

Microbiology and Molecular Genetics

Klemens J. Hertel, PhD, Department Chair

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<http://www.microbiology.uci.edu/>

The Department of Microbiology and Molecular Genetics provides advanced training to individuals interested in the regulation of gene expression and the structural and functional properties of proteins encoded by these genes. The research in the Department covers a wide range of topics with special emphasis on bacterial gene expression and pathogenesis; viral gene expression and host interactions; vector-borne malaria and dengue fever transmission; nuclear-cytoplasmic transport and intracellular signaling; eukaryotic gene expression; mRNA splicing, and processing; cancer genetics and tumor suppressors; ion channel expression and function; genomics and bioinformatics.

The Department offers graduate study in the School of Medicine and in conjunction with the program in Cellular and Molecular Biosciences (CMB) (<https://cmb.uci.edu/>) and the program in Mathematical, Computational, and Systems Biology (MCSB) (<https://ccbs.uci.edu/education/mcsb/>), which are described in the School of Biological Sciences section. Students are eligible to enter the Department program after meeting the specific requirements of the CMB gateway curriculum or by direct application to the Department or via the M.D./Ph.D. Medical Scientist Training Program (MSTP) (<https://mstp.uci.edu/>). The Department program leads to a Ph.D. degree in Biomedical Sciences, awarded after successful completion of all requirements. Students admitted into the CMB program who select a research advisor in the Department begin following the departmental requirements for the Ph.D. at the beginning of their second year.

Participation in the Department's seminar series and completion of at least one advanced topics course per year for three years are expected of all students. All students are required to convene a pre-advancement committee meeting at the end of their second year. In their third year, students take the advancement-to-candidacy examination for the Ph.D. degree by presenting and defending an original proposal for specific dissertation research. The normative time for completion of the Ph.D. is five years, and the maximum time permitted is seven years.

Faculty

Alan G. Barbour, M.D. Tufts University, *Distinguished Professor of Microbiology and Molecular Genetics; Ecology and Evolutionary Biology; Medicine*

Emiliana Borrelli, Ph.D. University of Strasbourg, *Chancellor's Professor of Microbiology and Molecular Genetics; Pharmaceutical Sciences*

Michael J. Buchmeier, Ph.D. McMaster University, *Professor Emeritus of Medicine; Microbiology and Molecular Genetics; Molecular Biology and Biochemistry*

Thomas P. Burke, Ph.D. University of California, Berkeley, *Assistant Professor of Microbiology and Molecular Genetics*

Michael Demetriou, M.D. Ph.D. University of Toronto, *Professor of Neurology; Microbiology and Molecular Genetics*

Timothy L. Downing, Ph.D. University of California, Berkeley, *Associate Professor of Biomedical Engineering; Microbiology and Molecular Genetics* (stem cells and tissue engineering, regenerative biology, cell programming, epigenomics, mechanobiology)

Alan L. Goldin, M.D. Ph.D. University of Michigan, *Professor of Microbiology and Molecular Genetics; Anatomy and Neurobiology; Physiology and Biophysics* (ion channels and central nervous system disease)

Sidney H. Golub, Ph.D. Temple University, *Edward A. Dickson Emeritus Professor and Endowed Chair and Professor Emeritus of Microbiology and Molecular Genetics*

Klemens J. Hertel, Ph.D. University of Colorado Boulder, *Professor of Microbiology and Molecular Genetics*

Anthony A. James, Ph.D. University of California, Irvine, *Distinguished Professor and Donald Bren Professor of Microbiology and Molecular Genetics; Molecular Biology and Biochemistry*

Orkide O. Koyuncu, Ph.D. University of Hamburg, *Assistant Professor of Microbiology and Molecular Genetics*

Gina Lee, Ph.D. Korea Advanced Institute of Science and Technology, *Assistant Professor of Microbiology and Molecular Genetics*

Matthew D. Marsden, Ph.D. University of Edinburgh, *Assistant Professor of Microbiology and Molecular Genetics; Medicine*

Michael McClelland, Ph.D. University of Georgia, *Professor of Microbiology and Molecular Genetics; Pathology and Laboratory Medicine*

Suzanne B. Sandmeyer, Ph.D. University of Washington, *Professor of Biological Chemistry; Microbiology and Molecular Genetics*

Rozanne M. Sandri-Goldin, Ph.D. Johns Hopkins University, *Chancellor's Professor of Microbiology and Molecular Genetics*

Bert L. Semler, Ph.D. University of California, San Diego, *Distinguished Professor of Microbiology and Molecular Genetics*

Yongsheng Shi, Ph.D. Syracuse University, *Chancellor's Fellow and Professor of Microbiology and Molecular Genetics*

Eric J. Stanbridge, Ph.D. Stanford University, *Professor Emeritus of Microbiology and Molecular Genetics*

Ming Tan, M.D. Johns Hopkins University, *Chancellor's Fellow and Professor of Microbiology and Molecular Genetics; Medicine*

Marian L. Waterman, Ph.D. University of California, San Diego, *Deputy Director of the Chao Family Comprehensive Cancer Center, Co-Director of the Cancer Systems Biology Center and Professor of Microbiology and Molecular Genetics*

Courses

M&MG 200A. Research in Microbiology and Molecular Genetics. 2-12 Units.

Individual research supervised by a particular professor.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

M&MG 200B. Research in Microbiology and Molecular Genetics. 2-12 Units.

Individual research supervised by a particular professor.

Prerequisite: M&MG 200A. M&MG 200A with a grade of B- or better

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

M&MG 200C. Research in Microbiology and Molecular Genetics. 2-12 Units.

Individual research supervised by a particular professor.

Prerequisite: M&MG 200B. M&MG 200B with a grade of B- or better

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

M&MG 200R. Research in Microbiology and Molecular Genetics for First-Year Students. 2-12 Units.

Independent research within the laboratories of graduate training faculty in the Department of Microbiology and Molecular Genetics for first-year Ph.D. students.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be taken for credit 3 times.

M&MG 201A. Research topics in Microbiology and Molecular Genetics. 1 Unit.

Seminars presented by graduate students and faculty of the Department which explore research topics in specialized areas of microbiology and molecular genetics. Opportunity for students to gain experience in the organization, critical evaluation, and oral presentation of current research developments.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

M&MG 201B. Research topics in Microbiology and Molecular Genetics. 1 Unit.

Seminars presented by graduate students and faculty of the Department which explore research topics in specialized areas of microbiology and molecular genetics. Opportunity for students to gain experience in the organization, critical evaluation, and oral presentation of current research developments.

Prerequisite: M&MG 201A. M&MG 201A with a grade of B- or better

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

M&MG 201C. Research topics in Microbiology and Molecular Genetics. 1 Unit.

Seminars presented by graduate students and faculty of the Department which explore research topics in specialized areas of microbiology and molecular genetics. Opportunity for students to gain experience in the organization, critical evaluation, and oral presentation of current research developments.

Prerequisite: M&MG 201B. M&MG 201B with a grade of B- or better

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

M&MG 203A. Advanced Studies in Microbiology and Molecular Genetics. 1 Unit.

Organized within each laboratory group, one to four hours. Advanced study in areas related to faculty research interests. Involves small group study based on readings, discussions, and guest speakers. May be conducted as journal clubs.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

M&MG 203B. Advanced Studies in Microbiology and Molecular Genetics. 1 Unit.

Organized within each laboratory group, one to four hours. Advanced study in areas related to faculty research interests. Involves small group study based on readings, discussions, and guest speakers. May be conducted as journal clubs.

Prerequisite: M&MG 203A

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

M&MG 203C. Advanced Studies in Microbiology and Molecular Genetics. 1 Unit.

Organized within each laboratory group, one to four hours. Advanced study in areas related to faculty research interests. Involves small group study based on readings, discussions, and guest speakers. May be conducted as journal clubs.

Prerequisite: M&MG 203B. M&MG 203B with a grade of B- or better

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

M&MG 206. Regulation of Gene Expression. 4 Units.

Aspects of gene expression including the organization of the eukaryotic nucleus in terms of protein-nucleic acid interaction (i.e., chromatin and chromosome structure); the enzymology and regulation of RNA transcription and pre-mRNA processing in eukaryotes; mechanisms of RNAi and translation.

M&MG 210A. Medical Microbiology. 4-6 Units.

Biology of microbial pathogens (viruses, bacteria, fungi, parasites) as foundation for subsequent study of infectious diseases. Topics: molecular basis of microbial pathogenesis; clinical presentation and epidemiology; diagnostic testing; antimicrobial therapy; prevention strategies. Format: lectures, laboratory, clinical cases, liveclasstech interactive questions.

M&MG 215B. Integrative Immunology II. 4 Units.

Lectures and student presentations of primary literature. Focuses on advanced topics and cutting edge technologies in modern immunology. Combination of didactic lectures and student-led journal article discussion.

Prerequisite: PHYSIO 215. PHYSIO 215 with a grade of B+ or better

Same as MOL BIO 215B, PHYSIO 215B.

Restriction: Graduate students only.

M&MG 221. Immunopathogenic Mechanisms of Disease. 3 Units.

Examination of the mechanisms underlying disease states mediated by immune dysregulation including mechanisms of immune evasion by cancer, diseases mediated by cytokine dysregulation, role of the microbiome of the GI tract and of other disease sites, and adoptive T-cell (CAR-T-cells).

Corequisite: Recommended: M&MG 215.

Prerequisite: M&MG 215. Recommended: M&MG 215.

Same as PATH 221.

Restriction: Graduate students only. Campus Honors Collegium students and juniors and seniors may audit.

M&MG 222. Molecular Pathogenesis of Microbial Infections. 4 Units.

Features lectures by faculty on the molecular aspects of microbial pathogenesis, highlighting both microbe and cellular functions. In addition to lectures, students review papers and discuss them. There will be two written exams, one on viruses and one on microbes.

M&MG 225. Molecular Mechanisms of Human Disease. 3 Units.

Provides an overview of the molecular mechanisms of human diseases, including neurologic, hematologic, neoplastic, and infectious diseases. Students gain an understanding of these mechanisms, as well as models of human diseases.

Same as PATH 225.

M&MG 230. Topics in Stem Cells. 2-4 Units.

One-hour seminar presentation by participating faculty or guest lecturer and open to the science community, followed by one-hour discussion of the lecture topic or related topic. Students are responsible for presentations and readings.

M&MG 240. M.D./PH.D. Tutorial. 1 Unit.

Explores a variety of topics that impact careers of medical scientists (M.D./Ph.D students). Topics range from scientific, such as recent advances in particular research areas, to ethical problems brought on by increased technology and intervention in the disease process.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

M&MG 250. Responsible Conduct of Research. 2 Units.

Each session includes a formal presentation by faculty/invited speaker followed by a discussion of case studies related to the topic under consideration.

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Graduate students only.

M&MG 270. Career Development. 2 Units.

Topics include preparation of papers, grants and fellowships, scientific presentations, and curriculum vitae, and career opportunities.

Repeatability: May be repeated for credit unlimited times.

M&MG 280. Tutorial in Microbiology and Molecular Genetics. 2 Units.

Tutorial in Microbiology and Molecular Genetics. Presented by the department faculty; relates current laboratory research to the literature.

Repeatability: May be repeated for credit unlimited times.

M&MG 292A. Scientific Communication. 2 Units.

Small group meetings for graduate students to practice scientific writing, debate, and presentation skills.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

M&MG 292B. Scientific Communication. 2 Units.

Small group meetings for graduate students to practice scientific writing, debate, and presentation skills.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

M&MG 292C. Scientific Communication. 2 Units.

Small group meetings for graduate students to practice scientific writing, debate, and presentation skills.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

M&MG 298. Independent Study. 1-12 Units.

Provided for MSTP students to synthesize the basic science information learned during the basic science years of medical school and learn how to apply that knowledge toward graduate research directed at understanding the basis of human disease.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

M&MG 299. Dissertation—Microbiology and Molecular Genetics . 1-12 Units.

Course provided for Ph.D. students to prepare and complete the dissertation required for a Ph.D. degree.

Repeatability: May be repeated for credit unlimited times.