Molecular and Cellular Physiology

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

The Department of Molecular and Cellular Physiology is located in the Beckman Center for Molecular and Genetic Medicine.

A central goal of physiology in the post-genomic era is to understand how thousands of encoded proteins serve to bring about the highly coordinated behavior of cells and tissues. Research in the department approaches this goal at many levels of organization, ranging from single molecules and individual cells to multicellular systems and the whole organism. The faculty share common interests in the molecular mechanisms of cell signaling and behavior, with a special focus on structure/function analysis of ion channels and G-protein coupled receptors, and their roles at the cellular, organ, and whole-organism levels; the molecular basis of sensory transduction, synaptic transmission, plasticity and memory; the role of ion channels and calcium in controlling gene expression in neural and immune cells; and the regulation of vesicle trafficking and targeting, cell polarity, and cell-cell interactions in the nervous system and in epithelia. Research programs employ a wide range of approaches, including molecular and cell biology, biochemistry, genetics, biophysics, x-ray crystallography and solution NMR, electrophysiology, and in vitro and in vivo imaging with confocal and multi-photon microscopy.

Graduate Programs in Molecular and Cellular Physiology

The department offers required and elective courses for students in the School of Medicine and is also open to other qualified students with the consent of the instructor. Training of medical, graduate, and postdoctoral students is available. The program offers a course of study leading to the Ph.D. degree. No B.S. is offered, and an M.S. is offered only in the unusual circumstance where a student completes the course work, rotation, and the written section of the qualifying exam, but is unable to complete the requirements for the Ph.D.

Doctor of Philosophy in Molecular and Cellular Physiology

Students with undergraduate or master’s degrees who have completed a year each of college chemistry (including lectures in organic and physical chemistry), physics, calculus, and biology are considered for admission to graduate study. Applicants submit a report of scores from the Graduate Record Examination (verbal, quantitative, analytical, and an advanced subject test in one of the sciences) as part of the application. Students who do not speak English as their native language must submit scores from TOEFL unless waived by Graduate Admissions.

Study toward the Ph.D. is expected to occupy five years, including summers. A minimum of six quarter-long courses is required, including:

- MCP 221 Advanced Cell Biology or MCP 256 How Cells Work: Energetics, Compartments, and Coupling in Cell Biology
- BIOS 200 The Nucleus
- two graduate-level courses (200-300 series)
- a choice of two out of these three courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCP 216</td>
<td>Genetic Analysis of Behavior</td>
<td>4</td>
</tr>
<tr>
<td>MCP 202</td>
<td>Advanced Immunology II</td>
<td>3</td>
</tr>
<tr>
<td>MCP 222</td>
<td>Imaging: Biological Light Microscopy</td>
<td>3</td>
</tr>
</tbody>
</table>

Students are also required to participate in the Molecular and Cellular Physiology Seminar Series and attend Department Scientific Meeting. Grades for course work must be a minimum of ‘B’, and at least two grades equal to ‘A-’ or above are necessary but not sufficient for continuation in the program. In addition, students in the program must maintain a grade point average of at least 3.3 for their required courses as a whole.

Qualifying Examination

At the beginning of the second year in residence as a graduate student, each Ph.D. candidate submits a written thesis proposal to be defended at an oral comprehensive examination. The examination should be taken prior of all course work completed by the required standard. Students undertake individual research studies as early as possible after consultation with their preceptor. Upon passing this exam, the student is advanced to candidacy for the Ph.D.

Dissertation and University Oral Examination

The results of independent, original work by the students are presented in a dissertation. The oral examination is largely a defense of the dissertation.

Advisers and Advisory Committees

A graduate advisory committee, currently professors Kobilka, Lewis, Nachury and Madison, advises students during the period before the formation of their qualifying committees.

Financial Aid

Students may be funded by their advisers’ research grants, by training grants, by department funds, or by extramural funds. Students are encouraged to obtain funding from outside sources such as NIH and NSF.

Chair: Brian K. Kobilka


Associate Professors: Miriam B. Goodman, V. Daniel Madison, Merritt C. Maduke

Assistant Professors: Liang Feng, Maxence V. Nachury, Lucy E. O’Brien (WTR 13’)

Courtesy Professors: Stefan Heller, John Huguenard, Anthony J. Ricci

Courtesy Associate Professor: Richard J. Reimer

Stanford University       1