**Genetics**

Courses offered by the Department of Genetics are listed under the subject code GENE on the [ExploreCourses website](http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GENE&filter-catalognumber-GENE=on). Stanford Bulletin’s [ExploreCourses website](http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GENE&filter-catalognumber-GENE=on).

An underlying theme in the department is that genetics is not merely a set of tools but a coherent and fruitful way of thinking about biology and medicine. To this end, the department emphasizes a spectrum of approaches based on molecules, organisms, populations, and genomes. It provides training through laboratory rotations, dissertation research, seminar series, didactic and interactive course work, and an annual three-day retreat of nearly 200 students, faculty, postdoctoral fellows, and research staff.

The mission of the department includes education and teaching as well as research; graduates from our program pursue careers in many different venues including research in academic or industrial settings, health care, health policy, and education. The department is especially committed to increasing diversity within the program, and to the training of individuals from traditionally underrepresented minority groups.

**Master of Science in Human Genetics**

The University requirements for the M.S. are described in the "Graduate Degrees" section of this bulletin.

The Department of Genetics offers an M.S. in Human Genetics, which is accredited by the American Board of Genetic Counseling. This program prepares students to practice in the healthcare profession of genetic counseling. The program is a full two-year program, and accepts students to begin the program only in Autumn Quarter. Students must be admitted directly into this program, and cannot automatically transfer from the Ph.D. programs within the department, or vice versa. While courses are oriented primarily towards genetic counseling students, they may also be taken by medical students, other graduate students, residents or post-doctoral fellows, and (with permission) undergraduates.

The degree requires the completion of clinical rotations and an approved research project.

Students must also complete:

- required course work:
  - **Units**
  - GENE 271  Human Molecular Genetics  4
  - GENE 272  Introduction to Medical Genetics  2-3
  - GENE 273  Introduction to Clinical Genetics Testing  1
  - GENE 274A  A Case Based Approach to Clinical Genetics  2
  - GENE 274B  A Case Based Approach to Clinical Genetics  2
  - GENE 275  Role Play and Genetic Counseling Observations  2
  - GENE 276  Genetic Counseling Clinical Rotations  4-7
  - GENE 278  Prenatal Genetic Counseling  1
  - GENE 279  Pediatric and Adult Genetic Counseling  1
  - GENE 280  Metabolic Genetic Counseling  1
  - GENE 281  Cancer Genetic Counseling  1
  - GENE 282A  Genetic Counseling Research Seminar  1

  GENE 282B  Genetic Counseling Research Seminar  1
  GENE 283  Genetic Counseling Research  1-8
  GENE 284  Medical Genetics Seminar  1-2
  GENE 285A  Genetic Counseling Seminar  2-3
  GENE 285B  Genetics Counseling Seminar  2-3
  GENE 285C  Genetic Counseling Seminar  2-3
  GENE 286  Advanced Genetic Counseling Seminar  2

  - several additional required courses (bioethics, research ethics and developmental biology).
  - and are encouraged to take 2-4 elective courses of their choice, including a research methods elective.

Faculty members include members of the Stanford faculty from Genetics, Pediatrics, Obstetrics, Pathology, Developmental Biology, Biomedical Ethics, Law, and Psychology, and practicing genetic counselors and clinical geneticists in various medical centers across the Bay Area.

Applications are due in December (see web site) for admission in the following Autumn Quarter. Applicants should demonstrate a combination of academic preparation, exposure to genetic counseling, and counseling and/or laboratory experiences. Exposure to persons with disabilities or chronic illness is also helpful. Additional information about the program is available at Stanford’s Master’s Program in Human Genetics ([http://www.med.stanford.edu/genetic-counseling](http://www.med.stanford.edu/genetic-counseling)) web site.

**Doctor of Philosophy in Genetics**

University requirements for the Ph.D. degree are described in the "Graduate Degrees" section of this bulletin.

The Ph.D. program in the Department of Genetics offers graduate students the opportunity to pursue a discipline that encompasses both a set of tools and a coherent way of thinking about biology and medicine. All major areas of genetics are represented in the department, including human genetics (molecular identification of Mendelian traits and the pathophysiology of genetic disease, gene therapy, genetic epidemiology, analysis of complex traits, and human evolution), and application of model organisms such as bacteria, yeast, flies, worms, or mice to basic questions in biomedical research. The department is especially strong in genomic and bioinformatic approaches to genome biology and evolution, and includes several genome-scale databases such as the Saccharomyces Genome Database (SGD), the Stanford Microarray Database (SMD), and the Pharmacogenetics and Pharmacogenomics Knowledge Base (PharmGKB) and, administered through the Department of Biochemistry, the Stanford Genome Technology Center (SGTC).

Exposure to the intellectual scope of the department is provided by laboratory rotations, dissertation research, advanced courses in genetics and other areas of biomedical science, seminar series, journal clubs, and an annual three-day retreat of faculty, students, postdoctoral fellows, and staff scientists. Emphasis is placed on interactions and collaborations among students, postdoctoral students, and faculty within the department and throughout the campus.

During their first year, graduate students in the department take graduate courses and sample areas of research by doing rotations in three or four laboratories. At the end of the first three quarters, students may select a laboratory in which to do their dissertation research. While the dissertation research is generally performed in one laboratory, collaborative projects with more than one faculty member are encouraged. In addition to interacting with their faculty preceptor, graduate students receive advice regularly from other faculty members who serve as members of their dissertation committee. Study for the Ph.D. generally requires between four
and five years of graduate work, most of which is focused on dissertation research.

Students are generally enrolled in the program to receive the Ph.D. degree, although a limited number of M.D. candidates can combine research training in genetics with their medical studies. Ph.D. candidates who have passed the qualifying exam in the second year can opt to receive the M.S. as a terminal degree.

There are opportunities for graduate students to teach in graduate-level and professional-school courses. In addition, students have the opportunity to participate in educational outreach activities coordinated by the department, which include opportunities to interact with secondary school students and teachers, lay groups, and local science museums.

Students who have recently received a bachelor’s, master’s, M.D., or Ph.D. degree in related fields may apply for graduate study. Prospective students must have a background in biology, mathematics, physics, and chemistry. Decisions for admission are based on comparison of the relative merits of all the candidates’ academic abilities and potential for research and the department’s interest in promoting a diverse learning environment. Interviews take place in late February or early March and successful applicants are offered admission by early spring. Students who wish to pursue a combined M.D./Ph.D. degree are considered for admission into the graduate program in the department after they have been admitted to the M.D. program in the School of Medicine.

Students begin graduate studies in Autumn Quarter. Prospective students are encouraged to start the application process early to ensure that they are able to submit a complete application by the December deadline. All students accepted into the Ph.D. program in the Department of Genetics are provided with full tuition and a stipend. Two training grants from the National Institutes of Health provide major support for the graduate training program in the department. Other student support is provided by departmental funds and from research grants, both federal and private, of the faculty. In addition, a number of graduate students are funded by fellowships, including those from the National Science Foundation and the Stanford Graduate Fellows program.

Emeritus: (Professor) Greg Barsh, Leonard Herzenberg, Uta Francke
Chair: Michael Snyder
Professors: Russ Altman, Carlos Bustamante, Michele Calos, Stanley Cohen, Ronald Davis, Andrew Fire, Margaret Fuller, Mark Kay, Stuart Kim, Joseph Lipsick, John Pringle, Matthew Scott, Tim Stearns, Anne Villeneuve
Associate Professors: Laura Attardi, Julie Baker, Anne Brunet, James Ford, Gavin Sherlock, Aaron Gitler, Arend Sidow, Julien Sage, Zijie Sun, Hua Tang, Douglas Vollrath
Assistant Professors: William Greenleaf, Jin Billy Li, Stephen Montgomery, Monte Winslow
Professor (Research): Leonore Herzenberg
Associate Professor (Research): J. Michael Cherry
Associate Professor (Teaching): Kelly Ormond
Courtesy Professor: Hank Greely, Alexander Urban
Lecturer: Andrea Kwan