidacy Examination and the Dissertation Examination. The written qualifying examination serves as the University-required “Qualifications Evaluation” defined in the Graduate Studies catalog as follows:

1. **Teaching requirement:** typically completed in years 2–5.

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 3 Fall</td>
<td>BSTA 999 Independent Study (1)</td>
<td>RCR</td>
</tr>
<tr>
<td></td>
<td>Minor (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced Elective (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BSTA 920 Guided Dissertation Research (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minor (1)</td>
<td></td>
</tr>
<tr>
<td><strong>Dissertation Phase: Candidacy Examination and Proposal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 4 Fall</td>
<td>BSTA 920 Guided Dissertation Research (2)</td>
<td>Teaching Assistantship¹</td>
</tr>
<tr>
<td></td>
<td>BSTA 999 Independent Study (1)</td>
<td>RCR</td>
</tr>
<tr>
<td>Year 4 Spring</td>
<td>BSTA 920 Guided Dissertation Research (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BSTA 995 Dissertation Research (2)</td>
<td></td>
</tr>
<tr>
<td><strong>Committee Meeting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 5 Fall</td>
<td>BSTA 995 Dissertation Research (3)</td>
<td>Teaching Assistantship¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RCR</td>
</tr>
<tr>
<td>Year 5 Spring</td>
<td>BSTA 995 Dissertation Research (3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defense of Dissertation</td>
</tr>
</tbody>
</table>

¹Teaching requirement; typically completed in years 2–5.
A Qualifications Evaluation of each student is conducted in the first two years. The evaluation is designed by the graduate group and may be based on an examination or on a review of a student’s overall academic progress. Satisfaction of this requirement is necessary in order to continue in the graduate program and is recorded in the student’s academic record. The student and the school’s graduate office must be notified of the outcome of the evaluation.

Students must pass the written qualifying examination as the first step toward full PhD candidacy. The exam consists of two parts, theory and methods. Students are given a grade on each part, and have up to two opportunities to take each part. A student must receive a passing score on both parts of the exam to be considered to have passed. Because the exam is offered only once a year, PhD students who do not pass one or both parts of the exam and elect to take it a second time have the opportunity to take two additional semesters of course work between examinations. A PhD student who passes one part of the exam at the PhD level is not required to take that part a second time. Details of the exam scheduling and format are subject to change. Further information will be placed on the departmental website; the final format and scheduling will be decided early in the fall semester.

7.4.1.2 MS Program Examination Requirements

For students in the MS program in Biostatistics, the written qualifying examination plays the role of the University-required “General Examination” defined in the Graduate Studies catalog under the MS degree as follows:

General Examination: A general examination by the graduate group in the major subject is required in addition to all other examinations. The purpose of the general examination is to test the candidate's knowledge of his or her major subject in its broader aspects as well as proficiency in the particular courses he or she has taken. This examination may be oral, or written, or both, as the graduate group may decide. The mere satisfaction of minimum requirements does not entitle the student to be admitted to this examination. The examination covers the topics in the eight “core” courses listed in the “training Programs” section. The exam consists of two sections: Part A (Theory) and Part B (Methods). Students must attempt both Part A and Part B on their first attempt. For doctoral students, failure to do so will result in an automatic grade of Fail on the section not attempted; for MS students failure to do so will result in an automatic grade of Fail on both parts of the exam.

7.4.2 Examination Results and Notification

All matters pertaining to grading and review of the examination by the faculty are confidential, but some general procedures are outlined here.

Once grading is complete (typically two weeks after the exam), the faculty meet to review the examination. Because the meeting also provides an opportunity to review the progress
of all students in the program, grades and related materials may also be discussed in addition to the exam scores. Because the difficulty of the examination may vary from year to year, there are no absolute cut-offs for passing.

For a PhD student, the examination has five possible outcomes:
1. Pass at the PhD level.
2. Pass only Part A (Theory) at the PhD level.
3. Pass only Part B (Methods) at the PhD level.
4. Pass at the MS level.
5. Fail.

A PhD student who achieves outcome 1 is eligible to continue working to complete other PhD program requirements and, in particular, should begin the process of selecting a dissertation topic and advisor. As described below the Candidacy Exam is required within 18 months of the successful completion of the written qualifications examination. A PhD student who achieves outcome 2 must re-take and pass Part B at the next opportunity in order to continue in the PhD program. A PhD student who achieves outcome 3 must re-take and pass Part A at the next opportunity in order to continue in the PhD program. A PhD student who achieves outcomes 4 or 5 must re-take the entire exam, and pass at level 1, at the next opportunity in order to continue in the PhD program. A PhD student who achieves outcome 1, 2, 3 or 4 may complete the requirements for the MS degree. A PhD student who achieves outcome 5 and wishes to earn an MS degree must pass a supplementary oral exam (described below).

For an MS student the examination has two possible outcomes:
1. Pass at the MS level
2. Fail

An MS student who achieves outcome 2 must pass a supplementary oral examination (see below) in addition to completing any other requirements for the MS degree. MS students will also be separately evaluated for outcomes 1, 2 and 3 as described above for PhD students. Applicants to the PhD program should note that outcomes 1, 2 or 3 do not guarantee admission into the PhD program. For MS students admitted to the PhD program, the outcome on the first attempt of the exam as an MS student is retrospectively considered to be equivalent to the first attempt as a PhD student (see above).

Each student who takes the exam receives written notification of his or her outcome as soon as possible after the faculty grading meeting. No other information is made available before that time. The letter notifies the student of the outcome of the exam, recommendations for continued study, and the process for discussion of the exam with the QEC.

**Supplementary Oral Examination for Students Seeking an MS Who Fail at the MS Level**
This oral examination is administered by a committee made up of three faculty members selected by the Chair of the QEC in consultation with the student’s academic advisor. In order to allow the student to graduate in May, the exam should take place no more than eight weeks after the distribution of the results of the written qualifying exam. This examination is separate from the required presentation of MS thesis work that is open to all Biostatistics students and faculty.

The oral examination is closed. In order to provide focus for both the student and the exam committee, the examination begins with a brief presentation (no more than 20 minutes) by the student of the MS thesis proposal. The examination then focuses on methodology and applications related to the MS thesis. A student who successfully passes is eligible to continue in the MS program. A student who fails is not eligible to receive the MS degree.

The faculty examination committee makes one of three recommendations for each student: Pass, conditional pass, or fail. A conditional pass may be selected if the committee believes that there are specific weaknesses that can be addressed in a short time by the student. If this option is selected, the committee members must identify the area(s) of weakness, as well as specific remedies and a time frame for satisfying the conditions. Possible remedies include, but are not limited to, continuation of the oral exam at a later date, writing a paper on a topic in statistics, or writing a paper on a data analysis, covering the specific area(s) identified as requiring improvement. The committee evaluates this work and makes a recommendation of pass or fail. The student must satisfy the conditions of the pass within three (3) months of the exam.

### 7.4.3 MS Students Applying to the PhD Program

Students enrolled in the MS program who wish to apply to the PhD program must submit a formal application. The application may be submitted prior to taking the written qualifying examination as the application is usually due prior to the examination. However, the results of the examination are available in late January, typically before the Admission Committee makes its final decisions. The Admission Committee determines how to use the results of the written examination in the admissions process.

MS students who pass both parts of the written qualifying examination at the PhD level on the first attempt and are admitted to the PhD program are not required to take a second examination. MS students who pass one or both parts at the MS level and are admitted to the PhD program are required to take the deficient part of the examination a second time and pass at the PhD level in order to continue in the PhD program. No student is allowed to take either part of the exam more than twice.

### 7.4.4 Review of the Examination

A student who does not pass one or both parts of the examination at the intended level may request to review his/her exam paper with the QEC Chair and, optionally, his/her academic advisor. The purpose of such a review is to help the student evaluate the types
of mistakes made, identify areas where further study is needed, etc. The QEC retains the graded exam papers and does not return them to the students.

A student may appeal the outcome of the qualifying examination to the QEC Chair, who together with the QEC membership evaluates the appeal and judges whether it has merit. A grade can only be changed in cases of a specific error in scoring. The QEC refers any grade change that could affect the student’s exam outcome to the full Biostatistics faculty, who decide whether to revise the exam outcome.

Because a minor revision of the score is unlikely to change the exam outcome, a student should only initiate a formal appeal if there were one or more egregious errors in the problem or in its grading, the correction of which would likely lead to a substantial increase in the score. The QEC Chair can advise the student on the prospects for success of a proposed appeal. A student who seeks a formal review must request it, in writing, from the QEC Chair within one week of the issuance of the letter notifying the student of the exam result.

7.4.5 Sickness Policy
A student who has declared an intention to sit for the exam, but at the time of the exam is too ill to take it, may request a deferment by contacting both his/her academic advisor and the Chair of the QEC. A deferment can be granted only if the student provides a note from a medical doctor excusing him or her from the exam as a result of the illness. The student may then be allowed to take the exam on or before the first business day when the note indicates that the student may return to work. The decision to request a deferment must be made before taking the exam. A student who takes any part of a day’s exam will be considered a complete exam and graded accordingly.

7.4.6 The PhD Candidacy Examination
In order to advance to candidacy for the PhD degree in Biostatistics, a student must successfully pass a candidacy examination. This examination satisfies the requirements of the University’s required “Candidacy Examination” defined in the Graduate Studies catalog:

A Candidacy Examination on the major subject area is required. This examination is normally held after the candidate has completed all required courses and may be satisfied by the successful defense of a dissertation proposal. It may be oral or written, or both, at the discretion of the graduate group. Feedback will be provided to the student within one month. Satisfactory completion of the Candidacy Examination requirement is recorded in the student’s academic record. Upon successful completion of the Candidacy Examination, the student is advanced to Candidacy. Normally, a student should advance to Candidacy by the end of the third year. The maximum time limit for a student to be advanced to Candidacy is five years, after which time the student will be dropped from the rolls.

The purpose of the candidacy examination is to evaluate whether the student is qualified to proceed to dissertation research. Although the examination is structured around the
dissertation proposal, it may also cover any material in the student’s course work. This includes the core courses and other requirements, as well as the minor courses. The examination should emphasize the student’s qualification to continue as well as the content of the dissertation proposal. Committee members are encouraged to communicate to both the student and the dissertation advisor suggestions regarding the proposed research, as well as the feasibility of completing the project in a reasonable time.

7.4.6.1 Candidacy Examination Committee Membership
The student’s candidacy examination committee must include
a) the student’s dissertation advisor, who must be a member of the GGE,  
b) a second Biostatistics faculty member,  
c) either a third Biostatistics faculty member or a Statistics Department faculty member,  
and,  
d) an expert in the applied content area of the proposed dissertation.

At least one member of the committee must be a faculty member outside of the GGEB. This can be a Statistics faculty member who does not hold a GGEB appointment, the content area expert, or an additional (fifth) member of the committee. At least half of the committee members must be from the GGEB. The candidacy exam committee chair and members are nominated by the dissertation advisor, subject to approval by the Program Chair and the GGEB chair. The candidacy committee must be approved in advance of scheduling the candidacy exam. The committee chair is a voting member who is responsible for chairing the candidacy exam. The student’s dissertation advisor may not be the committee chair.

The student’s candidacy exam committee typically continues, at least in part, as the dissertation committee. Changes to the committee must be approved by the program Chair and the GGEB chair.

7.4.6.2 Candidacy Examination Scheduling
A student should attempt the candidacy exam within 18 months, or approximately three semesters, after passing the written qualifying exam. Students may petition the Program Chair for exceptions to this rule. It is the responsibility of the dissertation advisor to work with the student to schedule the candidacy exam once the dissertation research has been clearly outlined. All dissertation committee members must attend the candidacy exam in person.

7.4.6.3 Content of the Dissertation Proposal
The student should provide a written dissertation proposal to the committee at least two weeks prior to the scheduled examination date. The members review the proposal and prepare questions for the exam.

The dissertation proposal should include a review of the literature relevant to the topic to be studied. The proposal may, but need not, include preliminary research results. The paper should be primarily a true proposal and should typically not exceed twenty pages.
The examination lasts up to two hours and typically includes three parts: First, the student gives a formal presentation of the proposal, generally not to exceed 45 minutes (which may be extended if there are questions during the talk). Next, committee members question the student on the proposal or on topics in biostatistics or the minor. Once all committee members are satisfied that the questioning is complete, the student is asked to leave the room. The committee then discusses the examination, votes the outcome (see below), and makes recommendations (if any) for future research and study. The student is then readmitted and informed of the outcome. The committee chair ensures that necessary forms are signed and returned to the graduate program office.

7.4.6.4 Candidacy Examination Outcomes

The candidacy exam has three potential outcomes:

a) Pass. The student has sufficiently mastered the material and advances to PhD candidacy.

b) Conditional pass. Additional evidence of mastery of the material is required, the nature of this evidence to be determined by the committee. An example would be a revised dissertation proposal that better represents the nature of the problem to be studied. Once all committee members agree that the additional requirements have been met, the outcome of the examination is changed to a “Pass”. The student is not required to retake the candidacy exam.

c) Fail. The student has not mastered the required material and must retake the examination in order to progress to PhD candidacy.

Retaking the Candidacy Examination

A student who fails the candidacy exam may take the exam for a second time when the advisor deems that the student has demonstrated satisfactory improvement in the areas of concern. A student who fails the candidacy exam after taking it a second time, or who does not make a second attempt within one year of the first (unsuccesful) attempt, is automatically considered to be withdrawn from the program. In such a case, the student may petition the faculty for reinstatement; the petition must include specific justification for the exception and indicate remedial actions to be taken by the student to prepare for PhD candidacy. The faculty may, at its discretion, reinstate the student and allow another chance to attempt the candidacy exam. In any event, no student may progress to PhD candidacy without passing the candidacy exam.

A student who has passed the candidacy exam but wishes to change dissertation topics must prepare a new proposal and submit it to his or her committee. A discussion of the new proposal should be scheduled within three months of its submission. If there is no substantial change in the statistical content area, the candidacy exam need not be retaken, and the committee need not be reconstituted. If there is a substantial change in the statistical content area, the full committee determines whether an additional candidacy exam is required. The student, the advisor for the new proposal, and the other members of the committee also decide on any changes in the composition of the committee.
7.4.7 Review of “Lab Notebook”

BGS mandates that the student’s dissertation committee review the student’s “lab notebook” at each of its meetings. The Biostatistics PhD program interprets this to mean that the student should make available for faculty review, upon request, primary documentation of any substantial element of the dissertation. Such a review takes place at the candidacy exam and any subsequent meetings of the committee, and following the closed session of the dissertation defense. Examples of materials subject to review include the statement and formal proof of a key theorem; the code and results of a simulation study; or the data, code and results of a data analysis. Prior to the meeting, the student’s advisor, in consultation with the dissertation committee, designates a short list of such items that the student makes available in electronic or hard-copy format. The committee chair sets aside time at the meeting for the review of this material. In keeping with the BGS policy, there is no expectation that the committee should scrutinize all such documents “in their entirety”; rather, the review should be sufficient to satisfy the committee that the student’s research records are “complete and well managed”.

7.4.8 Frequency of Dissertation Committee Meetings

Once a student has advanced to candidacy, his/her dissertation committee must meet at least once each year to review goals and progress. A review of the “lab notebook” must accompany each such meeting. The advisor, working with the chair of the committee, schedules the meetings. The student is responsible for providing any review materials needed by the committee in a timely fashion.

7.4.9 PhD Dissertation Examination

This section provides guidelines for the content of the dissertation and the format of the defense. The final steps toward the PhD degree are the preparation of an acceptable dissertation and the dissertation defense, referred to in the Graduate Studies catalog as the Dissertation Examination:

Dissertation Examination: A public, oral presentation of the dissertation is required. The presentation may take the form of a workshop based on a draft of the dissertation, or it may be based on the final version of the dissertation, depending on the rules of the graduate group. In either case, the presentation must either include or be followed by an oral examination. This examination may be private if specified by the rules of the graduate group.

7.4.9.1 Dissertation Committee Membership

In most cases, the dissertation committee is the same as the candidacy examination committee. The chair of that committee also chairs the defense. Please refer to the section on the candidacy examination for details on the composition of the committee.
7.4.9.2 Scheduling
The defense should be scheduled when the candidate and the dissertation advisor agree that the research is near completion and the draft dissertation is in a format suitable for distribution to the committee. As soon as a date and time are fixed, the graduate program coordinator reserves a room (for at least two hours) and prepares the necessary public announcements. In order to accommodate space and scheduling constraints, the date of the exam should be set one month or more before it will take place. All dissertation committee members must attend the exam in person.

7.4.9.3 Content and Format of the Dissertation
A typical dissertation consists of five chapters: The first is an introduction and brief literature review; in many cases, this is similar to the dissertation proposal. The next three cover the three main topics of the dissertation; these may be written in a format suitable for submission as individual articles to peer-reviewed journals. The final chapter summarizes the dissertation findings and indicates possible future research directions. There are no upper or lower limits on the length of the document.

The School of Arts and Sciences (SAS) Graduate Division Office publishes specific guidelines for the format of the dissertation; these guidelines refer to required pages, page layout, etc. The candidate is responsible for understanding and satisfying these requirements.

7.4.9.4 Content and Format of the Defense
At least four weeks prior to the exam, the student should provide each committee member with a copy of the full dissertation. The committee members review the dissertation and prepare exam questions based on it. The defense consists of two parts:

a) Open session. The chair describes the process to all attendees and introduces the candidate. The candidate then presents his/her research in the style of a departmental colloquium. Typically, the candidate presents one chapter in depth, with a very brief overview of the others. This presentation should not exceed 45 minutes. At the close of the formal presentation the candidate takes questions from the audience. To leave sufficient time for the closed portion of the exam, the chair has the right to terminate the open session if it goes on beyond one hour.

b) Closed session. In this part of the exam, attended only by the student and the committee, committee members ask specific questions related to the dissertation. Because the committee members have read the entire dissertation, this is their opportunity to ask questions about any part of it, including chapters not presented in detail in the open session. Once all committee members are satisfied that the questioning is complete, the student is asked to leave the room. The committee then discusses the exam and votes an outcome (see below). The student is then
readmitted and informed of the outcome. The committee chair sees that necessary forms are signed and returned to the graduate program office.

7.4.9.5 Dissertation Examination Outcomes
The dissertation exam has three potential outcomes:

a) Pass. The student has completed the dissertation requirements for a PhD in biostatistics. The student then works with the graduate program coordinator to ensure that all other requirements are met prior to deadlines for the proposed graduation date.

b) Conditional pass. The defense was satisfactory but additional requirements, usually minor, must be satisfied. Commonly, the student is asked to address specific questions raised at the defense, or to incorporate edits proposed by committee members. The dissertation advisor typically oversees these changes, but other committee members may also review changes at their discretion. Once the additional requirements are met, the student is considered to have completed the dissertation. The student is not required to defend the dissertation again.

c) Fail. The student must defend the dissertation again.

7.5 Teaching Assistants

7.5.1 Courses That Receive Teaching Assistants
The program assigns TAs to large service courses such as the biostatistics core courses in the Masters of Science in Clinical Epidemiology and the Biomedical Graduate Studies program. TAs may also be assigned to courses in the Biostatistics program or in programs outside of the department such as the Masters of Public Health or the Masters of Science in Health Policy Research. The Program Chair assigns TAs to courses based on course needs and student qualifications.

7.5.2 Students Who Serve as Teaching Assistants
All doctoral students are required to spend the equivalent of six hours per week for one semester serving as a TA for one of the Ggeb’s courses in biostatistics that is equivalent to one course unit (1 c.u.). Some students serve as full-time TAs during a single half-semester, full semester, or the entire academic year as part of their financial support from the Department. Other students are assigned to serve as part-time TAs or graders for other biostatistics courses. Full-time doctoral students may be required to teach in additional semesters to meet the needs of the department’s educational programs. Students who are fully supported on research assistantships or traineeships are eligible to receive supplementary compensation for additional teaching. Teaching must be completed outside of the hours required for a student’s research assistantship.
7.5.3 Benefits of Serving as a Teaching Assistant

In addition to being a degree requirement for all doctoral students, the teaching experience is an opportunity to work closely with a faculty member in the Department, to review and deepen understanding of the material being taught, and to acquire and sharpen teaching skills.

7.5.4 Duties of a Teaching Assistant

TA duties typically include some or all of the following:

- Attending regular meetings with the course instructor
- Attending lectures
- Holding office hours
- Running lab sessions
- Assisting in the preparation of written course materials, exams and solution sets
- Grading assignments or exams and recording the grades
- Coordinating access to computing facilities, online data sets, and web applications

Timeliness in the completion of these duties is essential. The course instructor and TA should communicate regularly to discuss duties, to share feedback from the students, and to ensure that the

TA’s time is being used efficiently. A student who feels s/he is spending on average more than the designated number of hours on teaching activities should speak to the instructor or, when appropriate, the Program Chair. Both instructors and TAs should recognize that time pressures can vary greatly over the course of a semester. For instance, TA duties usually are light at the start of the course, heavy in the middle, and then light again toward the end (unless assistance is required grading exams). Moreover many TAs are themselves taking courses, whose work load can also vary. Experience shows that grading homework and preparing and directing lab sessions are the two items that occupy most of a TA’s time, especially for a first-time TA. TAs should not hesitate to request specific direction on what to present in lab sessions. Open communication is the key to a successful teaching experience.

In cases where TA duties include assisting in the grading of exams, course instructors should provide the TA with clear guidance on how to assign points. Instructors should also recognize that some students may feel awkward evaluating their peers.

An instructor may ask a qualified TA to give an occasional lecture. The instructor should allow the TA sufficient time to prepare the lecture and should offer any necessary guidance about what is to be covered.

TAs should share their e-mail addresses and mailbox locations with their students. TAs are not on call for their students; nevertheless, students should expect reasonable access to TAs, particularly in the days leading up to exams and project due dates.
7.5.5 Support for Teaching Assistants and Opportunities for Help and Feedback

TAs are encouraged to speak with the instructor, their academic advisor and the Program Chair about their teaching experiences, particularly if difficulties arise. Courses in statistics can be highly stressful for students, particularly those who struggle with mathematics. A potential conflict can often be avoided if its warning signs are recognized early and the situation is handled thoughtfully.

7.6 Other Policies

7.6.1 Student Travel

Doctoral students receiving support may apply for partial reimbursement (currently, up to $500/year) for travel to professional meetings. Applicants must justify the expenses prior to attending the meetings. If departmental funds are insufficient to cover all applicants, the Program Chair ranks the applications based on number of meetings previously attended, student status (e.g., dissertation candidacy), whether the student is presenting at the meeting, whether the presentation is invited or contributed, availability of other funds, and so on. Faculty members may augment or replace this benefit from other sources.

7.6.2 International Students Travelling Abroad

Unfortunately it is often difficult for international students leaving the US to re-enter in a timely fashion. Absences of four or more weeks due to visa issues are becoming increasingly common. While the program understands that these issues are largely out of the control of our international students, it also puts a strain on our financial sponsors when students are unavailable to carry out the obligations of their research assistantships in person. Students are entitled to two weeks of vacation per year; international students who leave the country for vacation must make a plan with their sponsor in advance of leaving the country to address the possibility of delayed entry. The written plan must be approved by both the research sponsor and the Program Chair. Sponsors are not required to allow students to work remotely, and in particular are not expected to fund students to work remotely for indefinite periods of time. International students should expect that funding will be suspended if suitable arrangements are not made and/or if students are absent for more than two weeks.

7.6.3 Registration in Biostatistics Courses

Any student who does not have dissertation status and who wishes to take a course in Biostatistics must formally register for the course. The University reserves the term “auditor” for a student who registers for a course without the intention of receiving a grade and academic credit. Thus, a non-dissertation student who wishes to “sit in” on a course should register as an auditor in this sense (with permission of the instructor, if required) and pay any applicable tuition and fees. Requests for waivers of this policy should be submitted to the Chair of the GGEB.
A student with dissertation status (i.e., who is paying dissertation fees and therefore does not pay for course units) may sit in on a course without registering for it. Students who intend to participate in a course in this way must agree to participate in the course in a manner defined by the instructor, and must obtain the instructor’s prior approval.

7.7 Funding Policies

Full-time PhD students are eligible for funding in the form of traineeships, fellowships, and research and teaching assistantships. The work associated with these sources of support is an essential part of the graduate training program.

At the beginning of the academic year, each funded student receives a letter describing sources of support and associated obligations. Students in the first and second year of their program serve as research or teaching assistants for up to 12 hours/week during the academic year and 40 hours per week during the summer. For students in the third year of their program these activities comprise 12 hours per week in the fall semester, 20 hours per week in the spring semester and 30 hours per week over the summer. Students in the fourth and fifth year of their program are assigned teaching or research assistantships for 20 hours/week throughout the year.

Students who join the program with no prior graduate training in biostatistics will typically be offered up to five years of funding. Students who have previously earned the MS in Biostatistics at Penn before joining the PhD program will receive up to three years of support. Students who enter the PhD program after having earned an MS in Statistics, Biostatistics or a closely related field may be offered three, four or five years of support, at the discretion of the Program Chair. Students who require support beyond the maximum number of years promised are eligible to receive additional funding if it is available after the program meets its other financial commitments.

7.8 Committees

Six committees provide governance and administrative leadership to the Biostatistics graduate programs. Membership is subject to change annually.

The Admissions Committee is responsible for the application and admission process. Responsibilities include developing admission policies; identifying qualified students; reviewing applications; selecting students for telephone or in-person interviews; ranking students for admission; reviewing applications from students in other BGS programs who seek to transfer into Biostatistics; and reviewing applications from students who wish to transfer from part-time (unfunded) to full-time (funded) status in the PhD program. Admission decisions are subject to approval by the GGEB Executive Committee (a committee of the whole) and the BGS Admission Committee. The chair of the Admission
Committee, together with a designated representative from the Epidemiology PhD program, represents the GGEB in the BGS Admission Committee.

The Curriculum Committee is responsible for all rules and policies related to courses, MS theses and doctoral dissertations. Responsibilities include developing policies related to course content; reviewing requirements for MS theses and PhD dissertations; approving proposals for the creation of new courses; and reviewing student course evaluations.

The Executive Committee oversees the graduate training program. Its primary responsibilities are to identify and secure student funding and to consider related strategic and financial issues, including determining the level of student stipends. It meets once a semester during the academic year. Membership consists of the Chair and Associate Chair of Educational Programs, all faculty members who are providing funding support to full-time doctoral students, and by invitation of the Program Chair.

The Student-Faculty Relations Committee facilitates communication between faculty and students and identifies opportunities for students to become involved in departmental activities outside of formal academic requirements. Student members identify and voice issues of concern to the students. Faculty committee members discuss the issues with student members, present them to the faculty as a whole as needed, and implement and track their resolution. The committee also implements opportunities for student-faculty interaction in social settings.

The Qualifying Examination Committee conducts the Program’s written qualifications exam. Responsibilities include developing guidelines, policies and procedures for the exam; soliciting questions for the exam; reviewing and selecting questions; creating the exam itself; managing its grading; presenting results to the faculty; and evaluating the merits of appeals of exam results. Decisions on the outcome of the exam are made by the Biostatistics faculty assembled as a committee of the whole.

The Student Recruitment Committee oversees the recruitment of graduate students into the Biostatistics MS and PhD programs. Its primary responsibility is to develop and manage student recruitment programs, including the interviewing of candidates selected by the Admission Committee. Members are expected to participate as interviewers.

8 PhD in Epidemiology Program

8.1 Overview

The mission of the PhD Program in Epidemiology is to train independent researchers in the development and application of epidemiologic methods and to prepare them for positions as scientific leaders in academia and industry. The PhD is a research degree; it indicates the highest attainable level of scholarship, and a commitment to a research career. The PhD does not represent merely the accumulation of course credits, but rather, the development and
completion of a well-designed and conscientious program of scientific investigation that makes a unique contribution to the field of epidemiology.

The PhD program in Epidemiology requires a total of 20 course units including basic and advanced courses in epidemiology, statistical methods, as well as electives drawn from other departments and schools that serve the student's research interests. The program also requires written qualifications and oral candidacy examinations, and the successful defense of a doctoral dissertation, in accordance with University of Pennsylvania policy. The PhD program typically requires the equivalent of at least four years of full-time study, in three defined phases: coursework, pre-candidacy, and candidacy. The coursework phase typically takes two years of full time study, and is intended to provide the student with the knowledge needed to pursue advanced, independent study and investigation in epidemiologic research. This phase culminates in the written Qualifications Examination, normally taken after most or all of the student's coursework has been completed. The pre-candidacy phase focuses on the preparation of a scientifically unique, methodologically sound, and feasible dissertation proposal. This phase ends with passing the oral Candidacy Examination, at which time the student is recognized as a Candidate for the PhD and focuses his or her effort on performing the research for and writing the dissertation. A successful public defense of the dissertation then completes the academic requirements for the PhD.

8.2 Academic advisor

At the time of application, noted in the personal statement, each incoming student will identify an academic advisor who serves as the student's primary mentor, advising in course selection and related academic matters. A student may change advisors by request to the Program Chair. A PhD student's dissertation advisor, once selected, normally assumes the role of academic advisor during the later years of study. At the beginning of the academic year, each student, in collaboration with his/her advisor, prepares a proposed academic program including courses to be taken, courses to be transferred, and timelines for examinations and dissertation preparation.

8.2.1 Policy on advisors

Mentors for students pursuing a PhD in epidemiology will be expected to have extensive training and experience in epidemiologic research. Generally, they will have the background outlined in the following criteria, although faculty members who do not fulfill all of the criteria may be approved in individual cases by the Graduate Group Chair, in consultation with the Graduate Group Executive Committee. Advisors should expect to dedicate considerable time and effort to one-on-one student supervision.

A. Training
   1. PhD (or equivalent) in epidemiology or other health-related field, OR
   2. MD and Master’s degree in epidemiology

   AND

B. Experience as a mentor to at least one student in epidemiology at the Master’s level or beyond, including advising through all phases from protocol development to submission of thesis or dissertation.
C. Experience as an independent investigator, as demonstrated through receipt of at least one R01 or equivalent as principal investigator and significant contributions to the epidemiologic literature

Mentors not holding the PhD are strongly urged to work closely with the Program Chair and other PhD faculty throughout the student’s program in order to ensure sensitivity to the special and intensive demands of mentoring PhD students.

8.3 Course requirements

The PhD in Epidemiology typically requires the equivalent of six semesters of coursework plus additional semesters devoted to dissertation research. This can be accomplished in the equivalent of four to five years of full-time study, although depending on the student’s research program, as many as six or even seven years may be needed to complete the program. The current standard course sequence for PhD students consists of nine core courses representing 9.5 course units. A minimum of an additional 9.5 course units are taken in electives (advanced epidemiology and/or biostatistics courses and courses outside the department and school, as needed to serve the student’s specific interests). However, the PhD curriculum is currently under review and these requirements may change; these changes will be reflected in a subsequent version of the Handbook, pending approval by the Graduate Group and Biomedical Graduate Studies. Students are subject to the course requirements in place at the time of admission. Course descriptions are provided at http://www.GGEB.med.upenn.edu/education/epi-degree/epi-curr.php

8.3.1 Core courses

The core courses required for all PhD students are:

- Introduction to Epidemiology (EPID 510), 1.0cu
- Advanced Topics in Epidemiology (EPID 640), 1.0cu
- Database Management for Clinical Epidemiology (EPID 532), 0.5cu
- Measurement of Health in Epidemiology (EPID 542), 1.0cu
- Doctoral Seminar (EPID 700), 0.5cu for each semester, minimum of four semesters or 2.0cu
- Research Design Consultation (EPID 710), 1.0cu
- Biostatistics for Epidemiologic Methods I (EPID 526), 1.0cu
- Biostatistics for Epidemiologic Methods II (EPID 527), 1.0cu
- Empirical Bioethics (EPID 690), 1.0cu

8.3.2 Electives

PhD students are required to take additional elective courses, totaling at least 9 course units. At least two of these courses must be advanced courses in statistical applications, such as (but not limited to) EPID 621: Longitudinal and Clustered Data, EPID 622: Applied Regression Models for Categorical Data, EPID 623: Survival Data Analysis, and EPID 680: Causal Inference in Epidemiology. Students meeting additional prerequisites in biostatistics may
satisfy this requirement through advanced courses in statistical methods, such as (but not limited to) BSTA 652: Categorical Data Analysis, BSTA 653: Survival Analysis, BSTA 656: Longitudinal Data Analysis, and BSTA 790: Causal Inference in Biomedical Research.

Elective courses include advanced courses in epidemiology and biostatistics, as well as advanced courses in related disciplines, such as biostatistics, statistics, demographics, sociology, anthropology, economics, and psychology. Students may also arrange to take independent study courses taught by members of the Graduate Group faculty or courses taught elsewhere in the University. However, it is important to select independent study courses carefully, since it is assumed that students will have completed the core at the time of the Qualifications Examination. The student and faculty member will design the activity and the form of the evaluation for the independent study course. Any such proposed independent study course must be approved in advance by the PhD Program Executive Committee. Finally, all electives will be chosen in consultation with the trainee’s faculty.

### 8.4 Doctoral seminar

All PhD students are required to participate in the Doctoral Seminar (EPID 700). Advanced students will be expected to present their work and take a leadership role in organizing each session. Students who are in the early stage (coursework phase) of their program will be expected to participate and present selected literature for discussion. The goal of the Doctoral Seminar is to expose all students to a wide variety of epidemiologic research. The seminar meets weekly.

### 8.5 Consulting projects

All PhD students must complete a series of consulting projects in epidemiology; this requirement is met by the successful completion of EPID 710. Students normally fulfill this requirement after they have passed the Qualifications Examination, but those with substantial prior experience in epidemiology may, with permission of the Chair, complete the requirement during the first or second year of study. The consulting projects may take one or more forms, such as a one-on-one consultation with an MSCE student or clinician-researcher outside the department, or formal consultation work in industry. The goal of the course is to demonstrate skill in “on-the-fly” consulting; merely providing database or analytical assistance does not satisfy the requirements for EPID 710. A minimum of three different consulting projects are required for a total of at least 100 hours engaging with clients. Students are required to prepare a brief description of each consulting project that includes the name, departments, and titles of those with whom the student is consulting, a paragraph or more on the background of the project, and a detailed description of what the student will do while engaged on the project. This information is provided on the Consulting Project Prospectus Form (Form 6 in Appendix B). In order to complete the course, the student will submit a report of activities performed for the projects to the EPID 710 course director.

All activities associated with the consulting project(s) must have the approval of the University of Pennsylvania Institutional Review Board (IRB). This requirement is the responsibility of the client, if associated with Penn, but students should ensure that they have been added to the pertinent protocol. For clients outside the University, students will need to submit a protocol to the Penn IRB for approval. No work on any consulting project may begin until Penn IRB approval has been obtained. In addition, the confidentiality of all work and that of individuals
associated with the project must be maintained. Project investigators may require a non-disclosure agreement to be signed by the student. The student should review this agreement with his/her advisor prior to signing it, and keep a copy of this agreement for his/her records.

8.6 Course plans
All students are expected to develop and maintain a current course plan with their advisor. This course plan must be approved by the advisor and the Program Chair and filed with the department’s Office of Graduate Programs. The course plan will be reviewed semi-annually in order to monitor the student’s progress and identify potential delays in completing the program. Typical course plans are shown below.
Sample course plan for an entering PhD student

<table>
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<tr>
<th>Year</th>
<th>Term</th>
<th>Course</th>
<th>c.u.</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Summer II</td>
<td>EPID 510: Introduction to Epidemiology</td>
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<td>EPID 526: Biostatistics for Epidemiology I</td>
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<tr>
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<td>Fall</td>
<td>EPID 542: Measurements of Health</td>
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<td></td>
<td></td>
<td>EPID 526/7: Biostatistics for Epidemiology I (cont’d.)/II</td>
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<td></td>
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<td>EPID/Other: Epidemiology or other elective</td>
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<td></td>
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<td></td>
<td>Spring</td>
<td>EPID/BSTA: Advanced Biostatistics course or elective</td>
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<td>EPID 690: Empirical Bioethics</td>
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<td>EPID 700: Doctoral Seminar</td>
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<td></td>
<td>Summer</td>
<td>Qualifications Examination</td>
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<td>Fall</td>
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<td>EPID 700: Doctoral Seminar (non-credit)</td>
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Dissertation Defense
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<tr>
<th>Year</th>
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<th>Summer</th>
<th>MEDICAL SCHOOL</th>
<th>GRADUATE SCHOOL</th>
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<tr>
<td>1</td>
<td>Module 1, Module 3, Module 6</td>
<td>Module 2, Module 3, Module 6</td>
<td>Epi lab rotation, Epidemiology seminar</td>
<td>Epi lab rotation, Epidemiology seminar 1-2 Epidemiology course units (EPID510, EPID 526)</td>
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<tr>
<td>2</td>
<td>Module 2, Module 3, Module 6</td>
<td>Clerkships - Module 4, Module 6</td>
<td>Begin EPID527, Epidemiology seminar</td>
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<td>3</td>
<td>Clerkships - Module 4, Module 6</td>
<td>Add'l clinical courses - Modules 5, 6</td>
<td>Finish EPID 527</td>
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<td></td>
<td>Add'l clinical courses; STEP 1</td>
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<tr>
<td>4</td>
<td>Clinical Connections</td>
<td></td>
<td>4-5 Epidemiology course units; work on selecting advisor</td>
<td>Detailed PhD curric to be drawn up at this time</td>
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<td>5</td>
<td>Clinical Connections</td>
<td></td>
<td>2-3 Epidemiology course units</td>
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<tr>
<td>6</td>
<td>Clinical Connections</td>
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<td>1-2 Epidemiology course units</td>
<td></td>
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<tr>
<td>7</td>
<td>Clinical Connections</td>
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<td>1-2 Epidemiology course units</td>
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<tr>
<td></td>
<td>Electives**</td>
<td></td>
<td>TA one course; Candidacy exam</td>
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<td>8</td>
<td>Electives; boards 2 (Modules 5, 6); Dean's letter Nov 1</td>
<td>Clerkships and/or electives and/or research (Modules 5, 6)</td>
<td>Additional research if needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sample course plan for an entering MD-PhD student**

Graduate Group in Epidemiology and Biostatistics Handbook 2014-2015
8.7 PhD Examinations

In addition to course-specific examinations, there are three PhD examinations required in order to ensure rigorous, appropriate evaluations during the phases of a student’s program. These examinations are described below.

1. Written Qualifications Examination
   a. The qualifications examination will be taken after the equivalent of two years of course work.
   b. The qualifications examination will be open-book and consist of three parts, administered over a one-week period:
      i. General epidemiology
         1. A series of questions and problems to assess competency in basic and advanced epidemiologic concepts, critical appraisal, and measurement
      ii. Research methods
         1. A series of questions and problems to assess competency in biostatistical and quantitative and qualitative epidemiologic methods.
      iii. The student’s content area of interest (e.g., genetic epidemiology, pharmacoepidemiology) and/or biostatistics minor
         1. This section will evaluate the student’s ability to integrate biological and clinical principles with epidemiologic knowledge and skills by writing a short grant proposal that addresses a research question provided by the committee. The proposal will include Specific Aims, Background and Significance, and Research Plan, and be limited to no more than 10 pages, not including references.
   c. Questions for the qualifications examination will be written and graded by the PhD Program Executive Committee.
      i. Questions for the general epidemiology and methods section will be written and graded by the committee.
      ii. Questions for the area of interest section will be written and graded by either members of the committee with expertise in the student’s area, or by faculty added to the committee as ad hoc members for this purpose.
   d. Students must pass all three parts of the qualifications examination in order to advance to the next phase of the PhD program. Those who fail one or more parts of the examination may re-take those parts once, but a passing grade on all three parts must be attained before the end of the second year of study. Given the highly subjective nature of the grant proposal component of the examination, the student and/or the qualifications examination committee automatically qualifies for one oral rebuttal and retake in the case of a failing grade on this component.
   e. Transfers from the MSCE program must take the PhD qualifications examination, even if the MSCE comprehensive examination was taken previously.
   f. Grandfathering: MSCE students who have transferred to the PhD program before January 1, 2009 are exempt from this policy. These students will have taken the MSCE comprehensive examination as their qualifications exam, and will be required to take another written examination, comparable in difficulty to the PhD qualifications exam and in addition to the oral exam, prior to being admitted to candidacy status, as has been done historically in the PhD program.
g. Review of the examination
   i. A student may request to review his exam paper in company with the Examination Committee Chair. The purpose of such a review is to help the student evaluate the types of mistakes made, identify areas where further study is needed, etc. The Examination Committee retains the graded exam papers and does not return them to the students.

h. Appeal process
   i. A student may appeal the outcome of the qualifying examination to the Examination Committee Chair, who together with the full committee will evaluate the appeal and judge whether it has merit. A grade can only be changed in cases of a specific error in scoring. The Examination Committee refers any grade change that could affect the student’s exam outcome to the full PhD Executive Committee, who decides whether to revise the exam outcome.
   ii. Because a minor revision of the score is unlikely to change the exam outcome, a student should only initiate a formal appeal if there were one or more egregious errors in the problem or in its grading, the correction of which would likely lead to a substantial increase in the score. A student who seeks a formal review must request it, in writing, from the Examination Committee Chair within one week of the issuance of the letter notifying the student of the exam result.

2. Candidacy examination
   a. The candidacy examination must be passed within 18 months of the qualifications examination.
   b. The focus of the candidacy examination is on the student’s proposed dissertation research, but other material may be included as desired by the student’s committee.
   c. The candidacy examination will consist of two parts:
      i. Written: dissertation proposal, submitted to the student’s committee at least one month prior to oral proposal defense, and approved by the committee prior to the oral proposal defense
      ii. Oral: Oral defense of proposal (non-public) before the committee with the inclusion of additional pertinent material at the discretion of committee
   d. Students must pass both parts of the candidacy examination in order to advance to the final phase of the PhD program. Those who fail the candidacy examination may re-take it once, at the discretion of the committee.
   e. The Candidacy Examination is administered by the Dissertation Committee (see Section 4.10)

3. Dissertation examination
   a. The final oral examination is the dissertation defense. The defense must be announced by public advertisement at least four weeks in advance using such venues as the GGEB website, posted announcements in Penn Medicine spaces (as allowed), and electronic mail.
   b. The defense should be scheduled when the candidate and the dissertation advisor agree that the research is near completion and the draft dissertation is in
a format suitable for distribution to the committee. As soon as a date and time are fixed, the graduate program staff reserves a room (for at least two hours) and prepares the necessary public announcements.

c. **All dissertation committee members should be present for the final defense. In emergencies, one member may participate in the defense by telephone. That member cannot be the committee chair, the student’s advisor, or the biostatistics faculty (if there is only one biostats faculty member on the committee). If one or more committee members are absent (i.e., not present or not participating by telephone) from the final defense, it cannot proceed and must be rescheduled.**

d. **Format of the defense**

   i. At least two weeks prior to the exam, the student should provide each committee member with a copy of the full dissertation. The committee members review the dissertation and prepare exam questions based on it. The defense consists of two parts:

      1. **Open session.** The chair describes the process to all attendees and introduces the candidate. The candidate then presents his/her research in the style of a departmental colloquium. Typically, the candidate presents one chapter in depth, with a very brief overview of the others. *This presentation should not exceed 45 minutes.* At the close of the formal presentation the candidate takes questions from the audience. The chair has the right to terminate the open session if it goes beyond one hour.

      2. **Closed session.** In this part of the examination, attended only by the student and members of the committee, the student is asked specific questions pertaining to the dissertation. Because the committee members have read the entire dissertation, this is their opportunity to ask any questions about any part of it, including material not presented in the open session. Once the committee members are satisfied that the questioning is complete, the student is asked to leave the room and the committee deliberates in closed session. During this time, the committee reviews the student’s work, draws up a list of recommendations, and votes an outcome. The student is then readmitted to the room, informed of the outcome, and is provided with any recommendations. The committee chair sees that necessary forms are signed and returned to the graduate program office.

   ii. The defense will be coordinated by the dissertation chair. This individual will be responsible for maintaining order and the sequence and timely completion of the examination.

e. The dissertation exam has three potential outcomes:

   i. **Pass.** The student has completed the dissertation requirements for a PhD in epidemiology. The student then works with the graduate program staff to ensure that all other requirements are met prior to deadlines for the proposed graduation date.

   ii. **Conditional pass.** The defense was satisfactory but additional requirements, usually minor, must be satisfied. Commonly, the student is asked to address specific questions raised at the defense, or to
incorporate edits proposed by committee members. The dissertation advisor typically oversees these changes, but other committee members may also review changes at their discretion. Once the additional requirements are met, the student is considered to have completed the dissertation. The student is not required to defend the dissertation again.

iii. **Fail.** The student must defend the dissertation again; only one additional attempt at the final defense is allowed.

f. Dissertation acceptances must be unanimous, in writing, and signed by all members of the dissertation committee. Approved dissertations must be submitted to the Graduate Council of the Faculties in a format that meets the style standards established by the Vice Provost for Graduate Education.

### 8.8 Preparing the dissertation

#### 8.8.1 Dissertation advisor

PhD in Epidemiology students must carry out their dissertation research under the mentorship of a faculty member of the GGEB. The dissertation advisor is the most important individual the student will interact with in the course of their graduate training. For this reason students should carefully evaluate their interests and experiences in choosing the advisor. The student’s dissertation advisor may not be the Dissertation Committee chair, but may be (and is usually) the student’s mentor. See Section 5.2.1 for information about advisor qualifications.

#### 8.8.2 Dissertation committee

Each student will organize a Dissertation Committee according to the following constituency. The committee will consist of at least four members, the majority of whom will be members of the GGEB. A GGEB faculty member will be appointed as the Chair of the committee by the student’s advisor. The role of the Chair is to run committee meetings and to oversee the candidacy examination and final defense. At least one member of the Dissertation Committee must be a member of the faculty in the Division of Epidemiology and ordinarily at least one other should be a member of the faculty in the Division of Biostatistics. These committee members will be collectively responsible for administering and evaluating the oral candidacy examination, reading the dissertation, and evaluating the final defense. Additional content experts from within or outside the GGEB may be added to the committee as needed. The initial constituency and any changes in the membership must be approved by the Program Chair and the Graduate Group Chair. This Committee will be in place at all times during the dissertation phase. If for some reason, a student changes to a different area of research, a new Dissertation Committee must be appointed immediately and must meet within three months to discuss new plans for the dissertation research.

#### 8.8.3 Additional biostatistics support

The biostatistics faculty member(s) on the committee will provide advice and collaborate on the scientific design and statistical analyses required for the dissertation research, but it is the student’s responsibility to perform such analyses. If appropriate, it may be possible to substitute the GGEB biostatistics faculty member with biostatistics faculty from another department at Penn or from outside the University, upon approval by the Program Chair and the GGEB Chair. If a student’s dissertation research area requires additional statistical
expertise, appropriate biostatistics faculty should formally be added to the dissertation committee.

8.8.4 Computing, programming, and database support
The student is responsible for writing all parts of the dissertation, including any methodological sections, and for conducting or directing all analyses; this ordinarily includes obtaining, preparing, and maintaining data needed for the research. Depending on the student’s research program, additional (non-faculty) assistance with computing, programming, and database development may be requested by the student. However, to ensure that the student gains the maximum possible experience with these critically important skills, this request must be approved by the dissertation advisor and the Program Chair. Upon approval, the student should make arrangements with the Biostatistics Analysis Center (BAC), the Clinical Research Computing Unit (CRCU), or other computing group or consultant as needed. The student and dissertation advisor are responsible for obtaining the necessary funding to defray non-faculty support costs.

8.8.5 Frequency of dissertation committee meetings
Once a student has advanced to candidacy, his/her dissertation committee will review goals and progress twice each year. The committee chair should complete the Dissertation Committee Meeting Report form and submit this to the Program Chair on September 1 of each year.

8.8.6 Laboratory notebook
BGS mandates that the student’s dissertation committee, at each of its meetings, review the student’s “lab notebook”. The PhD Program in Epidemiology interprets this to mean that the student should make available for faculty review, upon request, primary documentation of any substantial element of the dissertation. Such a review takes place at the candidacy exam and any subsequent meetings of the committee prior to, but not including, the dissertation defense. Examples of materials subject to review include the statement and investigation of a research question; the code and results of a simulation study; or the data, code and results of a data analysis. Prior to the meeting, the student’s advisor, in consultation with the dissertation committee, designates a short list of such items that the student makes available in electronic or hard-copy format. The committee chair sets aside time at the meeting for the review of this material. In keeping with the BGS policy, there is no expectation that the committee should scrutinize all such documents “in their entirety”; rather, the review should be sufficient to satisfy the committee that the student’s research records are “complete and well managed”.

8.8.7 Content and format of the dissertation
The dissertation must be a scholarly work, providing a written account of an independent investigation of an epidemiologic question or series of related epidemiologic questions. It will be in the form of a monograph, containing one or more research questions about the epidemiology of a particular health topic or disease. Within this monograph, there will be at least three separate manuscripts of publishable quality, one of which must offer a novel methodologic approach to a question in epidemiologic research. It will include the formulation of one or more hypotheses, a review of the appropriate literature, a description of the project, data collection, data analysis, data interpretation, discussion of the findings, and limitations of
the work. If the dissertation involves the investigation of more than one question, each question must focus on an epidemiologic or methodologic issue related to the health topic or disease under investigation. The dissertation project should demonstrate that the candidate has a command of the subject and a thorough knowledge of the research methodology used to investigate the question(s).

8.9 Non-credit requirements

8.9.1 Teaching practicum

Students in the PhD program must spend one semester providing teaching support as a Teaching Assistant (TA) for an Epidemiology or Biostatistics course. In addition to being a degree requirement for all doctoral students, the teaching experience is an opportunity to work closely with a faculty member, to review and deepen understanding of the material being taught, and to acquire and sharpen teaching skills. TAs are usually assigned to core courses in the Master of Science in Clinical Epidemiology program, but students may find teaching in one of the elective courses, or other epidemiology-related courses in other departments to be of interest as well. The Program Chair assigns TAs to courses based on course needs and student qualifications, in consultation with the student, the course director, and his/her advisor. Upon assignment, students must prepare a teaching assistance plan in writing, signed off by the instructor and approved by the chair for TA activities related to the course. This plan must be completed at least four weeks prior to the start of the course. The form for this plan is found in Appendix B (Form 5).

TA duties typically include some or all of the following:

- Attending lectures
- Holding office hours
- Running lab sessions
- Assisting in the preparation of handouts, exams and solution sets
- Grading homework and recording the grades
- Helping to grade exams and recording the grades
- Coordinating access to computing facilities, online data sets, and web applications
- Attending regular meetings with the course instructor.

Please note that merely serving as a grader in a course does not fulfill the TA requirement for the doctoral program. The student must make a substantive contribution to the course.

Timeliness in the completion of these duties is essential. The course instructor and TA should communicate regularly to discuss duties, to share feedback from the students, and to ensure that the TA’s time is being used efficiently.

Both instructors and TAs should recognize that time pressures can vary greatly over the course of a semester. For instance, TA duties usually are light at the start of the course, heavy in the middle, and then light again toward the end (unless assistance is required grading exams).

Experience shows that grading homework and preparing and directing lab or discussion sessions are the two items that occupy most of a TA’s time, especially for first-time TAs. TAs
should not hesitate to request specific direction on what to present in lab or discussion sessions. Although the success of a course is ultimately the instructor’s responsibility, students should recognize that instructors cannot be expected to solve problems that they don’t know exist. Open communication is the key to a successful teaching experience. In cases where TA duties include assisting in the grading of exams, course instructors should provide the TA with clear guidance on how to assign points. Instructors should also recognize that some students may feel awkward evaluating their peers.

The instructor may provide the opportunity for the TA to prepare and deliver at least one lecture. In this case, the instructor should allow the TA sufficient time to prepare the lecture and should offer any necessary guidance about what is to be covered. Whenever possible, the TA’s lecture will be videotaped and reviewed with the instructor and his/her mentor in order to identify strengths and weaknesses.

To ease communication, TAs should share their e-mail addresses and mailbox locations with their students. TAs are not on call for their students; nevertheless, students should expect reasonable access to TAs, particularly in the days leading up to exams and project due dates.

8.9.2 Weekly seminar
A fundamental component of the PhD program is attendance at the weekly Center for Clinical Epidemiology & Biostatistics Seminar, at which faculty and researchers within and outside of Penn present their work or discuss timely issues in epidemiology. All PhD students are required to attend this seminar series weekly, unless excused due to scheduling conflicts, illness, or other reason. Excuses should be made with the Academic Coordinator, either before or as soon as possible after a missed seminar. Advanced PhD students are also welcome to present at this seminar. However, slots fill up early in the academic year, so it is best to discuss any plans to present with the advisor and the Chair of the Seminar Committee. Students are also encouraged to suggest experts from the field as potential seminar speakers to the Seminar Committee.

8.9.3 Research rotations
Students are encouraged to meet and work with a variety of the faculty in epidemiology and biostatistics, as well as those in other departments and schools of the University, in order to explore their interests. These “research rotations” can take several forms: a formal course, an independent study, or a more informal approach that may include sitting in on research project meetings.

8.10 General program policies

8.10.1 Exemptions and modifications
Trainees may place out of the following courses only, upon passing an examination administered by the course instructor: Introductory Epidemiology, Introductory Biostatistics, and Database Management for Clinical Epidemiology. Electives should be taken so that the total number of course units still equals 20. Such requests are made in writing as a letter to the Academic Review Committee. The student should justify the request to place out of a course, and the request should be accompanied by reprints, abstracts from meetings, course syllabus,
or other appropriate material. **These requests should be made before the end of the first semester in the program.**

### 8.10.2 Terminal master's degree

The PhD Program in Epidemiology does not admit students for study towards a Master's degree.

### 8.10.3 Student memberships

All PhD students in Epidemiology are encouraged to join one or more professional societies, but especially the American College of Epidemiology as an Associate or the Society for Epidemiologic Research as a Student Member.

### 8.10.4 Student travel

Ordinarily, travel funds will be supplied through a student's fellowship award, or through a grant or other funds provided by the advisor or other faculty, or by the student using his or her own resources.

### 8.11 Facilities

#### 8.11.1 Program web-resource

The PhD Program will use Canvas to provide student-related forms, resources and web links. These pages can be accessed by logging in to [https://canvas.upenn.edu/](https://canvas.upenn.edu/)

#### 8.11.2 Student Space

The PhD program has space for students on the first floor of Blockley Hall. It includes a group meeting room equipped with two conference tables, whiteboards, and computer projection capability; a room with 30 study carrels; and lockers. There is also wireless connectivity throughout the first floor of Blockley Hall. Administration of the carrels and locker assignments is managed through the Office of Graduate Training (918 Blockley Hall).