

Berkeley Public
Health

**Biostatistics Graduate
Degree Program**

2019-20 Student Handbook

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Division of Biostatistics/Epidemiology
2121 Berkeley Way West

Dear Biostatistics Incoming Class:

Welcome to the Graduate Group in Biostatistics at the School of Public Health at the University of California, Berkeley.

We are pleased that you have decided to pursue your graduate studies here and look forward to interacting with you both in the classroom and extracurricular activities that await you.

The Graduate Group in Biostatistics has highly dedicated and experienced faculty and staff, and we encourage you to get to know them so that you fully benefit from your time at Berkeley. Each of you has been assigned a faculty advisor who will help to guide you during your time in the program. You are also encouraged to consult with our Program Manager, Janene Martinez for any questions related to graduate policies and procedures, or biostatistics program in general.

We encourage you to read through your program handbook, and ask any questions you may have. You will also receive information from our Student Services and Admissions office. Please read these messages, as this information will be essential to your success here at SPH.

In particular, we encourage you to take some time this summer to review essential statistical concepts. The default course series for Fall is to enroll in Stat 201A/B and PH 240A (more information on these courses is provided below). In particular, the online course Data 8 (<http://data8.org/>) provides an excellent source of review materials (all freely available).

We look forward to getting to know each of you and understanding how we can help you achieve your educational and professional aspirations in the field of biostatistics.

All best wishes,

Sincerely,

Maya Petersen, PhD, MD
Associate Professor of Biostatistics
Graduate Group Co-Chair

Mark van der Laan, PhD
Professor of Biostatistics
Graduate Group Co-Chair

Core Competencies

Masters of Arts

- Understand the foundations of statistical inference, e.g., maximum likelihood estimation, regression.
- Have grounding in theoretical framework and ability to apply existing estimators in following categories:
 - Computational statistics
 - Multivariate analysis
 - Categorical data analysis
 - Survival analysis
 - Longitudinal data analysis
 - Causal inference
 - Clinical trials
 - Statistical genomics
 - Statistical computing
- Have fluency in statistical programming languages for both analysis using classic methods and implementation of novel methods.
- Identify and apply sound and pertinent methods to address statistical inference questions in biological, public health, and medical research.
- Effectively communicate research findings, orally and in writing.

PhD (in addition to above)

- Develop and apply sound and pertinent methods to address statistical inference questions in biological, public health, and medical research
- Be able to place scientific questions in rigorous statistical framework:
 - Understand and have the ability to apply methods and list assumptions for identifying statistical estimands that address scientific question(s) of interest.
 - Be able to either develop estimators for above, or to recognize when such estimands have been developed and have the ability to apply them.
 - Have working knowledge of computational methods and programming languages that can be used to implement or evaluate novel methods.
- Have ability to teach statistics at the university level

Introduction

This guide aims to provide information and counsel for the pursuit of a graduate degree in Biostatistics at the University of California, Berkeley. This document does not cover all regulations pertaining to graduate studies at UC Berkeley, please take a look at the links included in the Things You Should Know and Services & Resources sections.

Collecting and exploring relevant data address many issues in the biological, health, and medical sciences. The development and application of techniques to better understand such data is the fundamental concern of the Graduate Group in Biostatistics at the University of California, Berkeley. Core methodological research interests include loss-based estimation (e.g., classification, regression, density estimation, variable selection), semi-parametric estimation, cross-validation, multiple hypothesis testing, survival analysis, clinical trials, adaptive designs, causal inference, and statistical computing. Areas of application include genetics, molecular biology, epidemiology, and medicine.

Since the inception of the program in 1955, the Graduate Group in Biostatistics has offered academic degree programs leading to the **Master of Arts (MA)** and **Doctor of Philosophy (PhD)** degrees. The curriculum offers instruction in statistical theory and computing, as well as opportunities to rigorously apply this knowledge in biological and medical research.

Students admitted into our degree programs come from diverse disciplines. The average quantitative GRE score for admitted students in 2019 was in the 88th percentile. Graduates from the Group in Biostatistics are highly sought-after and obtain prestigious positions in academia, industry, and government.

Degree Programs

Students admitted into the MA or PhD program typically have a strong mathematics and statistics background with a focus in the biological sciences.

The Master of Arts Degree

The MA degree in Biostatistics is completed in four semesters. Candidates for this degree are expected to earn 48 units with graduate courses in biostatistics and statistics (some courses in public health, biology, computer science, or related fields may qualify). At least 16 units (4 courses) must be from core graduate-level biostatistics courses; additional requirements are detailed in the Curriculum section below. The 12-unit minimum enrollment requirement may be met with independent research or seminar courses. Students are expected to enroll for all four semesters of the program; therefore, the use of the filing fee in the final semester is not an option.

Students pursuing an MA degree in Biostatistics will be expected, upon completion of the program, to be well versed in some or all of the following areas:

- Fundamental statistical inference methods, including loss-based estimation (e.g., regression, and maximum likelihood estimation) and hypothesis testing.
- Survival analysis.
- Computational statistics.
- Statistical computing.
- Causal inference methods for complex data structures, including censored and longitudinal data.
- Computational biology, including genetic mapping and high-throughput microarray and sequencing gene expression studies.

Early in the Fall semester of the second year students will receive a google form questionnaire asking students whether they are planning to complete the Plan I or Plan II of the master's comprehensive plan requirements.

MA Thesis (PLAN I)

The Master's Thesis is filed at the end of the two- year MA program. The decision to complete a thesis must be made early in the semester the student plans to graduate. Students are encouraged to solicit committee membership from among the biostatistics faculty. Requirements for the configuration of the MA thesis committee are as follows: **Thesis Committee Membership** consists of three faculty members, with two inside members from the Group in Biostatistics and one member from "outside" the department (e.g., Epi, Bioeng, etc.). If an outside member cannot be identified, a third member from the Group in Biostatistics is permissible. The Committee Chair must be an "inside" member (from within the Group in Biostatistics). There will also be a Thesis seminar (PH 292.X) designed specifically for Biostatistics MA students in the Spring. A timeline will be sent to students planning to file their thesis early Fall semester with a specific deadlines and memo of understanding that MA students will review and adhere to meet.

MA Comprehensive Examination (PLAN II)

Students may take the Oral Comprehensive Examination in lieu of the MA thesis at the end of the two-year MA program. The decision to take the comp exam must be made early in the semester the student plans to graduate. The **Comprehensive Examination Committee** will be identified by Student Services staff, and consists of two faculty members from the Group in Biostatistics.

The MA comprehensive examination is designed to test a candidate's breadth and depth of knowledge and understanding of material from the curriculum, as well as the ability to articulate and explain basic concepts. Each examiner negotiates with the candidate a topic

to explore. Candidates are expected to write a short essay on each of these topics and provide the written materials to each examiner at least three weeks before the oral exam. If examples are needed, please contact the Student Services staff. During the oral exam, examiners are free to question the candidate for more background, methodological detail, or examples. The comprehensive examination lasts about 90 minutes.

Applying to the Doctoral Program

Some students pursuing the MA degree intend to continue directly into a PhD program, while others take research positions in federal agencies, state and local health departments, health care delivery organizations, and private industry. MA students interested in continuing into the UC Berkeley Biostatistics doctoral program immediately following their MA degree should petition to add the new degree program through the Online Application for Admission during their second year of study during the normal admissions cycle.

The Doctor of Philosophy Degree

A PhD degree in Biostatistics requires a program of courses selected from biostatistics, statistics, and at least one other subject area (such as environmental health, epidemiology, or genomics), an oral qualifying examination, and a dissertation. Courses cover traditional topics as well as recent advances in biostatistics and statistics. Those completing the PhD will have acquired a deep knowledge and understanding of the MA subject areas. Since graduates with doctorates often assume academic research and teaching careers, a high degree of mastery in research design, theory, methodology, and execution is expected, as well as the ability to communicate and present concepts in a clear, understandable manner.

The PhD degree program requires 4-6 semesters of coursework, followed by 4-6 semesters of research to complete the qualifying examination and dissertation (in total, a minimum of four semesters of registration is required). Since there are no formal course requirements for the PhD, a program of courses appropriate to a student's background and interests may be developed with a graduate adviser.

All students accepted into the PhD program must hold a master's degree in biostatistics or a related field. Applicants to the PhD program who do not already hold an MA, if admitted, are admitted initially to the MA degree program. This practice does not prolong the time to conferral of the doctorate, since the first two years of both the MA and PhD programs for students coming from the baccalaureate are identical.

The Graduate Division, upon recommendation of the Head Graduate Adviser, will advance a student to PhD candidacy. Student must still enroll in 12 units/semester.

To advance to candidacy, a student must:

- Complete a recommended program of courses.
- Pass an oral qualifying examination administered by a committee approved by the Graduate Division.
- Satisfy the faculty member who is expected to be the dissertation committee chair of an ability to perform original research.

PhD Qualifying Examination

The primary purpose of the oral qualifying examination is to test both a candidate's general competence in statistical theory and the ability to apply statistical methods to a subject-matter area. The exam is designed to measure breadth and depth of knowledge, as well as provide a determination of the candidate's readiness to enter the research phase of study. To assure the examining committee that the candidate has both a firm grasp of statistical foundations and familiarity with current problems in the field, the examination is conducted as follows:

1. The candidate is expected to begin with a 45- minute presentation of a dissertation topic, including a review of previous work and the proposal of a sound research strategy.
2. Following this presentation, the candidate is asked to demonstrate an ability to synthesize the methods learned through courses and to soundly apply this knowledge to areas and problems suggested by committee members. To achieve this goal, committee members are likely to ask questions that delve into subjects that go beyond the chosen area of dissertation research.

The committee for the PhD Qualifying Examination consists of four faculty members (3 “inside” members and 1 “outside”). At least two inside members must be core biostatistics faculty, one additional “inside” member must be faculty from another department but still a member of the Graduate Group in Biostatistics (for a list of core faculty and faculty who are members of the Graduate Group in Biostatistics please refer to [Grad Group List](#)), and one Academic Senate Representative (ASR), previously known as “outside” member. The ASR must belong to the UC Berkeley Academic Senate (*i.e.*, may not be an adjunct or clinical faculty or a lecturer) and may not be a member of the Group in Biostatistics (per list mentioned above). The chair of the qualifying examination committee must be a member of the Group in Biostatistics. Additionally, **the chair of the qualifying examination committee may not serve as chair of the dissertation committee**, though it is expected that the proposed chair of the dissertation committee will serve on the qualifying examination committee. The Graduate Division must approve this committee at least three weeks prior to the exam itself.

The candidate should meet with the chair of the qualifying examination committee to discuss the structure of the exam and any other pertinent issues. To be eligible for the examination, a student must have a grade-point average of at least 3.0. When the date/time (a three hour timeblock) is agreed upon the Student Services staff will reserve a conference room and the student will submit the [Higher Degrees eform](#) via CalCentral for Graduate Division approval.

Grading

Students have the option of taking a course on a Satisfactory/Unsatisfactory (S/U) basis, but no more than one-third of the master's program may be fulfilled by courses graded Satisfactory. UC Berkeley's Grade Definitions can be found [here](#).

PhD Dissertation Committee

The candidate's research is conducted under the guidance of a dissertation committee that **consists of three faculty members**, with two "inside" members from the Group in Biostatistics and one ASR from "outside" the department (*e.g.*, Epidemiology, Bioengineering, etc.). The committee chair, which must be a member of the Group in Biostatistics, is primarily responsible for supervising the student's research progress. The dissertation committee must be in place at the time the student submits the [Higher Degree eForm for Advancement to Doctoral](#) to the Graduate Division via CalCentral.

Preparation of the PhD Dissertation

It is important for the student to meet regularly with the chair and other members of the dissertation committee. All members of the committee should approve the dissertation before it is put into final form. Instructions on the preparation and submission of the dissertation are available from the Graduate Division. The student is responsible for following these instructions, including obtaining all signatures of approval, and should allow ample time to complete all requirements well before the date when s/he plans to file the dissertation. A PDF file of the final version of the dissertation should be provided to the Group in Biostatistics.

Designated Emphasis

A "Designated Emphasis" is defined as an area of study constituting a new method of inquiry or an important field of application relevant to two or more existing doctoral degree programs. Students enrolled in the PhD program are eligible to apply for interdisciplinary study in a designated emphasis. A designated emphasis for the PhD degree is the analogue of a minor in baccalaureate programs. The Group in Biostatistics, in conjunction with other departments on the Berkeley campus, offers a [Designated Emphasis in Computational and Genomic Biology](#) and a [Designated Emphasis in Computational Science and Engineering](#).

Students should apply to the DE several months in advance of the Qualifying Examination, which must include at least one member of the DE Group Faculty.

DEs are not free-standing degree programs, but must be added as an additional major along with an existing doctoral degree program. Students electing to add a Designated Emphasis are required to complete the academic work in the Designated Emphasis in addition to all the requirements of the doctoral program.

To qualify for the Designated Emphasis, students must have a representative of the DE on the Qualifying Examination Committee and must be examined in that area of study.

Students are consequently required to be admitted to the DE **before** taking the Qualifying Examination.

Financial Support

Admitted students are eligible for various types of financial support, including campus fellowships and funding from the Graduate Group in Biostatistics. Students interested in teaching or research positions may apply directly to the Group in Biostatistics.

Information on other sources of financial aid, such as loans and the work-study program, is available through the Financial Aid and Scholarships Office

(<https://financialaid.berkeley.edu/>) Students should not rely on receiving financial support unless a specific award is offered before arrival at Berkeley.

For domestic students (US citizens and permanent residents), the main application for financial aid is the FAFSA (Free Application for Federal Student Aid) and students should be aware of deadlines for initial submission and renewal. It is important that all students submit a renewal of the FAFSA each year, regardless of the desired type of financial support.

A review of financial support for graduate students is available on the Graduate Division website. Outstanding candidates may be offered awards from the Graduate Division after successful campus-wide competition.

Sources of financial support available through the Graduate Group in Biostatistics are outlined below. All admits are considered for support, regardless of degree goal.

For International and Out-of-State Students, the Biostatistics Graduate Group will generally provide at most one year of NRST (Non Resident Supplemental Tuition) funding for those biostat students offered funding as incoming MA and PhD students.

- Incoming PhD students will be encouraged to take their qualifying exam during the Spring term of first year. After passing the qualifying exam and advancing to candidacy, they no longer have to pay NRST.
- All incoming international MA students will be responsible for the NRST during their second year (unless explicitly offered extended NRST funding at the time of admission).
- International students petitioning to the PhD from MA will be have their NRST funded for the first year, even if they received it for their first year of the MA.

Graduate Student Appointments

Graduate Student Researchers (GSR) are selected for promise in biostatistics research. A GSR must be a registered graduate student with a grade-point average of at least 3.0. GSR positions may be held with faculty inside or outside the Group in Biostatistics. The more research experience, the better the chances of obtaining a GSR position.

Graduate Student Instructors (GSI) are chosen for promise in teaching and serve an apprenticeship under the supervision of a faculty member. A GSI must be a registered graduate student with a grade-point average of at least 3.0.

The duties of a GSI include preparing for and conducting problem-solving sessions, holding office hours, grading homework and/or exams, and attending any meetings called by the instructor. Full-time employment is based on a 40-hour workweek: a 50% GSI appointment assumes 20 hours per week, which is the maximum appointment the University allows graduate students to work. There are exceptions to this policy, which one has to request from the Graduate Division.

Traditionally, GSI positions are for PB HLTH 142 (Introduction to Probability and Statistics in Biology and Public Health) which is a large service course covering elementary statistical methods, the course is offered in Fall and Spring semesters as well as the Summer Session D. More advanced courses that involve GSIs are PH 241, PH C242C, and PH 245. The latter courses have laboratory and/or problem-solving sessions by-and-large designed and taught by the GSI, under the supervision of the instructor. Biostatistics students are also often employed as GSIs in the Department of Statistics and must apply directly to that department to be considered for such appointments. Since teaching is often a vital part of a career in biostatistics, students are encouraged to take advantage of any opportunity to engage in teaching.

In order to be considered for a GSI appointment, all students who do not speak English as a native language and do not have a bachelor's degree from a US institution must demonstrate oral **English proficiency**. This may be done by taking the TOEFL iBT or

the Test of Spoken English (TSE) prior to enrolling at Berkeley, or the Speaking Proficiency English Assessment Kit (SPEAK) once enrolled at Berkeley.

Additionally, all first-time GSIs must meet various requirements as required by the [Graduate Student Instructor Teaching & Resource Center](#). Among them, new GSIs must complete a 300-level pedagogy course. In the School of Public Health a PH 375A/B are offered in the Fall semester. Anyone who wishes to enroll in the Spring semester can review 300-level courses offered by other departments on the Course Catalog.

Faculty

The faculty involved in graduate training in Biostatistics fall into two overlapping categories — those who are part of the *Division of Biostatistics/Epidemiology* (School of Public Health) and those who belong to the *Graduate Group in Biostatistics*. The principal distinction between these two units is the type of degree awarded. The Graduate Group in Biostatistics was formed to grant academic degrees in Biostatistics (MA and PhD) and is governed by the Graduate Division. Professors Maya Petersen and Mark van der Laan currently both serve as the Co-Chairs for the Graduate Group in Biostatistics. Professor Arthur Reingold serves as the Chair for the Division of Biostatistics & Epidemiology, which is part of a professional school and participates in the Master of Public Health (MPH) in the Epi/Biostatistics degree program. Professor Mahasin Mujahid serves as the Director for the Epi/Biostats MPH Program.

Graduate Group in Biostatistics Faculty

The faculty members participating in the Graduate Group in Biostatistics are diverse in their interests and present a broad and dynamic spectrum in their research and teaching activities. **The membership of the Graduate Group in Biostatistics is as follows (*Graduate Group Member, SPH, **Core Biostatistics Faculty, >Emeritus):**

Peter J. Bickel [Statistics] *Non-parametric inference, asymptotic methods*

David R. Brillinger [Statistics] *Time series in biology*

Perry de Valpine [Environmental Science, Policy, and Management] *Statistical methods in ecology*

Sandrine Dudoit, [Statistics] *Loss-based estimation, multiple hypothesis testing, cross-validation, statistical computing, applications of statistics to biomedical and genomic research, such as high-throughput microarray and sequencing gene expression studies*

Haiyan Huang [Statistics] *Bioinformatics, distributional approximation*

****Alan E. Hubbard**, [Biostatistics] *Survival analysis, censored and longitudinal data, causal inference*

****>Nicholas P. Jewell** [Biostatistics and Statistics] *Sampling, survival analysis, HIV/AIDS, epidemiological data analysis, genomics*

Michael J. Klass [Statistics] *Approximations, random vectors*

***Mi-Suk Kang Dufour** [Biostatistics and Epidemiology] *Implementation science, reproductive health, HIV, and malaria programs. Application of quantitative methods to evaluation of population interventions in the effectiveness of implementation*

****Lexin Li** [Biostatistics] *Neuroimaging data analysis, networks data analysis, personalized recommendation*

****John M. Marshall** [Biostatistics and Epidemiology] *Genetics-based strategies to control mosquito-borne diseases, Mathematical modeling to support malaria elimination, Mathematical epidemiology and social science*

Priya Moorjani [Molecular Cell & Biology] *Human population genetics and evolutionary biology*

Rasmus Nielsen [Integrative Biology and Statistics] *Population genetic analysis, genomics of natural selection*

****Maya Petersen, Graduate Group Co-Chair** [Biostatistics and Epidemiology] *Causal inference in clinical data, dynamic treatment regimes, HIV*

Elizabeth Purdom [Statistics] *Bioinformatics, High-dimensional data analysis*

Sophia Rabe-Hesketh [Education] *Generalized linear mixed models and latent variable models*

John Rice [Statistics] *Applied statistics, stochastic problems in neurophysiology*

Corinne Riddell [Biostatistics and Epidemiology] *Racial and ethnic health inequalities, Social epidemiology, Perinatal epidemiology, Data visualization, Health variation across US states*

****Steve Selvin** [Biostatistics and Epidemiology] *Data analysis of epidemiologic problems*

Yun S. Song [Statistics and EECS] *Mathematical population genetics, computational biology, bioinformatics, applied probability and statistics*

****Mark J. van der Laan, Graduate Group Co-Chair and HGA** [Biostatistics and Statistics] *Semi-parametric methods, targeted minimum loss-based estimation, machine learning, causal inference, survival analysis, censored and longitudinal data, computational biology, applications in epidemiology*

Bin Yu [Statistics] *Machine learning, classification and unmixing in remote sensing, network tomography, Minimum Description Length (MDL)*

Jingshen Wang [Biostatistics] *TBD*

Graduate Advisors

Upon enrollment, every student is assigned a graduate advisor, chosen among the faculty of the Group in Biostatistics. This advisor often changes to accommodate the student's interests, once engaged in thesis or dissertation research. It is the responsibility of the graduate advisor to assist the student in developing an optimal training program that meets the requirements for the desired degree and also provides sufficient flexibility to match the student's background and objectives. It is especially important that there be good communication between a student and the graduate advisor, so that, in planning a course of study, the advisor has a clear understanding of the student's needs and interests. If, for any reason, a student is dissatisfied with the assigned advisor, it is possible to change to another.

Student Initiative: It is each student's responsibility to schedule appointments with their advisor. If your advisor's office hours conflict with your course schedule, please contact them to request alternate appointment times. You are encouraged to meet with your advisor early in the first semester to 1) get to know your faculty advisor's interests and research focus; 2) share with your advisor who you are and what you hope to accomplish during your studies; and 3) learn what you might expect from your relationship with your faculty advisor. Plan ahead and have an agenda for your meeting. Be prepared to talk about your background in the context of how you've developed your current academic goals and interests. Read about your faculty advisor's work and interests and be specific about your questions or topics of discussion. If you want to talk about the field, use the advisor's recent articles to guide your conversation.

Teaching Program Faculty

Though not part of the Group in Biostatistics, the faculty listed below play an important part in the training program.

Clinical Faculty in Biostatistics

- **Deryk Van Brunt** - *Health informatics*

Affiliated UCSF Faculty

The faculty from the Department of Epidemiology & Biostatistics at the **University of California, San Francisco** are potential sources of thesis, dissertation topics, and research assistantships. Faculty from the UCSF campus who are affiliated with our group include:

Su-Chun Cheng – *Survival analysis; Design and analysis of clinical trials; Collaborative research in cancer and AIDS*

John M. Neuhaus – *Methods for longitudinal and clustered data*

Mark R. Segal – *Survival analysis; Longitudinal data; Computer intensive methods*

Stephen C. Shiboski – *Applications of statistics to problems in infectious disease epidemiology; Nonparametric approaches to survival analysis*

Curriculum

The curriculum in Biostatistics involves courses from a wide variety of areas spanning the mathematical and biological sciences. The core to this curriculum includes: loss-based estimation (e.g., classification, regression, density estimation, variable selection), semi-parametric estimation, cross-validation, multiple hypothesis testing, survival analysis, clinical trials, adaptive designs, causal inference, and statistical computing. Courses in the biomedical sciences, such as epidemiology, genetics, and microbiology, are also part of the curriculum and are fundamental for an understanding of subject-matter issues.

All courses taught at UC Berkeley are listed and described in the **General Catalog** (<http://guide.berkeley.edu/>) course times and locations are given in the **Schedule of Classes** (<https://classes.berkeley.edu/>).

New MA Students should take the following courses:

STAT 201A Introduction to Probability at an Advanced Level
STAT 201B Introduction to Statistics at an Advanced Level
PH C240A Introduction to Modern Biostatistical Theory and Practice

Biostatistics Core Courses

In addition to **Statistics 201A and 201B and PH C240A**, to complete the requirements for the MA, students are expected to take **PH252D** (Introduction to Causal Inference) and at least two other courses from the following courses:

- PH C240B Biostatistical Methods: Survival Analysis and Causality
- PH 252E Advanced Topics in Causal Inference
- PH 244 Big Data: A Public Health Perspective
- PH C242C Longitudinal Data Analysis
- PH 240E/F Statistical Genomics
- PH 290.X Targeted Learning in Biomedical Big Data
- PH 292.X Biostat MA Spring Seminar (for thesis filing)

These requirements may differ for students who have had coursework in these subject areas before entering the program and who will want to take advantage of **more advanced** course offerings (e.g., STAT 210A and 210B). A program of courses tailored to suit each student's background and interests may be arranged with a graduate advisor. Students should make sure to communicate this to the Student Services Staff.

Courses in the Biostatistical Methods series PB HLTH C240 (A, B, and E/F) are designed to introduce students to basic concepts as well as cutting-edge topics. These courses are cross-listed in the STAT C245 series. Part A concerns fundamentals of biostatistical theory and practice; Part B survival analysis; Parts E/F statistical genomics.

Courses in the Special Topics in Biostatistics PB HLTH 243 series cover a wide range of topics corresponding to specific faculty interests and expertise. One goal of these courses is to introduce students to current issues that might potentially lead to dissertation projects. Topics presented and course format will depend on instructor preference.

In addition to the core Biostatistical Methods PB HLTH C240 series, the following is a non-exhaustive selection of courses of interest to Biostatistics students.

Additional Electives

- PH 243D Special Topics in Biostatistics: Adaptive Designs

Theoretical and Applied Statistics Courses

- STAT 152 Sampling Surveys
- STAT 204 Probability for Applications
- STATC205A/B Probability Theory
- STAT 210A/B Theoretical Statistics
- STAT 215A/B Statistical Models: Theory and Application
- STAT 230A Linear Models
- STAT 232 Experimental Design
- STAT 240 Non Parametric and Robust Methods
- STAT C241A Statistical Learning Theory
- STAT 260 Observational Study Design and Causal Inference
- STAT 272 Statistical Consulting
- EDUC 275G Hierarchical and Longitudinal Modeling
- EDUC 275H Research Group in Multilevel Modeling

Additionally, a variety of special topics courses are offered each year.

Computing Courses

- STAT 133 Concepts in Computing with Data
- STAT 243 Introduction to Statistical Computing
- STAT 244 Statistical Computing

Epidemiology Courses

- PH 250A/B/C Epidemiologic Methods & Theory
- PH 252 Epidemiological Analysis
- PH 254 Occupational and Environmental Epidemiology

Seminars and Variable Unit Courses

Enrollment in many of these courses requires approval of the faculty member in charge.

- PH 299 Independent Research
- PH 292 Biostat MA Thesis Seminar
- PH 293 Doctoral Seminar/Biostat Speaker Series
- PH 375B Instructional Techniques in Biostatistics
- STAT 278B Statistics Research Seminar
- STAT 298 Directed Study for Graduate Students
- STAT 299 Individual Study Leading to Higher Degrees

Additional Courses

Other departments where biostatistics students find many relevant courses include: Mathematics (analysis, differential equations, and linear algebra), Molecular and Cell Biology, computational biology, genetics.

PH 298 and 299 policy

For MA students no more than 12 units may be in the PH 298, 299 series. Additionally students must receive instructor approval to enroll in their respective PH 298 and PH 299 sections. Moreover, course numbers for PH 298 and PH 299 sections are not posted and students must contact the epi/bio program student services staff for that semester's course number. Finally, unless otherwise discussed and agreed upon all PH 298 and 299 units must be taken on an S/U (satisfactory/unsatisfactory) basis. PH 299 units count toward the overall unit total, but not against the 1/3 S/U limit mentioned above.

Computing

Computing is an integral part of modern biostatistics and students have access to all university computing resources, which creates a vast and diverse computing environment.

School of Public Health Computing Facilities

There is a printer on the 5th floor of Berkeley Way West which all students can use.

Student Information

Currently, there are 47 students pursuing degrees in Biostatistics, 22 working toward an M.A. degree and 25 working toward a Ph.D.

A large number of our graduates have gone on to research and teaching careers at colleges and universities, both here in the US and internationally. Others have pursued careers in the pharmaceutical/biotech industries, at health care delivery organizations, at the Veteran's Administration, and at medical schools and schools of public health across the US and abroad. The demand for biostatisticians with advanced training is high, particularly for those seeking teaching and research careers.

Over 180 students have graduated with master's degrees and many of these graduates have also completed doctoral programs either here at UC Berkeley or at other universities. Those who have not gone on for doctoral training have had no difficulty obtaining positions at such organizations as Kaiser Division of Research, The California Birth Defects Monitoring Program, Genentech, Amgen, and other biomedical and pharmaceutical research firms.

Biostatistics Graduate Student Association We are pleased to bring to your attention the **Biostatistics Graduate Student Association (BSGSA)**. Led by President: Mary Combs, this association has been a very valuable resource for graduate students and has organized a variety of academic and social events, including alumni panels and career information sessions with local biotechnology companies.

Mailboxes

Should a student need to have academic or research related mail sent to them at the Berkeley Way West Building, any correspondence will be placed in the epi/bio box on the 5th floor mailroom (room 5302). **All personal mail and large items should be sent to your residence, including any of the professional journals to which you might subscribe.** Use the following mailing address:

Your Name

Division of Biostatistics/Epidemiology

2121 Berkeley Way #5302, Berkeley, CA 94720-7360

Fax: 510-643-5056

Campus E-mail and Calendar

All registered students are eligible for, and are required to have, a bConnected account — your official campus email, calendar, and document sharing account. Your campus email address is based on your online identity (your CalNet ID followed by @berkeley.edu), and it will be used by professors, departments, and university administration to send information regarding enrollment, financial aid, and class assignments. Your calendar is used for scheduling meetings, office hours, etc. Your bConnected account comes with 30GB of data storage.

To create your official UC Berkeley email account, visit

<http://bconnected.berkeley.edu>.

Once your berkeley.edu e-mail account is set up, update your UC Berkeley official email listing in the CalNet Directory: <http://calnet.berkeley.edu/directory/update>.

Your official email address, @berkeley.edu, will be used for all communication.

Registration and Enrollment- CalCentral

You will enroll in classes using <https://calcentral.berkeley.edu>. You may use CalCentral during your appointment period drop classes through the ***second week of instruction*** at no additional cost. Drops can still be made via CalCentral after the second week of instruction, but will incur a \$10 fee, payable on CalCentral *MyFinances*. You may use CalCentral to add a class through the ***third week of instruction*** at no additional cost. Adds can still be made via CalCentral after the third week, but will incur a \$5 fee. Students will be able to add, drop, and/or change units (in variable unit courses) with a fee (for adding/dropping courses) through the end of the tenth week. Any changes after the ***tenth week of instruction*** will need to be made by downloading and completing the [Petition to Change Class Schedule Form](#) and submit it to Janene or Sumaiya by Monday of the last week of Instruction (December 9, 2019 for Fall 2019 and May 4, 2020 for Spring 2020).

You may also obtain information regarding your current schedule, your final grades from the previous semester, financial aid application/award status, finance/billing information, and much more on CalCentral.

A **late registration fee of \$150** will be charged to any student not officially arrested by Friday of the third week of instruction. If you are not enrolled in any class by the third week of instruction your registration may be canceled and you will need to apply for re-admission.

To be officially registered, you must meet four criteria:

1. You must be enrolled in at least one course.
2. Your registration fees must have been paid, either in full, or, if on the Deferred Payment Plan, at least your first installment of 20% by September 23, 2016.
3. You must have no blocks against your registration.
4. You must complete the Sexual Violence and Sexual Harassment Training online and in-person.

With CalCentral you will be able to access your current class schedule, financial aid and award status, as well as information regarding your grades, billing, advising appointments, bCalendar and more. You can also update your postal address, email address, and telephone information, view and order copies of your transcript.

Students in the MA degree program should note that a minimum number of units must be completed for the degree and a reduced course load could result in a prolonged degree program.

bCourses is Berkeley's Learning Management System (LMS) powered by Canvas. It is an online system specifically designed for the delivery and communications of course content, online engagement between students and instructors, and the management of student work in support of face-to-face and hybrid classes. Please visit <https://bcourses.berkeley.edu> to create a site.

Berkeley Electronic Press, simply called '**bepress**' (<http://www.bepress.com>), was built by scholars to serve the needs of scholars. In the late 1990's, academic journals were plagued by slow turnaround times, limited access, and unreasonable prices. Publishers wanted to maximize profits, while editors wanted to maximize readership and share ideas. In 1999, UC Berkeley Professors Robert Cooter, Aaron Edlin, and Ben Hermalin banded together to launch a sustainable alternative, bepress, which also set out to provide authors and universities with a solution for them to share their research openly and widely. Thus bepress pioneered Digital Commons, a software service that is now the leading hosted

Biostatistics Working Papers Series

A complete list of biostatistics technical reports can be viewed at <http://www.bepress.com/ucbbiostat/>

Instructions for Submission

The following items should be submitted in **plain text**, i.e., no italics, bolding, formulas, or symbols, in the **body** of an email message to biostat@berkeley.edu.

1. **Title** of the paper.
2. **Authors**: Include affiliation and e-mail address of the first author if it is not you. The first author will receive an email regarding the status of the submission.
3. **Keywords or phrases**: Up to six, separated by commas.
4. **Abstract**: Omit any italics, bolding, formulas, or symbols.

The text of your report must be submitted in **PDF (optimized) format**. **Remove** title, authors, and the abstract from the text of your article. If your article includes an **acknowledgement** on page 1 (as a footnote or as part of the text or on a separate page), please move this material to the end of article, placing it before the references. Send your PDF file as an email attachment to biostat@berkeley.edu.

Graduate Appeal Procedure

Procedures for handling complaints related to graduate studies at UC Berkeley are detailed on the Graduate Division website: <http://grad.berkeley.edu/policy/coursework-grading-probation-and-dismissal-policy/>

Academic Calendar 2019-2020

https://registrar.berkeley.edu/sites/default/files/pdf/UCB_AcademicCalendar_2019-20_V4.pdf

Frequently Asked Questions by Current Students

What is my CalNet Student Identification Number (SID)? What is my Passphrase?

Your SID is first assigned to you upon your application to the school. It will be your unique identifier throughout your career at UC Berkeley (it's a good idea to memorize it as you will use it often). Your Passphrase will also remain the same and will be used as a password to access various resources like Berkeley's internet system, library databases, and the Telebears and Bearfacts sites. For more information, please visit the CalNet ID website at <http://calnet.berkeley.edu>. For more information, contact the CalNet team at: calnet-admin@lists.berkeley.edu.

How do I register for classes?

You can enroll in classes through the online system: calcentral.berkeley.edu. Please check the online schedule on the [Berkeley Academic Guide](#) each term for new courses and for course availability. Course Numbers (previously CCNs) will also change every semester. Graduate students may take no more than half of the required degree units in courses numbered 100 through 199. Additionally, courses numbered 99 and below are considered to be lower-division undergraduate courses and **do not** count toward meeting any graduate degree requirements.

Online Courses: Residential students are welcome to enroll in OOMPH courses, but must first contact student services staff for a permission code. The following restrictions apply: residential students may take no more than two online classes per semester. Students must first complete the [OOMPH 101 tutorial](#). More information can be found on the [OOMPH site](#). For any additional questions regarding OOMPH courses and their structure please contact student services staff.

How do I view my grades, registration status, class schedule, and financial aid information?

CalCentral is the Berkeley website that allows you to view grades, registration, class schedules and financial aid information. You can update your personal information, accept or decline financial aid loan offers, and view your grades. To log on you will need your CalNet ID and passphrase.

How do I pay my fees?

If you are receiving financial aid in the form of a stipend, block grant or GSI/GSR position, your fees will be paid directly by the school. With the new Student Information System (SIS), if you are making payments out-of-pocket you will pay via MyFinances in CalCentral. At least 20% of fees must be paid one week before the start of the semester.

How do I set up my campus email and calendar?

All registered students are eligible for and are required to have a bConnected account — your official campus email, calendar, and document sharing account. Your campus email address is based on your online identity (your CalNet ID followed by [@berkeley.edu](#)), and will be used by campus to send you important information on registration status, enrollment, financial aid, and class assignments. Your calendar is used for scheduling meetings, office hours, etc. Your bConnected account comes with 25GB of data storage.

After the Graduate Division transfers your new student data to the registrar's office and you have a CalNet ID, you can create a bConnected account. Go to

<http://bConnected.berkeley.edu> to create your bConnected account and review important campus policies for computer use, email and online data security. You are responsible for communications sent to and from your @berkeley.edu address and data stored in your bConnected account.

Where do I get a Cal Student ID Card? How about my AC Transit Class Pass/Easy Pass (Bus Pass)?

You can obtain a Cal Student ID Card in 212 Sproul Hall Monday through Friday between 9am & 4:30pm. You will need a valid photo ID and your SID. Cal 1 Card photos can either be submitted online ([learn how to submit your photo online](#)) or taken in person at the Cal 1 Card office. The card is free, although there is a fee for replacement cards. Once you have your card you can pick up the AC Transit EasyPass Clipper card which is loaded with an electronic Class Pass. The pass can be used for unlimited rides on any AC transit bus (including the transbay bus to San Francisco). For more information on the Cal1Card, please visit: <https://cal1card.berkeley.edu/>

How can I enroll in the Student Health Insurance Plan (SHIP)?

As a Berkeley student you are automatically enrolled in SHIP unless you waive the insurance by providing proof of being enrolled in another health insurance plan. SHIP is a comprehensive insurance plan that offers 12 months of coverage anywhere in the world. Students can access primary medical care services on campus at the Tang Center through University Health Services (UHS). SHIP also covers care outside UHS, hospitalizations, and referrals to specialty care. In addition, SHIP includes dental coverage. Vision care is not included but can be accessed at a discount through the UC Berkeley School of Optometry.

For more information on SHIP visit: <http://uhs.berkeley.edu/students/insurance>.

For more information on UHS visit: <http://uhs.berkeley.edu>.

For more information on the School of Optometry visit: <http://www.caleyecare.org>.

I just moved, how do I update my personal information with the school?

Update your personal information on CalCentral.

I'm not currently a California resident, what steps can I take to have residency by my 2nd year?

Please make sure to inform us of your residency status. The cost of tuition is different, depending on whether or not you qualify as a resident of California. It is possible to

establish California residency by your second academic year. There are strict guidelines to follow, including a maximum number of days you can be outside the state. If you are uncertain about your residency status, please visit the website of the

Residence Affairs unit under the Office of the Registrar:

(<https://registrar.berkeley.edu/tuition-fees-residency/residency-tuition-purposes>) or contact the Residence Deputy (510-642-5990). No other UC Berkeley personnel are authorized to supply information relative to residence requirements for tuition purposes. Please also take a look at the CA Residency Requirement [here](#).

How many units do I have to take each semester? Do I have to maintain a certain GPA?

UCB SPH requires all students to be enrolled in 12 units each semester and maintain a GPA of 3.0.

What is Berkeley time?

At Berkeley, classes start 10 minutes after their scheduled times, known as “Berkeley Time,” this time serves as a buffer zone for students with back-to-back classes.

For example, if your schedule says you have

Class A from 9:00–11:30AM

Class B from 11:30AM–2:00PM

Don't worry!

Class A will start at 9:10 and end at 11:30, and

Class B will start at 11:40 and end at 2:00,

giving you 10 minutes to travel from class A to B.

How do I set up an appointment with student services staff?

Students can add themselves to Janene or Sumaiya's calendar by clicking on the top right box in bmail (made up of small 3x3 boxes to the left of the bell for google notifications and your profile picture) then clicking on calendar. For a quick tutorial see [Google Calendar](#).

Once a student is on their calendar, they can check staff availability by typing either name name/email address on the left-hand side column under add coworker's calendars, please also make sure to add the staff member's name/email to the meeting (once the meeting is created) and send Janene or Sumaiya an invitation so that they receive an email notification.

Please make sure you get on their calendars. Staff is continuously working on multiple

projects (admissions, PhD retreat, beginning/middle of the semester fires, etc) and are not able to accommodate all drop in requests. Please also note that staff is in the office around 8:30am, take lunch around noon and leave by 5pm, so students should not schedule anything before 9am, during 12-1pm or after 5pm. If you have an emergency and can't get on either calendar, email the staff directly and schedule a time to meet.

Closing note: *All rules pertaining to graduate study on the Berkeley campus are contained in a document called the **Guide to Graduate Policy**. This document should be referred to whenever exceptional issues arise and is available at <http://grad.berkeley.edu/policy/introduction/>*

Things You Should Know

Policies and Procedures

Policies and procedures that govern graduate work at UC Berkeley are found on the [Graduate Division website](#). Additionally, please read the [Graduate Division New Student Handbook](#). It is your responsibility to read these policies and procedures. Note that SPH has its own set of policies and procedures that may be different from the Graduate Division policies, so please check in with the student services staff if you have any questions.

Facilities Access

Berkeley Way West (BWW) is a secure building and anyone entering prior to 8am or after 6pm on weekdays, anytime on weekends, and those accessing first floor classrooms or fifth floor offices must first obtain a CalCard. First make sure that you have completed all the tasks that appear in your CalCentral profile. For new students in 2019-2020, Student Services will be picking up everyone's ID cards and pass them out at Orientation on August 26th. Students will be sent a link where they will enter the student ID (SID) and the 6 digit card number that is listed on the back of the ID. Should you need to have a new ID issued, you will need to complete the [SPH CardKey Access Form](#) and submit to Janene or Sumaiya for their review and approval. They will then forward the form to facilities services who liaises with UCPD for form processing.

Please also take some time to review building etiquette, policies, etc on the BWW website: <http://sph.berkeley.edu/faculty-staff/working-berkeley-way-west>

Biostatistics Student's Office Space

There are two dedicated student spaces for School of Public Health. On the second floor, a Graduate Student Lounge, room 2500. This lounge is behind key card access and access must be applied for (see key card access section above for details). This lounge is shared by

all 3 schools in the building (SPH, Graduate School of Education- GSE, and the Department of Psychology) and is limited to graduate students only. The second dedicated student space for the School of Public Health at Berkeley Way West is on the 5th floor- Suite 5241: the Graduate Student Research Suite. This open office layout has several rows of workstations and touchdown spaces. This space is reserved for PhD students and

actively employed graduate student researchers (GSRs). The space is intended to be a quiet library-like space for independent research and should not be used for office hours or other collaborative GSI work. In the suite, 36 of the workstations are dedicated spaces for Doctoral Students. They are divided between five divisions and spaces are weighted according to the number of PhD/DrPH students in each division. Please reach out to Program staff to nominate yourself for a dedicated workstation. Please note, if you advocate for a dedicated space you are expected to use that space at least 75% of the workweek. Preference will be given to commuting students, students with a lot of research materials, or students with other space requiring needs.

Additionally, any space that does not have signage is considered “touchdown” (an unassigned workstations shared between part-time employees, visitors, etc as needed). These are generally large flat desks with no height management (not a sit/stand desk). This includes both the non-sit/stand desks in the center of the room and half of the sit/stand workstations. Moreover, there are many soft spaces scattered throughout the building. Students are encouraged to utilize any space that works with their personal workflow. Please note that floors 3 and 4 are reserved for specific schools.

Finally, there is also shared office space in **439 Evans Hall** provided to Biostatistics doctoral students as a courtesy of the Department of Statistics. Since space has become very limited, we regret that we are not able to generally offer such facilities to MA students. If interested in office space, please contact Janene Martinez (jcarolm@berkeley.edu) she will assess space availability and add your name to the waitlist.

SPH Student Services

The School of Public Health Office of Student Services and Admissions is located in Suite 2220 in the Berkeley Way West Building. Student Services staff are responsible for many school-wide events and procedures such as pre-application advising, admissions, Spring Visit, Welcome Week and Commencement.

Biostatistics Listserv

As a student in a Biostat program, you will be automatically enrolled in our student listserv. The listserv is intended to encourage the sharing of information and resources

among students. Important messages will be sent from the Epi group faculty and staff. Messages can include scholarship/fellowship opportunities, job postings, course/curriculum changes/information, and deadlines specific to Biostat students.

Services and Resources

Berkeley International Office: (<http://internationaloffice.berkeley.edu/>) - resources and advice on immigration, financial and personal matters.

Cal Student Central: (<http://studentcentral.berkeley.edu/>) a one-stop student services center for financial aid, billing, registration, and enrollment in one convenient location.

Career Center: (<https://career.berkeley.edu/Info/AboutUs.stm>) assisting students and alumni with career exploration, internship and job searching, and the graduate or professional school application process.

Student Parent Central: <https://studentparents.berkeley.edu/>

Cal 1 Card: Your Student ID Card, access badge, debit account, etc (<https://cal1card.berkeley.edu/>)

Financial Aid Office (FAO): (<http://financialaid.berkeley.edu>) information for graduate students re: student loans and federal student aid.

Housing (Cal Rentals): (<https://och.berkeley.edu/>) Berkeley's own rental listings unit and resource for finding local housing.

Library Research Services for Graduate Students:

(http://lib.berkeley.edu/services/for_users/grad_students.html)

Office of the Registrar: (<http://registrar.berkeley.edu>) for up-to-date information on registration fees, adding/dropping classes, CalCentral, residency, grades and more.

Parking & Transportation: (<http://pt.berkeley.edu>) information about parking permits, campus shuttles and emergency preparedness.

Police: (<http://police.berkeley.edu>) information about campus safety programs, night escort services and emergency preparedness.

Student Calendar: (<http://registrar.berkeley.edu/GeneralInfo/stucal.html>) important dates for filing and registration.

University Health Services (UHS) : (<http://uhs.berkeley.edu/>) information about student medical care, counseling, psychological services, insurance, workshops and more.

The Tang Center: Counseling & Psychological Services: (510) 642-9494

Urgent Care Medical Services: (510) 642-3188

Social Services: (510) 642-6074

Graduate Division Resources and Services for Graduate Students:

<http://grad.berkeley.edu/students/> This website contains everything a prospective or current student needs to know about graduate study at UC Berkeley.

The UC Berkeley website: The website <http://www.berkeley.edu> provides links to a variety of campus resources, including: course descriptions, course schedules, Financial Aid and Scholarships Office, and most academic departments/units.

Office of the Dean of Students: (510) 642-6741 | <http://sa.berkeley.edu/dean>
Student advocacy, support and resources referrals.

Campus Police: <http://police.berkeley.edu> (510) 642-3333; (510) 642-6760

Night Safety Shuttle and BearWALK Service: (510) 642-7233

Child Care: <http://housing.berkeley.edu/child>

The Parents Network: (<http://parents.berkeley.edu>) newsletters, recommendations, and advice for student parents.

Student Legal Services: (510) 642-3916 | <http://sls.berkeley.edu> Legal advice for currently registered UC Berkeley Students

Student Ombuds Office: (510) 642-5745 | <http://students.berkeley.edu/ombuds>

Confidential sounding board to help identify possible next steps regarding campus-related conflicts or concerns.

Sponsored Projects Office (SPO): <http://spo.berkeley.edu> SPO coordinates administration of grants and contracts funded by federal and state agencies, foundations, companies, and more.

Health and Wellness

Graduate school can be stressful, so be sure to create a lifestyle that supports your mental and physical health throughout the program. We encourage you to be physically active, eat well, and pursue methods of relaxation so that you can enjoy the program and do your best work. If you are experiencing difficulty, stress, or hardship at any time while in the program, please let Janene, Sumaiya, a faculty member, or your advisor know as soon as possible so we can explore arrangements to assist you.

Counseling Services- University Health Services

(<http://www.uhs.berkeley.edu/students/counseling/>) provides group and individual counseling for students; personal, academic, and career-related issues. The Tang Center has great resources on how to cope with grad school and stress <http://uhs.berkeley.edu/bewell/>. We also welcome any suggestions for ways to improve the training and services we provide.

Support Groups

Counseling Services- University Health Services:

(<http://www.uhs.berkeley.edu/students/counseling/>) provides group and individual counseling for students; personal, academic, and career-related issues.

Disabled Students' Program (DSP) :

(<http://dsp.berkeley.edu>) offers services and resources for students with disabilities.

Gender Equity Resource Center: (<http://students.berkeley.edu/osl/geneq.asp>) a Cal Community Center dedicated to fostering a safe, equitable and inclusive campus experience for all. Provides programs, services and information about gender, sexual orientation, sex, gender identity, sexual and relationship violence and bias-related incidents.

LGBT Services: (<https://campusclimate.berkeley.edu/students/ejce/geneq>) provides support services and resource referrals and works collaboratively with other departments to develop workshops, programs, conferences on issues of importance to the lesbian, gay, bisexual and transgender community.

Getting Involved

Public Service Center: (<https://publicservice.berkeley.edu/>) charged with coordinating student volunteer and community service programs.

Graduate Assembly (GA) : (<http://ga.berkeley.edu>) graduate student arm of student government on campus.

Graduate Social Club: (<https://ga.berkeley.edu/project/gsc/>) events for grad students to meet and mingle.

SPH Student Government (SPHSG): The School of Public Health Student Government is a group of public health graduate students who act as a liaison between the students and the administration and [faculty](#). It functions as a communication vehicle between these entities to involve and inform students of ongoing activities and decision-making at the school <http://sph.berkeley.edu/current-students/student-government>

Arts and Recreation

Berkeley Art Museum and Pacific Film Archive: (<http://www.bampfa.berkeley.edu>) information on art exhibits, film screenings and museum collections.

Cal Performances: (<http://www.calperfs.berkeley.edu>) information on dance, theater, music and other events at Zellerbach Auditorium.

Calbears: (<http://calbears.cstv.com>) official site if the California Golden Bears; includes team schedules and ticket information.

Recreational Sports Facility (RSF) : (<http://calbears.berkeley.edu>) information on the campus gym, membership, fitness classes, sports facilities, personal training and more.