MOLECULAR, CELLULAR, AND DEVELOPMENTAL BIOLOGY

Kline Biology Tower, 203.432.3538
http://mcdb.yale.edu
M.S., Ph.D.
Chair
Vivian Irish

Director of Graduate Studies
Farren Isaacs

Professors Ronald Breaker, John Carlson, Lynn Cooley (Genetics), Craig Crews, Stephen Dellaporta, Paul Forscher, Mark Hochstrasser (Molecular Biophysics & Biochemistry), Scott Holley, Vivian Irish, Akiko Iwasaki (Immunobiology), Christine Jacobs-Wagner, Douglas Kankel, Paula Kavathas (Immunobiology), Haig Keshishian, Mark Mooseker, Thomas Pollard, Anna Pyle, Joel Rosenbaum, Alanna Schepartz (Chemistry), Hugh Taylor (Obstetrics, Gynecology & Reproductive Sciences), Robert Wyman

Associate Professors Sreeganga Chandra (Neurology), Thierry Emonet, Valerie Horsley, Farren Isaacs, Kathryn Miller-Jensen (Biomedical Engineering), Matthew Rodeheffer (Comparative Medicine), Weimin Zhong

Assistant Professors Murat Acar, Shirin Bahmanyar, David Breslow, Damon Clark, Nicole Clay, Nadya Dimitrova, Joshua Gendron, Stavroula Hatzios, Yannick Jacob, Josien van Wolfswinkel

FIELDS OF STUDY
Research in genetics and molecular biology encompasses studies of non-coding RNAs, genome engineering, genome organization and regulation, gene dosage, aging, bacterial chemotaxis, and oncogenes. Research topics in cellular and developmental biology include structure and dynamics of the cell cytoskeleton, molecular motors, chemical biology, the nuclear envelope, IncRNAs, regeneration, developmental biomechanics, vertebral column development, neural and epidermal stem cells, and systems developmental biology. Research in neurobiology focuses on growth cone motility, neural differentiation, synaptogenesis, visual perception, olfaction, and the formation of topographic maps. A Special Program in Plant Sciences provides research and training in the molecular genetics of flowering, epigenetics, the physiology of hormone action, pathogen defense systems, sex determination, and the circadian clock. Because of the breadth of the department, students are provided with unique opportunities for interdisciplinary studies.

To enter the Ph.D. program, students apply to the Molecular Cell Biology, Genetics, and Development (MCGD) track, the Biochemistry, Biophysics, and Structural Biology (BBSB) track, or the Plant Molecular Biology (PMB) track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), http://bbs.yale.edu.

SPECIAL ADMISSIONS REQUIREMENTS
Applicants should have obtained training in the structure, development, and physiology of organisms; the structure, biochemistry, and physiology of cells; genetics; elementary calculus; elementary physics; inorganic and organic chemistry; statistics or advanced mathematics. Lack of some prerequisites can be made up in the first year of graduate study. Students having different science training, such as degrees in chemistry, physics, or engineering, are encouraged to apply. In addition to the GRE General test, a Subject Test is recommended, preferably in Biology, or in Biochemistry, Cell and Molecular Biology.

INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)
Students applying to the MCGD or BBSB track of the Biological and Biomedical Sciences program may simultaneously apply to be part of the PEB program. See the description under Non-Degree-Granting Programs, Councils, and Research Institutes for course requirements, and http://peb.yale.edu for more information about the benefits of this program and application instructions.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE
Each student is expected to take at least three courses, in addition to MCDB 900/MCDB 901, First-Year Introduction to Research. With the help of a faculty committee, each student will plan a specific program that includes appropriate courses, seminars, laboratory rotations, and independent reading fitted to individual needs and career goals. There is no foreign language requirement. Late in the third term of study, the student meets with a faculty committee to decide on a preliminary topic for dissertation work and to define the research areas in which the student is expected to demonstrate competence. By the end of the fall term of the second year, each student prepares a dissertation prospectus outlining the research proposed for the Ph.D. The student is admitted to candidacy for the Ph.D. when (1) the prospectus is accepted by a dissertation committee of faculty members, (2) the committee is satisfied that the student has demonstrated competence in the areas necessary to conduct the proposed work, and (3) the other requirements indicated above are fulfilled. The student should complete the requirements for admission to candidacy no later than the end of the second year of study. Following admission to candidacy, students are required to meet with their thesis advisory committee at least once a year. The remaining requirements include completion of the dissertation research, presentation and defense of the dissertation, and submission of acceptable
copies of the dissertation to the Graduate School and to the Center for Science and Social Science Information (CSSSI). All students are required to teach in two one-term (TF level 10) courses during their Ph.D. study, but not during the first year of graduate study. Requirements for M.D./Ph.D. students are the same as for Ph.D. students, except that a single term of teaching is required. During their first year of study, students must successfully complete MCDB 901, First-Year Introduction to Research – Ethics: Scientific Integrity in Biomedical Research, to fulfill the responsible conduct and ethics in research requirement. This requirement must be met prior to registering for a second year of study. Further, in the fourth year of study, all students must successfully complete B&BS 503, RCR Refresher for Senior BBS Students.

HONORS REQUIREMENT
Students must meet the Graduate School’s Honors requirement by the end of the fourth term of full-time study (see Course and Honors Requirements under Policies and Regulations).

MASTER’S DEGREE
M.S. (en route to the Ph.D.) The minimum requirements for award of the Master of Science degree are (1) two academic years registered and in residence full-time in the graduate program; (2) satisfactory completion of the first two years of study and research leading to the Ph.D.; this requirement may be met either (a) by completing a minimum of five courses with an average grade of High Pass and at least one Honors grade, in addition to satisfactory performance in MCDB 900/MCDB 901, or (b) by (i) successfully completing at least three courses with an average grade of High Pass and at least one Honors grade, (ii) satisfactory performance in MCDB 900/MCDB 901, and (iii) passing the prospectus examination; (3) recommendation by the department for award of the degree, subject to final review and approval by the degree committee. No courses that were taken prior to matriculation in the graduate program, or in Yale College, or in summer programs may be applied toward these requirements.

Prospective applicants are encouraged to visit the BBS website (http://bbs.yale.edu), MCGD, BBSB, and PMB tracks.

COURSES