

Molecular and Cellular Biology

Director

- Matthew J. Potthoff (Pharmacology)

Faculty: <https://medicine.uiowa.edu/mcb/faculty>

Website: <https://medicine.uiowa.edu/mcb/>

The Molecular and Cellular Biology Program provides interdisciplinary training in the concepts and methodologies fundamental to the investigation of biological mechanisms at the molecular level. Faculty members are involved in a variety of research projects related to gene expression and regulation.

Programs

Graduate Program of Study

Major

- Doctor of Philosophy in Molecular and Cellular Biology

Students interested in doctoral studies in molecular and cellular biology should apply under the newly created umbrella program in Biomedical Science (select molecular medicine subprogram). Direct application to the Ph.D. in molecular and cellular biology is not currently being considered. Students who entered the graduate molecular and cellular biology program prior to fall 2017 can refer to the 2015-16 General Catalog for previous degree requirements.

Facilities

Training is conducted primarily in laboratories and teaching facilities of the Carver College of Medicine Stead Family Department of Pediatrics and the Departments of Anatomy and Cell Biology, Biochemistry, Internal Medicine, Microbiology and Immunology, Molecular Physiology and Biophysics, Neurology, Obstetrics and Gynecology, Ophthalmology and Visual Sciences, Otolaryngology—Head and Neck Surgery, Pathology, Pharmacology, Physical Therapy and Rehabilitation Science, Psychiatry, and Radiation Oncology; and the College of Liberal Arts and Sciences Departments of Biology and Chemistry. Faculty laboratories and central research facilities available to students provide access to the most up-to-date research equipment.

Courses

Molecular and Cellular Biology Courses

MCB:6215 Transcription and Multi-Functional Regulation by RNA 1 s.h.

Principles and techniques for investigating mechanisms of controlling eukaryotic gene expression; basic genome organization, chromatin structure, transcription, RNA processing, translation; cloning methods, use of electronic sequence databases, footprinting, chromatin immunoprecipitation, in vivo and in vitro transcription assays, DNA microarray analysis, information retrieval. Prerequisites: BISC:5201.

MCB:6217 Epigenetics, Cancer, and Mouse Models of Disease 1 s.h.

Epigenetic mechanisms of transcriptional control; regulation of chromatin structure and its relation to disease; fundamental concepts in cancer; mouse models for understanding the molecular basis for human disease; based on research publications. Prerequisites: BISC:5201.

MCB:6220 Mechanisms of Cellular Organization 3 s.h.

Current understanding of basic cell biological processes; key experiments that led to guiding insights; mechanisms that cells use for compartmentalization and how those mechanisms are regulated; biogenesis of major organelles (e.g., mitochondria, peroxisomes, nucleus, secretory/endocytic membrane system); functions of cytoskeleton in cell motility, organelle motility, and cell division. Prerequisites: BIOC:3130. Same as ACB:6220, MPB:6220.

MCB:6225 Growth Factor Receptor Signaling 1 s.h.

Mechanisms of signaling by growth factors; cytokines and related molecules that regulate cell proliferation, development, differentiation, and survival; emphasis on molecular mechanisms of signaling, relevance of these signaling processes to various human diseases. Same as ACB:6225, MPB:6225.

MCB:6226 Cell Cycle Control 1 s.h.

Cell cycle regulation, DNA damage-dependent cell cycle regulation, redox-dependent cell cycle regulation, cellular senescence. Same as ACB:6226, MPB:6226.

MCB:6227 Cell Fate Decisions 1 s.h.

Cellular fate decisions, including signal integration, terminal differentiation in development, mechanisms of embryonic stem cell gene regulation/cellular reprogramming, cell death paradigms, and cell death in development and cancer. Same as ACB:6227, MPB:6227.

MCB:6240 Inflammatory Cell Signaling and Targeted Cancer Therapy 1 s.h.

Introduction to topics in important cancer signaling pathways; promises and challenges of targeted cancer therapy; emphasis on current fundamental topics in cancer cell signaling; how altered protein ubiquitination/deubiquitination, constitutive activation of protein kinases, and transcription factors underpin uncontrollable proliferation and survival of cancer cells in tumor microenvironment; translation of knowledge to targeted cancer therapy; promotion of critical thinking. Recommendations: MCB:6225, MCB:6227, and BIOC:5243.

MCB:6250 Mechanisms of Parasitism Journal Club 1 s.h.

Reviews of recent publications in molecular parasitology research and thesis research by training grant or journal club students. Same as MICR:6250.

MCB:6280 Topics in Molecular and Cellular Biology 1 s.h.

Opportunity to work closely with participating faculty to gain skill in critical reading of research literature and facility in presenting material to an audience. Requirements: advanced graduate standing.

MCB:7290 Seminars in Molecular and Cellular Biology 1 s.h.

Research findings in molecular biology. Requirements: molecular and cellular biology graduate standing.

MCB:7305 Molecular and Cellular Biology Research arr.

Requirements: molecular and cellular biology graduate standing.