



HARVARD
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Department of Biostatistics

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Graduate Student Handbook

**DOCTORAL PROGRAM
IN BIOSTATISTICS**

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1 INTRODUCTION

This handbook describes the academic programs for the Doctor of Philosophy (Ph.D.) offered by the Department of Biostatistics at Harvard University. The Department offers courses of study leading to the Doctor of Philosophy and Master of Science degrees. Both the Ph.D. and SM programs provide rigorous training in theory and practical experience in statistical and bioinformatics methods used in the biomedical sciences. The Department's programs are designed to prepare students for careers in the theory and practice of biostatistics and bioinformatics, especially as applied to the biomedical and health sciences. The programs include training in the application and development of methodology, consulting, teaching, and collaboration on a broad spectrum of health-related problems. All students work with faculty on ongoing projects in methodological research and scientific collaboration. About sixty faculty participate in these programs.

The sections of this handbook include information and Departmental regulations concerning entrance requirements, program descriptions, degree requirements, and other Departmental policies. The Ph.D. Program is overseen by the Graduate School of Arts and Sciences, whereas the SM degree is governed by the School of Public Health. Policies and official requirements of the Graduate School of Arts and Sciences are set forth in the *Graduate School of Arts and Sciences Policies* (<https://gsas.harvard.edu/policies>). Policies and official requirements of the School of Public Health are set forth in the *Harvard T. H. Chan School of Public Health Student Handbook* (<https://www.hsph.harvard.edu/student-handbook/>). Each graduate student is responsible for general knowledge of, and adherence to, the policies and requirements of the degree program in which the student is enrolled. Additional departmental information is available at <https://www.hsph.harvard.edu/biostatistics/>. Vitally important for our community is that all members demonstrate respect for each other and our discipline. For all members of the community, respect is demonstrated by attending all scheduled classes or meetings, and arriving on time, fully prepared, and ready to participate.

This handbook was prepared by the Director of Graduate Studies for the Ph.D. program and approved by the Faculty of the Department of Biostatistics. The Director is responsible for reviewing the student's program of study, and has the authority to consider exceptions to the rules and regulations established by the Department. Recommendations of the Director are forwarded to the Chair of the Degree Program Committee for final approval. The Director and the Department Chairs welcome suggestions and comments.

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2 THE DOCTOR OF PHILOSOPHY PROGRAM

The Ph.D. program in Biostatistics trains students in the areas of probabilistic and statistical theory, biostatistical and bioinformatics methods, statistical computation and algorithm development, the ability to collaborate and communicate effectively with scientists in related disciplines, and the ability to teach biostatistics and bioinformatics effectively to general or specialized audiences. The Ph.D. program includes training in the development of methodology, consulting, teaching, and collaboration on a broad spectrum of health-related problems.

All Ph.D. students work with faculty on ongoing projects in methodological research and scientific collaboration. Faculty and students conduct methodologic research in Bayesian inference, bioinformatics, causal inference, clinical trials, computational biology, data analysis, decision sciences, experimental design, health policy, multivariate and longitudinal studies, quantitative genomics, sequential methods, spatial statistics, statistical computing, statistical genetics, stochastic processes, and survival analysis, among other areas. Areas of application include big data, biology, cancer, clinical research, computational biology, the environment, epidemiology, genetics, health disparities, HIV/AIDS, infectious diseases, neurology, and psychiatry, among other areas. Collaborative activities include coordination of national and international clinical trials, participation in studies of potential environmental hazards, collaboration on novel genetic and genomic studies, design of health surveys, evaluation of health interventions and medical technologies, and consultation with federal, state, and local agencies.

The Department of Biostatistics offers the Ph.D. in Biostatistics with two areas of interest: Biostatistics and Bioinformatics. Students select the area of interest most appropriate to their background and interests, and satisfy the degree program requirements listed below for their area of interest. Some Ph.D. requirements are common to both areas of interest, while others are specific to the area of interest selected. The decision regarding which area of interest a student is pursuing (Biostatistics or Bioinformatics) can be indicated at the time of application to the program, or can be made in the 2nd year at the time of submission of the degree program form.

The Ph.D. program in Biostatistics prepares students in the following five specific competencies:

1. Applying innovative probabilistic and statistical theory and computing methods to the development of new biostatistical or bioinformatics methodology, publishing of original methodological research, and the solution of public health problems.
2. Providing scientific and biostatistical or bioinformatics leadership in the design, conduct, and analysis of collaborative research studies in medicine and public health.
3. Applying modern statistical and computational methods to effectively analyze complex medical and public health data, including the development of new software for non-standard problems and simulation methods.
4. Collaborating and communicating effectively with research scientists in related disciplines.
5. Teaching biostatistics or bioinformatics effectively to health professionals, research scientists, and graduate students.

2.1 Admissions Procedures and Requirements

2.1.1 Graduate School of Arts and Sciences Requirements

For information on general requirements for admission, see the Graduate School of Arts and Sciences website (<https://gsas.harvard.edu/admissions>) or contact the Admissions Office by phone (617/496-6100).

2.1.2 Departmental Requirements

All candidates for admission to the Ph.D. program should have successfully completed calculus through multivariable integration and one semester of linear algebra. Knowledge of a programming language is also required. Evidence that these requirements have been fulfilled should form part of the application. In addition, all applicants are strongly encouraged to have completed two semesters of calculus-based probability and statistics, two semesters of advanced calculus or real analysis, and a course in numerical analysis. Students with interests in bioinformatics are also encouraged to have completed courses in biology, computational biology, and genetics. Practical knowledge of a statistical computing package such as SAS, Splus, R, Stata, or SPSS is also desirable. Students with interests in bioinformatics should also have knowledge of a scripting language such as Python or Perl and some familiarity with relational databases. The Biostatistics Department holds a Summer Preparatory Program in August for admitted students, which is designed to review basic concepts of probability, statistics, advanced mathematics, and statistical computing prior to the first semester in the Ph.D. program.

2.2 Advising and Degree Program Approval

2.2.1 Academic Advisor

The Department has a Ph.D. Committee which provides guidance and assistance to students. All entering students are assigned an academic advisor to help plan course loads and explain Departmental requirements. At the earliest possible date, the student and the academic advisor will develop a program of study. Should a student wish to change his/her academic advisor, he or she is encouraged to discuss this with the Director of Graduate Studies. In addition, the Department and GSAS/SPH provide services for all students with clinically documented learning and/or physical disabilities.

2.2.2 Dissertation Advisor

After the written qualifying examination has been successfully completed, and usually in the third or fourth semester of study, the doctoral candidate will identify an area of research and a dissertation advisor from among the faculty in the Department. The dissertation advisor assumes the responsibilities of the academic advisor and directs the student's doctoral research. In some situations, students may choose to have co-advisors, but at least one of these must be a faculty member of the Biostatistics Department.

2.2.3 Oral / Dissertation Committee

By October 15 after choosing a dissertation advisor, the student, in consultation with the dissertation advisor, nominates an Dissertation Committee to oversee the student's progress. Students must submit an [Oral / Dissertation Committee Nomination Form](#), which requires approval by the Director of Graduate Studies. The Dissertation Committee ordinarily consists of the dissertation advisor, who serves as the chairperson, and at least two other faculty members. At least two of the committee members must be faculty members from the Department of Biostatistics or the Faculty of Arts and Sciences. The chair should be a faculty member of the Department of Biostatistics. In some cases, a student could have two co-chairs of the Dissertation Committee. The student is responsible for arranging periodic meetings with the Dissertation Committee, and for submitting [Dissertation Progress Report forms](#) (Appendix B) at six month intervals (November 1 and May 1). Students must meet with their dissertation committee *at least* once every six months; students in their final year of the program are encouraged to meet every three to four months to support completion of their dissertation. A [Dissertation Committee Meeting form](#) must be submitted to the Biostatistics Senior Manager of Academic Services after each committee meeting, summarizing the progress of the student and evaluation of timeline. Changes or additions to the Dissertation Committee may be made by submitting a separate [form](#), with approval of the Director of Graduate Studies.

2.2.4 Departmental Approval of Program

The degree program plan must be submitted to the Department for approval, on the doctoral Degree Program form provided by the Department (Appendix B). This program must be approved by the student's faculty advisor and the Director of Graduate Studies. This plan should be submitted by May 1 of the second year. At this time the student may not have completed all required courses; any subsequent changes to the degree program plan must be submitted to and approved by the Director of Graduate Studies. Students can view their own progress towards completing program requirements by running the "advising report" available through the my.harvard website under the My Program tab.

2.3 Degree Requirements

The Ph.D. Program in Biostatistics trains students in probabilistic and statistical theory; the use of biostatistical and bioinformatics methods in formulating problems, planning studies, conducting analyses, and writing reports; conducting independent methodologic research; providing scientific leadership in collaboration with scientists in related disciplines; and the ability to teach and consult effectively through oral and written communications.

Ph.D. students are expected to take progressively more advanced courses, to prepare for the qualifying exams, and to choose a dissertation advisor and research topic. The student is also expected to participate in the Working Group seminars offered by the Department. These seminars provide background for choosing a dissertation topic, as well as general knowledge of contemporary biostatistical and bioinformatics research.

A detailed presentation of the GSAS's regulations for doctoral students is found at <https://gsas.harvard.edu/>. All doctoral students and their advisors should make sure that GSAS and Departmental requirements are met according to schedule.

Full-time students must register for the equivalent of at least (16 credits) each semester.

2.3.1 Residency

The Graduate School of Arts and Sciences requires that each student have a minimum of two years of full-time study in residence.

2.3.2 Course Requirements

The requirements listed below are minimal requirements for the Ph.D. program in Biostatistics. Each student should, in consultation with his/her advisor, select an area of interest and develop a program of study to best meet his/her individual needs and goals. Each student's program is reviewed individually, and the degree program must be approved by the Director of Graduate Studies.

The Ph.D. Program in Biostatistics builds on a ordinally graded core curriculum consisting of the following four courses, generally taken in the first year of the program:

- BIST 230 Probability Theory and Applications I
- BIST 231 Statistical Inference I
- BIST 232 Methods I
- BIST 234 Introduction to Data Structures & Algorithms

In addition, the equivalent of 7 full semester courses (generally 28 credits) of ordinally graded Biostatistics courses (<https://content.sph.harvard.edu/biostats/courses/course.html>) must be taken from the advanced doctoral core. Students with an area of interest in Bioinformatics are required to take BIST 282. Courses strongly recommended for students within the biostatistics and bioinformatics areas of interest are shown in the following table. Not all courses listed may be offered every year. Note that some training grants may have specific course requirements.

The advanced doctoral core, and specific recommendations by area of interest, includes:

Course #	Course Title	Biostatistics ¹	Bioinformatics ¹
BIST 235	Advanced Regression & Statistical Learning	SR	SR
BIST 238	Advanced Topics in Clinical Trials		
BST 239	Health Survey Samples		
BIST 240	Probability Theory and Applications II	SR	SR
or STAT 212	Probability II		
BIST 241	Statistical Inference II	SR	SR
or STAT 213	Inference II		
BIST 244	Analysis of Failure Time Data	SR	
BIST 245	Analysis of Multivariate & Longitudinal Data	SR	SR
or STAT 230	Multivariate Statistical Analysis		
BIST 249	Bayesian Methods in Biostatistics	SR	SR
or STAT 220	Bayesian Data Analysis		
BST 254 Sec 2	Design & Monitoring of Adaptive Clinical Trials		
BST 256	Theory & Methods for Causality I		
BST 257	Theory & Methods for Causality II		
BIST 282	Introduction to Computational Biology & Bioinformatics		R
EPI 207	Advanced Epidemiologic Methods		
EPI 511	Advanced Population & Medical Genetics		SR
ID 542	Methods for Mediation & Interaction		
APMTH 203	Introduction to Disordered Systems & Stochastic Processes		
APMTH 207	Advanced Scientific Computing: Stochastic Methods for Data Analysis		
APMTH 221	Advanced Optimization		
CS 205	Computing Foundations for Computational Science		
CS 281	Advanced Machine Learning		
CS 282R	Topics in Machine Learning		
STAT 221	Monte Carlo Methods & Other Computational Tools for Statistical Learning		
STAT 225	Spatial Statistics		
STAT 240	Matched Sampling & Study Design		
STAT 260	Design and Analysis of Sample Surveys		
STAT 286	Causal Inference & Program Evaluation		

¹R=required, SR=strongly recommended

Other advanced courses in Biostatistics, including many of the special topics courses, and courses at MIT (including MIT 6.255, 6.438, 6.867, 6.881, 6.882, and 9.520, when offered) and the Faculty of Arts and Sciences (FAS) that are offered at an advanced level, may also be acceptable. Students are advised to consult with the Director of Graduate Studies to check prior to enrolling in the courses in question.

All advanced doctoral core courses contributing to the degree program must be taken for an ordinal grade (cannot be taken as pass/fail; also see Section 2.4), and should be completed with a grade of B or better. Ordinarily, students will complete all course requirements by the end of the sixth semester. By May 1 after passing the written qualifying exam the degree program form should be filed with the Department. At this point, students should indicate whether they are pursuing an area of interest in bioinformatics or biostatistics.

In addition, the Department requires that all students take EPI 201. A student may choose to take EPI 202 and include this course as part of his/her cognate field, if appropriate (see 2.3.3).

2.3.3 Cognate Requirement

The Department requires students to explore in some depth a selected cognate field, a non-quantitative field outside of biostatistics or statistics. Examples of cognate fields include the biology of AIDS or cancer; biophysics; environmental health; epidemiology (e.g., chronic disease epidemiology, environmental and occupational epidemiology, infectious disease epidemiology, molecular epidemiology, psychiatric epidemiology, psychosocial epidemiology); genetics; health policy and management; human development; molecular biology; society and health; or other non-quantitative fields. The cognate field should be complementary to the student's area of interest in biostatistics or bioinformatics; certain training grants may also have specific requirements for the cognate courses. The courses used to satisfy the cognate requirement should form a coherent set of courses related to the cognate field selected, and should primarily be substantive, rather than quantitative, in nature.

Students must complete 8-10 (e.g., the equivalent of two full semester courses) credits of ordinarily graded courses in the cognate field. Provided that the inclusion of such courses contributes to the selection of a coherent cognate field, a maximum of one full semester course among BST 227, BST 260, BST 261, BST 262, BST 263, BIST 267, RDS 280, RDS 282, RDS 285, EPI 202, EPI 203, EPI 204, EPI 288, EPI 289, or other semi-quantitative courses in epidemiology or other fields will be allowed to count towards the fulfillment of this requirement. Students are advised to consult with the Director of Graduate Studies to check whether certain combinations of courses are appropriate for cognate consideration prior to enrolling in the courses in question. Note that courses cannot typically be approved individually as part of the cognate, since the combination of courses within a certain theme or field needs to be evaluated.

All cognate field courses contributing to the degree program must be completed with a grade of B- or better. The selection of courses for the cognate field must be approved by the Director of Graduate Studies, as well as the relevant Training Grant Director (when applicable). Ordinarily, students will complete the cognate requirement by their sixth semester.

2.3.4 Consulting Requirement

Students must acquire experience in the planning of experiments and establishing a collaborative interaction with an investigator. To meet this requirement students must take the consulting seminar (BST 312A&B). A project outside the consulting seminar may be substituted only if approval is obtained from the Director of Graduate Studies. Ordinarily, students will complete the consulting requirement by the end of their sixth semester, unless they pass their written qualifying exams in their first year.

2.3.5 Teaching Requirement

Students must acquire extensive experience in teaching biostatistics or bioinformatics, since this is one of the key competencies of the biostatistics doctoral program. To meet this requirement, students will generally be required to serve as a teaching assistant (TA) for up to two 4-credit courses in the Department per year in the program, with the exception of their first year in the program (during which they cannot serve as a TA). However, students who acquire sufficient external funding through individualized training grants (for example, from NSF, NIH F31, or NDSEG) will be exempted from serving as a TA for one course per year during the period of their external funding. In addition, students who are funded by collaborative research grants may be exempted from serving as a TA during the semesters for which they are conducting such collaborative work; however, every student must serve as a TA for at least two full semester courses (or their equivalent) during the doctoral program to meet the teaching competency. Students funded from faculty research grants to conduct their dissertation research will be considered as equivalent to those funded by departmental NIH training grants with regard to TA requirements.

2.3.6 Summer Project / Wintersession / Vacation

All PhD students are expected to be at full-time status for the Fall and Spring semesters. Although WinterSession courses count toward spring semester credits, PhD students are expected to take 16 credits of coursework during the Spring semester (late January through May), plus any additional credits for WinterSession courses they may take. PhD students are welcome to talk with their academic advisor, training grant director (if appropriate), the Director of Graduate Studies, or other faculty if they have any questions.

Although students are required to commit to full-time training year round, we recognize that students require some time away from their studies for a healthy life balance. We generally expect that students will take up to a month off during the summer (last 2 weeks of May, and another 2 weeks to be coordinated with summer project advisor or dissertation advisor), and have additional allowed vacation time of 2 weeks during the winter break, the March HSPH Spring break, and other designated HSPH holidays. Additional vacation time of more than 3-4 days must be approved in advance by their advisor and the Director of Graduate Studies.

During the summer after their first academic year, all students are expected to work full-time for 10 weeks, by conducting a research project with one of our faculty and preparing for the written qualifying exam.

1st Year PhD students should take 2 (2.5 credits at HSPH) credits of course work or, alternately the student could be engaged in a project with the approval of their faculty advisor (and the approval of the training grant director, if the student is funded by a training grant) for 30 hours/week for 3 weeks (or the equivalent if spread over 4 weeks). Students engaged in a WinterSession project do not ordinarily register for course credits. If a student takes 1 credit (1.25 credits at HSPH) of course work, then he/she should also have an approved project for 15 hours/week for 3 weeks. All such students should prepare a brief (1/2 page) proposal of how they plan to spend the WinterSession period and then discuss it with their advisor(s) and obtain their approval before December 15. Submit for required form by December 15.

Students funded by research assistantships must make sure that their RA supervisor also approves his/her WinterSession activities.

2.3.7 Employment Outside of the Training/Research Program

It is the policy of both GSAS and the Department to limit outside employment, as the doctoral program requires a full-time commitment to your training and research. Many of the funding sources, such as NIH training grants, require that students do not have outside employment. Your dissertation advisor, training grant director, and the Director of Graduate Studies must review and approve in advance, and in writing, any requests to take on any additional employment, including extra paid TAing at SPH or elsewhere, summer TAing, and tutoring. In order to be considered, the proposed employment must be of limited duration and scope.

2.3.8 Summer Internships

In view of the full-time commitment to training and research in the doctoral program noted above, and particularly the NIH requirement that students maintain full-time commitment to training year-round for those funded by NIH training grants, students are generally discouraged from participating in summer internships outside the department. However, in cases when the internship will directly relate to the students' doctoral training, those in the second or third year may be allowed to participate with the same approvals required as for any outside employment as noted in Section 2.3.7. To request permission to apply for a summer internship, students must submit a Summer Internship Proposal [form](#) by April 1 prior to the start of the internship. Note that students must obtain permission in advance before applying for or pursuing any summer internship. Students should be aware that reappointment on NIH training grants may not always be possible after return from a summer internship. Special considerations generally apply to international students regarding internships, and such students must consult with the Harvard International Office ([HIO](#)) prior to agreeing

to conduct any summer internship. Several months' advance notice must be given to Rachel Boschetto, the Ph.D. Student Funding Manager, to allow for processing of appointments.

2.3.9 Research Ethics / Reproducible Research Requirements

Students must satisfy a research ethics requirement by completing a course (currently HPM 548) in responsible conduct of research (RCR) during the first semester in the program. The course must fulfill the National Science Foundation (NSF) and National Institute of Health (NIH) requirements for RCR instruction. Students funded on NIH training grants may also be required to complete training or coursework in reproducible research. Students may also be required to complete further training or courses in both research ethics and reproducible research in 'refresher courses' at intervals of 3 years, and all students are strongly recommended to complete such training.

2.3.10 Public Health Practice Requirement

Students may be required to take a public health course by the School of Public Health as part of their accreditation requirements. These requirements will be communicated to all incoming students by the School of Public Health directly.

2.3.11 Teaching / Research Credits

In addition to regular coursework, Ph.D. students may register for BIST 311 which is used to indicate that a student has received a teaching assistant or teaching fellow appointment, and should be registered for the duration of the course assigned (2 credits for a 2 credit course, etc.). BIST 311 credits must be approved by the Senior Manager of Academic Services.

For independent study with a faculty member which is not directly related to dissertation work, or research work done before passing the written qualifying exam, Ph.D. students should cross-register for a BST 300 Independent Study section with the Associate Chair giving a short description of their research and including contact information for their supervising faculty member in their petition to enroll. All BST 300 sections are graded as pass/fail. Students are discouraged from taking more than 4 credits of BST 300 in any single semester.

BIST 350 should be used by Ph.D. candidates who have passed their written qualifying examination and who are working on their dissertation research. Students may register for a maximum of 16 credits of BIST 350 per semester, as needed, to maintain full-time status.

2.3.12 Transfer of Coursework

The Department of Biostatistics does not allow courses taken elsewhere to count towards the residency requirement. However, students may occasionally be permitted to use graduate level courses in Biostatistics or related areas taken at other universities to satisfy some Departmental requirements for the Ph.D. degree (e.g., core courses, epidemiology requirement, consulting requirement). Generally, when core courses are waived, it is not necessary to make up the credit in other biostatistics courses. In addition, students funded on certain training grants which require laboratory rotations may be able to request exemption from one or more rotations based on their prior rotations of a similar duration and nature conducted at other universities prior to admission.

To request a waiver of Departmental requirements on the basis of prior coursework, the student must petition the Director of Graduate Studies for approval and complete the required form provided on the GSAS website. Students who have completed courses through the Harvard Tuition Assistance Program (TAP) or been classified as a Harvard Special Student complete one form, while those completing graduate coursework elsewhere complete a different form found on the GSAS website (<https://gsas.harvard.edu/registration/credit-completed-graduate-work>). For students completing graduate work outside of Harvard, the petition should contain a course description and syllabus. An official transcript indicating the grade received must

be on file, or submitted with the petition. Each request is considered on an individual basis. All waivers of departmental requirements must be approved by the Director of Graduate Studies.

2.3.13 Examination Requirements

Students must take and pass two qualifying examinations: a written examination and an oral examination.

The Written Examination The written examination is currently given annually in the summer following the first spring semester. Students will take the exam for the first time before their second year in the doctoral program. Any student who does not pass the exam on their first attempt will be allowed to retake the examination the following year.

The exam consists of two parts which are administered in two sessions on different days. Material relevant to the exam is covered in the doctoral core courses of the Biostatistics program (see Section 2.3.2). The exam tests the student's understanding of probability, statistical inference, and statistical and computational methods. Copies of past examinations are available on request from the Senior Manager of Academic Services.

The written qualifying examination is evaluated by the Qualifying Exam and Academic Standing Committees, who establish the passing score. Students whose scores fall below the passing score are further evaluated based on their performance in coursework, summer projects, and performance as research/teaching assistants. On the basis of this further evaluation, a student whose qualifying exam score is below the passing score may nonetheless be determined to pass the qualifying exam. Students who do not pass the exam on their first attempt may retake the exam one more time.

The Oral Examination The oral examination assesses the student's potential to perform research in a chosen field, and examines the student's knowledge of biostatistics or bioinformatics. Successful completion of the written examination is a prerequisite for taking the oral examination. The oral examination should be scheduled by March 31 in the academic year after passing the written examination or by October 15 in the seventh semester, whichever comes first. In preparation for the oral examination, the student must decide on a specialized topic on which he/she wishes to be examined. In most cases, this specialized topic will be related to the student's chosen dissertation research area.

Students should prepare an oral exam proposal in the format of an individual training grant (F31) application, which includes a 1-page "Specific Aims" page and a 6-page research proposal section. The research proposal will summarize the literature and indicate their proposed specific aims for their dissertation (usually two or three aims); at the time of the oral exam it is expected that students will have completed substantial work for their first dissertation paper, with some preliminary results, and have general ideas and possible directions for their second and third papers.

This research proposal must be given to the Oral / Dissertation Committee at least two weeks prior to the examination, and the oral scheduling form must also be submitted to the department at least 2 weeks in advance (see Appendix B). The Dissertation Committee ordinarily consists of the dissertation advisor, who serves as the chairperson, and at least two other faculty members (see Section 2.2.3). At least two of the Dissertation Committee members must be either members of the Faculty of Arts and Sciences, or of the Department of Biostatistics. The chair should be a faculty member of the Department of Biostatistics. In some cases, a student could have two co-chairs of the Dissertation Committee. At the oral examination, students will be required to make a short presentation of their chosen topic, typically 30 to 45 minutes long, and will then be examined on the topic by the Committee; students should allow for up to two hours for scheduling the exam. This examination may include questions regarding the cognate area, as well as in the biostatistics or bioinformatics area of proposed research.

2.3.14 Doctoral Dissertation

The dissertation should be an original contribution to scientific knowledge. It can contribute to a subject matter field through innovative application of existing methodology, can make an original methodologic

contribution, or be a combination of the two. Most dissertations consist of material sufficient for three publications, and are often written such that each chapter reflects a paper considered publishable in a high quality peer-reviewed journal. The dissertation topic should be complementary to the student's area of interest in biostatistics or bioinformatics.

Acceptance of the dissertation is the responsibility of the student's Dissertation Committee, the Department, and GSAS. When the dissertation is complete, the student defends it to the Dissertation Committee at a public presentation. The defense must be openly publicized and scheduled at least three weeks in advance. A [Dissertation Defense Scheduling Form](#) must also be submitted three weeks in advance (see Appendix B). Copies of the dissertation must be given to the members of the Dissertation Committee and the Department Chair *at least* two weeks before the defense.

The defense should be scheduled as a two-hour block consisting of a 45 to 60 minute long presentation followed by a question-and-answer period. The defense presentation should cover the main material presented in the dissertation. The question-and-answer period will first include questions from the Dissertation Committee, then from other faculty members in the Biostatistics department, and finally from the general audience. Following the presentation and question-and-answer period, the committee will privately discuss whether the candidate has sufficiently completed the requirements for a doctorate. If the candidate has passed, the Dissertation Committee will sign the Dissertation Acceptance Certificate which the candidate must include when submitting their dissertation to GSAS.

Note that GSAS has specific requirements on formatting, submission, publishing, and distributing the Ph.D. dissertation, which can be found at <https://gsas.harvard.edu/degree-requirements/dissertations> in the GSAS Policies. Students submit their dissertations electronically through Harvard's electronic thesis and dissertation submission system. Timelines and submission deadlines are noted in the degree calendar section of the GSAS Student Policies.

2.4 Satisfactory Progress Requirements

A doctoral student's academic standing will be assessed by the Department on a regular basis to ensure that he/she is progressing at an appropriate rate. The Department adheres to the general satisfactory progress requirements as established by the Graduate School of Arts and Sciences and described in this [section](#) of the [GSAS Policies](#). Our Department will use the following additional criteria in establishing satisfactory progress.

1. Students in the first year of the Biostatistics doctoral program are expected to complete four core courses (BIST 230, BIST 231, BIST 232, and BIST 234) with a minimum average of B+ and no grade below B.
2. No more than one grade below B in any academic year; satisfactory performance on summer projects and as teaching assistants, research assistants, and/or computing assistants; maintain full time status of 4 full semester courses (16 credits) minimum per semester. According to the GSAS Policies, in each of the first two years a student must have achieved the minimum grade-point average required by this faculty, a B average (3.0).
3. Students will complete their written qualifying examination by the beginning of their third semester. The written exam must be passed by the beginning of the fifth semester.
4. Students will complete their oral examination by March 31 in the year after passing the written examination or by October 15 in the seventh semester, whichever comes first.
5. Ordinarily, students will complete all course, cognate, and consulting requirements by the end of the sixth semester.
6. Appropriate progress on the dissertation as reported in the Dissertation Progress Report form.

Ordinarily, a student will complete their degree within 3 to 5 years after entering the program.

2.5 Master of Arts

No one is admitted as a candidate for the Master of Arts (AM), only for the Ph.D. Nevertheless, the requirements for the Master of Arts degree must be satisfied by all students as they move toward the Ph.D. and are ordinarily expected to be completed by the end of the fourth semester. The AM degree may be granted when these requirements are fulfilled. In addition, the Department may confer a terminal AM degree on students who will not be completing the requirements for the Ph.D. In order to satisfy the AM requirements, 40 credits of ordinarily graded courses are required from the doctoral core, the advanced doctoral core, or the two-year Master of Science in Biostatistics degree core (described in the [Biostatistics Masters Handbook](#)), or other courses approved by the Director of Graduate Studies. Upon fulfilling these requirements, students should submit an application for the AM degree to GSAS.

A ADMINISTRATIVE REQUIREMENTS FOR DOCTORAL PROGRAM

Detailed requirements and deadlines are given at the Graduate School of Arts and Sciences [webpage](#). All forms linked below are also located on last page of this Graduate Student Handbook.

• Year One

– First Semester

- Complete Research Ethics requirement (HPM 548 or other approved RCR course).
- Complete Public Health requirement.
- Complete or ask for waivers of fall core courses (BIST 230 and BIST 232) that you intend to waive by emailing the Senior Manager of Academic Services with details about the course(s) taken or experience that you have that may qualify you for a waiver.
- May begin taking courses to count toward completion of cognate.
- Turn in [Wintersession plan](#) by December 15.

– Second Semester

- Complete or waive spring core courses (BIST 231 and BIST 234).
- Begin independent research with a faculty member (BST 300) for a minimum of 2 credits.
- Start to take advanced core courses if applicable.
- Continue completion of cognate-related courses.
- Search for summer project. Turn in [proposal form](#) about summer project to the Senior Manager of Academic Services by May 1.

– Summer

- Complete ten-week summer project.
- Study for qualifying exam, and take qualifying exam in late summer.
- Attend TA training sessions in SPH orientation week (late August).

• Year Two

– Third Semester

- Continue summer project through the fall semester via independent research with faculty member (BST 300) for a minimum of 2 credits.
- Present summer project in January.
- Take advanced core courses.
- Continue completion of cognate-related courses.

– Fourth Semester

- Take advanced core courses.
- Continue completion of cognate-related courses.
- If requesting permission to apply for a summer internship, submit a Summer Internship Proposal [form](#) by April 1 prior to pursuing the internship.

- If written qualifying exam passed, choose dissertation advisor. Notify Senior Manager of Academic Services of your choice by April 15.
- Turn in your [PhD Degree Form](#) by May 1.
- AM degree “along the way” should be completed, and degree application should be submitted by GSAS deadlines.

• **Year Three**

– Fifth Semester

- Take advanced core courses.
- Continue completion of cognate-related courses.
- Complete (or waive) the first half of the consulting course, BST 312A.
- If written qualifying exam passed, turn in the [Oral / Dissertation Committee nomination form](#) by October 15.
- Notify the Senior Manager of Academic Services when scheduling a dissertation committee meeting. A [Dissertation Committee Meeting form](#) must be submitted within a week of all dissertation committee meetings.
- If written qualifying exam passed, turn in your first [Dissertation Progress Report](#) (due twice a year) by November 1.

– Sixth Semester

- Complete advanced core courses.
- Complete cognate-related courses.
- Complete (or waive) the second half of the consulting course, BST 312B.
- Notify the Senior Manager of Academic Services when scheduling a dissertation committee meeting. A [Dissertation Committee Meeting form](#) must be submitted within a week of all dissertation committee meetings.
- Turn in [Dissertation Progress Report](#) by May 1.
- [Schedule](#) and complete Oral Qualifying Exam by March 31 (if written qualifying exam was passed on 1st attempt).
 - Circulate the written report for the Oral Qualifying Exam to the Dissertation Committee at least two weeks before the exam takes place.
- If qualifying exam passed on 2nd attempt, choose dissertation advisor. Notify Senior Manager of Academic Services of your choice by February 15.
- Turn in the [Oral / Dissertation Committee nomination form](#) within three months of choosing a dissertation advisor (by May 15 if written qualifying exam was passed on 2nd attempt).

• **Year Four**

– Seventh Semester

- Turn in [Dissertation Progress Report](#) by November 1.
- [Schedule](#) and complete Oral Qualifying Exam by October 15 (if written qualifying exam was passed on 2nd attempt).
 - Circulate the written report for the Oral Qualifying Exam to the Dissertation Committee two weeks before the exam takes place.

- Notify the Senior Manager of Academic Services when scheduling a dissertation committee meeting. A Dissertation Committee Meeting form must be submitted within a week of all dissertation committee meetings.

– Eighth Semester

- Notify the Senior Manager of Academic Services when scheduling a dissertation committee meeting. A Dissertation Committee Meeting form must be submitted within a week of all dissertation committee meetings.
- Turn in Dissertation Progress Report by May 1.
- Apply for degree by deadline. GSAS requires that Ph.D. applicants file an Application for Degree by the dates listed on their academic calendar. (NOTE: The application deadlines are several months before graduation.)
- Schedule your dissertation defense. Submit a Dissertation Defense Scheduling Form to the Department at least three weeks prior to the dissertation defense. Copies of the dissertation should be provided to the Dissertation Committee and to the Senior Manager of Academic Services at least two weeks prior to the defense. A Dissertation Acceptance Certificate will be completed by the Department before the dissertation defense and signed by the Dissertation Committee after the student's defense. In addition to the electronic dissertation submission, the original complete and signed Dissertation Acceptance Certificate must be delivered to the GSAS Registrar's Office by 4:00 PM on the dissertation deadline.

B DOCTORAL DEGREE FORMS

- **Biostatistics PhD Degree Program Form**
https://content.sph.harvard.edu/biostats/publications/handbook/PHD_Degree_Form.pdf
- **Oral Examination Scheduling Form**
https://content.sph.harvard.edu/biostats/publications/handbook/Orals_Exam_Scheduling_Form.pdf
- **Summer Internship Proposal Form**
https://content.sph.harvard.edu/biostats/publications/handbook/Summer_Internship_Proposal_Form.pdf
- **Oral / Dissertation Committee Nomination Form**
https://content.sph.harvard.edu/biostats/publications/handbook/Dissertation_Committee_Nomination_Form.pdf
- **Dissertation Committee Nomination Change Form**
https://content.sph.harvard.edu/biostats/publications/handbook/Dissertation_Committee_Nominations_Change_Form.pdf
- **Dissertation Committee Meeting Form**
https://content.sph.harvard.edu/biostats/publications/handbook/Dissertation_Committee_Meeting_Form.pdf
- **Dissertation Progress Report Form**
https://content.sph.harvard.edu/biostats/publications/handbook/Dissertation_Progress_Report_Form.pdf
- **Dissertation Defense Scheduling Form**
https://content.sph.harvard.edu/biostats/publications/handbook/Dissertation_Defense_Scheduling_Form.pdf