

In recent years biostatistics has become one of the most stimulating areas of applied statistics. The field encompasses the methodology and theory of statistics as applied to problems in the life and health sciences. Biostatisticians are trained in the skilled application of statistical methods to the solution of problems encountered in public health and medicine. They collaborate with scientists in nearly every area related to health and have made major contributions to our understanding of AIDS, cancer, genetics, bioinformatics, and immunology, as well as other areas. Further, biostatisticians spend a considerable amount of time developing and evaluating the statistical methodology used in those projects. The Department of Biostatistics offers MS and PhD degrees in Biostatistics and, through the School of Public Health, the MPH and DrPH degrees with a specialization in biostatistics. All students receive a balanced education, blending theory and practice.

A degree in biostatistics prepares students for work in a variety of challenging positions in government, industry, and education. Graduates have found careers involving teaching, research, and consulting in such fields as medicine, public health, life sciences, survey research, and computer science. There has always been a strong demand for well-trained biostatisticians; graduates have had little difficulty finding employment well suited to their particular interests.

FACULTY

Chair

William G. Cumberland, PhD

Professors

Thomas R. Belin, PhD
 William G. Cumberland, PhD
 Dorota M. Dabrowska, PhD
 Robert M. Elashoff, PhD
 Gang Li, PhD
 Janet Sinsheimer, PhD
 Robert E. Weiss, PhD
 Weng Kee Wong, PhD

Professors Emeriti

Abdelmonem A. Afifi, PhD
 Nancy G. Berman, PhD
 Potter C. Chang, PhD
 Virginia A. Clark, PhD
 Wilfrid J. Dixon, PhD
 Frederick J. Dorey, PhD
 Donald Guthrie, PhD
 Robert I. Jennrich, PhD

Associate Professor

Steve Horvath, PhD, ScD
 Christina M. R. Kitchen, PhD
 Marc Suchard, PhD

Assistant Professors

Rajesh Nandy, PhD
 Catherine Ann Sugar, PhD

Lecturers

Jeffrey Gornbein, DrPH
 Jean L. Mickey, PhD, *Emerita*
 Fei Yu, PhD

Adjunct Professors

David W. Gjertson, PhD
 Martin L. Lee, PhD
 James W. Sayre, DrPH

Adjunct Associate Professors

David A. Elashoff, PhD

Adjunct Assistant Professors

Catherine M. Crespi, PhD
 Sinha Karabi, PhD
 Sunghee Lee, PhD
 Angela Presson, PhD

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DEGREES OFFERED

Master of Public Health (MPH)
 Master of Science in Biostatistics (MS)
 Doctor of Public Health (DrPH)
 Doctor of Philosophy in Biostatistics (PhD)

■ **MASTER OF PUBLIC HEALTH (MPH)**

The MPH is a schoolwide professional degree in the field of public health. Biostatistics is one of the areas of specialization. Students are expected to focus on public health practice and to acquire a broad knowledge related to professional skills. Teaching experience is not required.

◆ **Admission Requirements**

Applicants must meet the University minimum requirement of an acceptable bachelor's degree with a B (3.0) average in upper division coursework and/or prior graduate study. Exceptionally qualified applicants may be considered on an individual basis. If undergraduate coursework has been deficient in breadth of fundamental training, students must take specified undergraduate courses after admission. Prior field experience is not required as a condition of admission, although a background of public health experience may be considered in the evaluation.

Applicants must perform satisfactorily on the verbal, quantitative and analytic sections of a recent Graduate Record Examination (GRE), Medical College Admission Test (MCAT), or Dental Admission Test (DAT). MCAT or DAT scores are accepted only for applicants already holding MD or DDS degrees. Graduate Management Admission Test (GMAT) scores are accepted only for applicants to the joint M.B.A./MPH program. The GRE requirement may be waived for applicants with a doctoral degree from a U.S. university and five years of appropriate postdoctoral experience.



Department of Biostatistics Faculty

The school does not have a minimum combined score requirement. As a guideline, the average GRE scores for those offered admission over the past three years are Verbal: 600, Quantitative: 780, and Analytical: 680.

International applicants should consult the *UCLA Application for Graduate Admission* for information on the Test of English as a Foreign Language (TOEFL), International English Language Testing System (IELTS) examination, and UCLA English as a Second Language Placement Examination (ESLPE) requirements.

The applicant's prior program of study should include adequate preparation in mathematics, physical sciences, biological sciences, and social sciences and typically includes two courses each in mathematics, biological sciences, social sciences; one course in physical sciences; and other courses that constitute an adequate preparation for the proposed area of specialization.

Applicants whose undergraduate or graduate work in the biological, physical, mathematical, and social sciences does not constitute adequate preparation for the proposed area of specialization must include courses in those sciences in their graduate programs; these may not be applied toward the minimum requirements for the degree.

Applicants must be one of the following:

1. Holders of a bachelor's degree from an accredited institution. Preparation in the sciences basic to public health must be adequate. Such sciences may include various combinations of (a) life sciences, (b) physical sciences and mathematics, (c) social sciences, (d) behavioral sciences. Applicants are not expected to be

prepared in all four of these fields, but a background in a suitable combination of these sciences is required.

2. Qualified physicians at UCLA in the General Preventive Medicine Residency.
3. Qualified students in the Latin American Studies, African Studies, or School of Medicine articulated degree programs or in the Asian American Studies, Islamic Studies, Management, or School of Law concurrent programs.

Specific Specialization Requirements

Students specializing in biostatistics should have completed at least one year of calculus. Students whose mathematics preparation does not include sufficient calculus must take courses in the Mathematics Department while in the MPH program. Majors in mathematics, statistics, computer science, or a field of application in biostatistics are preferred.

◆ *Course Requirements*

Students must complete at least one year of graduate residence at the University of California and a minimum of 11 full courses (44 units), at least six of which must be graduate courses and at least two of which must be 400-series courses. Only one 596 course (4 units) may be applied toward the six graduate courses; 597 and 598 courses may not be applied toward the degree.

Required school core courses include Community Health Sciences 100, Environmental Health Sciences 100, Epidemiology 100, and Health Services 100. Each core course may be waived if students have taken a similar college-level course elsewhere and can pass the waiver examination.

Field training in an approved public health program of up to 10 weeks (a minimum of 4 units but no more than 8) is required of candidates who have not had prior relevant field experience.

In addition to the core courses, at least three courses (2 or 4 units) outside the area of specialization are strongly recommended.

Required department courses include Biostatistics 110A and 110B (100A and 100B may be substituted with departmental permission); Biostatistics 200A, 201, 402A, 402B (402B satisfies the field training requirement), 403A, and 406; and 12 units of elective courses from Biostatistics 200B, 200C, M210 through M238, or M403B, 410 through 419. Additional elective courses are recommended and should be selected in public health, biomathematics, or mathematics.

Biostatistics

Only courses in which students receive a grade of C– or better may be applied toward the requirements for a master’s degree. S/U-graded courses may not be applied toward the degree requirements. Students must maintain an average of no less than 3.0 (B) in all courses required or elected during graduate residence at the University of California.

◆ *Comprehensive Examination Plan*

Students must pass a departmental comprehensive examination. Students who fail may be reexamined once. The aim of the examination, as a culminating experience, is to assess students’ ability to select theories, methods, and techniques from across the content matter of a field, integrate and synthesize knowledge, and apply it to the solution of public health problems.

◆ *Field Training*

Field training in an approved public health program is required of candidates who have not had prior relevant field experience. A minimum of 4 units, but no more than 8, is required.

◆ *Time to Degree*

From graduate admission to award of the degree (depending on the area of specialization), normal progress is from three to seven terms. The upper limit for completion of all requirements is seven quarters of enrollment, including graduate study at a University of California campus prior to admission to the School of Public Health. The maximum time allowed from enrollment to graduation, including leaves of absence, is five years.



Tommi Gaines, DrPH '08 in biostatistics, used data from the California Health Interview Survey to test the validity of different methods for analyzing multiracial data.

■ MASTER OF SCIENCE (MS) IN BIOSTATISTICS

The MS in Biostatistics is a research-oriented degree within the general field of biostatistics. Teaching experience is not required.

◆ *Admission Requirements*

Applicants must meet the University minimum requirement of an acceptable bachelor’s degree with a B (3.0) average in upper division coursework and/or prior graduate study. Exceptionally qualified applicants may be considered on an individual basis. Majors in mathematics, computer science, or a field of application in biostatistics are preferred. Undergraduate preparation should include calculus and linear algebra. If undergraduate coursework has been deficient in breadth of fundamental training, students must take specified undergraduate courses after admission. Prior field experience is not required as a condition of admission, although a background of public health experience may be considered in the evaluation.

Applicants must also perform satisfactorily on a recent (within the last five years) Graduate Record Examination (GRE). The Medical College Admission Test (MCAT), Dental Admission Test (DAT), or Graduate Management Admission Test (GMAT) may be accepted in lieu of the GRE under certain circumstances. Strong emphasis is placed on the quantitative and analytical components of the GRE; the department does not have a minimum combined score requirement.

International applicants should consult the UCLA Application for Graduate Admission for information on the Test of English as a Foreign Language (TOEFL), International English Language Testing System (IELTS) examination, and UCLA English as a Second Language Placement Examination (ESLPE) requirements.

In addition, undergraduate preparation should include Mathematics 31A, 31B, 32A, 32B, 33A, 33B (second-year calculus), or the equivalent.

◆ *Course Requirements*

The MS degree requires a minimum of nine graduate and upper division courses, of which at least five must be graduate courses in the 200 and 500 series. The five required graduate courses must be in biostatistics or mathematical statistics, including at least three courses in biostatistics.

Unless previously taken, the following courses must be included in the degree program: Biostatistics 110A,

Biostatistics

110B, 115, 200A, 200B, 200C, M215, 240, 402A, 402B, 596; Statistics 100A, 100B; and 12 units of special topics courses from Biostatistics M210 through M238 (except M215), 403A, or 414 through 419. At least 4 of the 12 units must be in the 200 series.

For exceptional students who have had a one-year course in probability and theoretical statistics plus one or more courses in applied statistics, it may be possible to complete the degree in one year.

Other courses in biostatistics or mathematical statistics, or in related areas such as biology, physiology, public health, management, or mathematics, are selected with the advisor's consent and approved by the chair.

A written report and written comprehensive examination covering the above course material must be passed. A failed examination can be repeated only once.

◆ *Comprehensive Examination Plan*

The thesis plan is not used. The written comprehensive examination covers the content of the required courses and must be passed. No more than one reexamination after failure is allowed. Students who do not take the reexamination at the time specified by the department forfeit their right to reexamination.

■ DOCTOR OF PUBLIC HEALTH (DrPH)

The Doctor of Public Health (DrPH) is a schoolwide degree and the highest professional degree for the public health generalist. Students are expected to focus on public health practice and to acquire broad knowledge related to professional skills. The dissertation is of an applied, practical, problem-solving nature and must demonstrate ability for independent investigation. Biostatistics is one of the areas of specialization. There is no foreign language requirement; teaching experience is recommended but not required.

◆ *Admission Requirements*

In addition to the University minimum requirements, (see the Graduate Study section in the UCLA General Catalog at www.registrar.ucla.edu/catalog), the department requires

1. Satisfactory performance on the Graduate Record Examination (GRE); the school does not have a minimum combined score requirement; as a guideline, the average GRE scores for those



Biostatistics student Jocelyn Chen receives the Abdelmonem A. Afifi Student Fellowship for academic excellence from Dr. Michael Prelip and Dean Linda Rosenstock.

offered admission over the past three years are Verbal: 517 and Quantitative: 767; the averages are generally higher for those admitted into the doctoral program than for those admitted into the master's program.

2. Completion of the MPH or a master's degree in an appropriately related field (if the master's degree is in a field other than public health, applicants must have taken the equivalent of the MPH mandatory core courses or include them in the course of study after admission).
3. At least a 3.0 junior/senior undergraduate grade-point average, at least a 3.5 GPA in graduate studies or demonstrated superiority in graduate work, and at least a B in each of the mandatory core courses.
4. A positive recommendation by the department to the School of Public Health.
5. Approval by the subcommittee on Student Affairs and the associate dean for academic programs.

◆ *Advising*

Within the first three quarters of study, students file Doctoral Form 1, *Petition for Establishment of Three-Member Guidance Committee and Study in Major and Minor Fields for the DrPH*. The guidance committee consists of three members, which must include the advisor in the major field and the advisor in the minor field. On this form, students list the courses to be taken for the minor which must be approved by the advisor, the area head, and the department chair. For more information,

see *Advising* under the **General Regulations** section of this announcement.

◆ *Course Requirements*

The DrPH with a specialization in biostatistics requires a research orientation for which the coursework for the MS in Biostatistics is more appropriate preparation than the coursework for the MPH

The following courses, if not already taken, should be included: Biostatistics 115, 200A, 200B, 200C, 202, M215, 250A, 250B; any three additional graduate-level courses in biostatistics selected with consent of the advisor; three courses in the 400 series selected with consent of the advisor; Statistics 100A, 100B. All doctoral students must enroll in Biostatistics 409 (doctoral statistical consulting field training course) for three consecutive quarters and in Biostatistics 245 every term.

In addition, 24 units of courses selected with consent of the advisor at the 200 or 400 level in at least two School of Public Health departments/programs other than Biostatistics are required for breadth. The School also requires students to select an additional area of concentration. Biostatistics students fulfill this requirement by enrolling in Biostatistics 409 (doctoral statistical consulting seminar: field training course) for 3 consecutive quarters. This requirement must be met prior to advancement to candidacy.

Electives, selected in consultation with the advisor, should be chosen from courses in mathematics, biomathematics, human genetics, AIDS, survey research methods, operations research, computer data processing, and other appropriate areas.

◆ *Screening/Qualifying Examinations*

A written screening examination is required of all students entering the DrPH program, to be taken before the end of the first year in the program (if not taken prior to entering the program). Courses covered by this and other examinations are determined in consultation with the advisor and the department faculty.

Before advancement to candidacy, students must pass written examinations in the major field prepared and administered by the department faculty. Normally no more than one reexamination after failure is allowed. The doctoral committee is nominated after students have made a tentative decision on a dissertation topic. The doctoral committee administers the University Oral Qualifying Examination after the written examinations have been successfully completed.

◆ *Doctoral Committee*

The doctoral committee consists of at least four faculty members who hold professorial appointments, two of whom must be tenured. Three of the four must hold appointments in the School of Public Health, one must be an outside member who holds no appointment in the School of Public Health, and one of the four must be from the minor field.

◆ *Final Oral Examination*

A final oral examination is required of all candidates.

◆ *Time to Degree*

Normally students are not admitted to the DrPH program until after they have completed a master's degree. If students have not completed a prior master's degree program, this program must be completed. Admission to the doctoral program should take place by the sixth quarter in residence, and the written and oral qualifying examinations should be completed by the tenth quarter in residence. If students have completed a master's degree program, the written and oral examinations should be completed by the sixth quarter in residence. Four quarters are normally taken from completion of the oral qualifying examination to the final oral defense. The maximum time allowed in the program is 20 enrolled quarters or eight years.

This limitation includes graduate study at a University of California campus prior to admission to the doctoral



Biostatistics student Lily Alstein receives the Raymond D. Goodman Scholarship from Professor Thomas Belin and Dean Linda Rosenstock.

Biostatistics

degree program and leaves of absence. However, the approved normative time-to-degree is 18 quarters (six years). For more information, refer to the *Standards and Procedures for Graduate Study at UCLA*.

■ DOCTOR OF PHILOSOPHY (PHD) IN BIOSTATISTICS

The PhD in Biostatistics is an advanced research degree that emphasizes depth of knowledge and research skills. The dissertation must demonstrate ability for independent scholarly investigation. There is no foreign language requirement for the PhD; teaching experience is recommended but not required.

◆ Admission Requirements

Qualifications for admission are those currently specified in the Graduate Study section in the *UCLA General Catalog*, (www.registrar.ucla.edu/catalog). Normally, students receive an MS in Biostatistics at UCLA before admission to the PhD program. Undergraduates with sufficient coursework in mathematics and statistics are considered for admission directly into the PhD program.

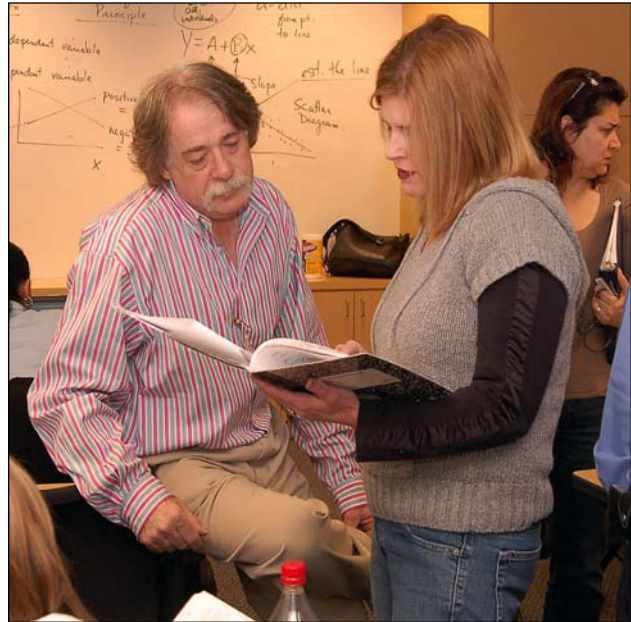
◆ Advising

A faculty advisor is appointed for each beginning doctoral student by the department chair. The advisor meets with the student each quarter to review academic progress. When the student advances to candidacy, the chair of the dissertation committee becomes the advisor.

◆ Course Requirements

Unless previously taken, the following courses must be completed: Biostatistics 250A, 250B, 251, 255, Statistics 200B, 200C, and at least three special topics courses from the Biostatistics 230, 270, and 280 series. Some substitution is accepted from courses in mathematics and biomathematics. Students who have not completed a master's degree or equivalent in biostatistics must include Biostatistics 115, 200A, 200B, 200C, 202, and M215 in the degree program, unless previously taken.

In addition, the full program of study must be approved by the department and must include, at the graduate level, three areas of knowledge: biostatistics, mathematical statistics, and a third field such as AIDS, biology, epidemiology, infectious diseases, medicine, microbiology, pharmacology, physiology, psychology, zoology, or public health. Students must also enroll in Biostatistics 409 (doctoral statistical consulting: field training course) for three consecutive quarters and 245 every term.



Biostatistics Professor Martin Lee

◆ Qualifying Examinations

Before advancement to candidacy, students must pass two written examinations and the University Oral Qualifying Examination. A failed examination may be repeated once only.

The written mathematical statistics examination and the written qualifying examination are normally taken in Fall Quarter of the second year in residence.

The University Oral Qualifying Examination is taken before advancement to candidacy and after successful completion of the written examinations. Administered by the doctoral committee, it is usually a defense of the dissertation proposal.

The timing of reexaminations is specified by the department in the case of written examinations or by the student's committee in the case of the oral examination. Students who do not take the reexaminations at the specified time forfeit their right to reexamination.

◆ Final Oral Examination

The final oral examination, a defense of the dissertation, is required. All members of the doctoral committee examine the candidate during the examination and read, approve, and certify the dissertation. The final oral examination is failed if more than one committee member votes "not passed." Reexamination after failure is determined on an individual basis. A copy of the dissertation must be submitted to the Graduate Division and the department.