

# MOLECULAR, CELLULAR, & INTEGRATIVE PHYSIOLOGY (GRADUATE GROUP)

## Graduate Studies

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## Group Office

227 Green Hall (formerly Life Sciences Building); 530-752-9092; Molecular, Cellular, & Integrative Physiology Graduate Group (<http://mcip.ucdavis.edu>); Faculty (<http://mcip.ucdavis.edu/faculty/>)

- Molecular, Cellular, & Integrative Physiology, Master of Science (<https://catalog.ucdavis.edu/departments-programs-degrees/molecular-cellular-integrative-physiology/molecular-cellular-integrative-physiology-ms/>)
- Molecular, Cellular, & Integrative Physiology, Doctor of Philosophy (<https://catalog.ucdavis.edu/departments-programs-degrees/molecular-cellular-integrative-physiology/molecular-cellular-integrative-physiology-phd/>)

## Molecular, Cellular, & Integrative Physiology (MCP)

### MCP 200L – Animal Cell Culture Laboratory (4 units)

*Course Description:* Techniques of cell culture, with emphases on cell physiology and the actions of drugs and toxicants on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro.

*Prerequisite(s):* Courses in undergraduate Biochemistry, Cell Biology, or General Physiology, or consent of instructor.

*Learning Activities:* Discussion 2 hour(s), Laboratory 6 hour(s).

*Grade Mode:* Letter.

### MCP 210A – Advanced Physiology (5 units)

*Course Description:* Advanced course on fundamental principles of cell physiology, transport physiology, signal transduction, physiology of excitable cells, and muscle physiology.

*Prerequisite(s):* Physiology Ph.D. program or consent of instructor.

*Learning Activities:* Lecture 3 hour(s), Discussion 2 hour(s).

*Enrollment Restriction(s):* MCP 210A (or HPH 210A) is a required core course for the Molecular, Cellular, & Integrative Physiology graduate group; course contains thermodynamics discussions and requires substantial math and physics background in order to succeed; approval for registering from Co-IRs is required to get CRN.

*Cross Listing:* HPH 210A.

*Grade Mode:* Letter.

### MCP 210B – Advanced Physiology (6 units)

*Course Description:* Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology.

*Prerequisite(s):* Physiology Ph.D. program, or consent of instructor.

*Learning Activities:* Lecture 5 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

### MCP 210C – Advanced Physiology (5 units)

*Course Description:* Graduate level instruction in the general principles of physiology and the neural and humoral control of the cardiovascular, renal, respiratory, gastrointestinal, sensory, musculoskeletal, and reproductive systems.

*Prerequisite(s):* Doctoral student in the Molecular, Cellular, Integrative Physiology graduate group, or consent of instructor.

*Learning Activities:* Lecture 5 hour(s).

*Grade Mode:* Letter.

### MCP 210L – Physiology Laboratory Rotations (5 units)

*Course Description:* One mandatory rotation and up-to two voluntary rotations. Students learn techniques and perform experiments related to particular research problems. At the end of the rotations students give a short talk and hand in a research paper.

*Learning Activities:* Laboratory 15 hour(s).

*Enrollment Restriction(s):* Restricted to Molecular, Cellular, & Integrative Physiology graduate students.

*Repeat Credit:* May be repeated 2 time(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

### MCP 215 – Electrophysiology Techniques & Applications (3 units)

*Course Description:* Broad scope of topics in electrophysiology techniques and applications.

*Learning Activities:* Lecture 1.50 hour(s), Discussion 1.50 hour(s).

*Cross Listing:* PTX 215.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### MCP 216 – Neurophysiology Literature (3 units)

*Course Description:* Lectures covering experimental and theoretical methods in studying cell membrane ion channels and the resulting characterization of the physiological functions and structure/function relationships of some of the most important channel types. Discussion of classical and current original papers.

*Learning Activities:* Lecture 1 hour(s), Discussion 2 hour(s).

*Grade Mode:* Letter.

### MCP 219 – Muscle Growth & Development (3 units)

*Course Description:* Integration of growth and development of skeletal muscle; morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentiation of fiber types. Experimental and hereditary myopathies.

*Prerequisite(s):* BIS 103; (BIS 104 or MCB 150); or consent of instructor.

*Learning Activities:* Lecture 2 hour(s), Seminar 1 hour(s).

*Grade Mode:* Letter.

### MCP 220 – General & Comparative Physiology of Reproduction (3 units)

*Course Description:* Basic phenomena of sexual and asexual reproduction and comparisons of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects.

*Prerequisite(s):* BIS 101; BIS 103; NPB 110; NPB 110L.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

### **MCP 222 – Mammalian Gametogenesis & Fertilization (3 units)**

*Course Description:* Emphasizes our current understanding of events in mammalian gametogenesis and the fertilization process. Published results, conclusions drawn from these results, and their contribution to our understanding are discussed.

*Prerequisite(s):* NPB 121; or the equivalent.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

### **MCP 230 – Advanced Endocrinology (2 units)**

*Course Description:* Focus on timely topic of endocrine research. Critical review of current literature and discussion of future research strategies in the area.

*Prerequisite(s):* NPB 130; or the equivalent, and graduate standing.

*Learning Activities:* Lecture 2 hour(s).

*Repeat Credit:* May be repeated when topic differs.

*Grade Mode:* Letter.

### **MCP 231 – Neuroendocrinology (3 units)**

*Course Description:* Neural-endocrine interactions; neural regulation of the endocrine system, especially in relation to reproduction; the role of hormones and growth factors in sexual differentiation of the brain.

*Prerequisite(s):* NPB 130; or the equivalent course in endocrinology; NPB 110 or the equivalent course in systemic physiology.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

### **MCP 234 – Current Topics in Neurotoxicology (3 units)**

*Course Description:* General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex neurodevelopmental disorders and neurodegenerative diseases.

*Prerequisite(s):* Core courses in one of the following graduate programs: Pharmacology Toxicology (PTX), Agricultural Environmental Chemistry (AGC), Biochemistry Molecular Biology (BMB), Cell Developmental Biology (CDB), Immunology (IMM), Molecular Cellular Integrative Physiology (MCP) or Neuroscience (NSC).

*Learning Activities:* Lecture 3 hour(s).

*Enrollment Restriction(s):* Restricted to upper level undergraduate students must obtain permission from the course coordinator.

*Cross Listing:* ETX 234, VMB 234.

*Grade Mode:* Letter.

### **MCP 242 – Biological Rhythms (3 units)**

*Course Description:* General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; daily, reproductive, and annual periods; shift-work, jet lag and sleep disorders.

*Prerequisite(s):* NPB 110 or the equivalent.

*Learning Activities:* Lecture 2 hour(s), Lecture/Discussion 1 hour(s).

*Grade Mode:* Letter.

### **MCP 255 – Physiology of the Stress Response (2 units)**

*Course Description:* Definition of Stress; Physiological mechanisms of adaptation to stress; Hormonal control of the systemic stress response; Mechanisms of the cellular stress response; Discussion of current trends in stress physiology and current methods for studying the stress response.

*Prerequisite(s):* Graduate Student Status.

*Learning Activities:* Lecture/Discussion 2 hour(s).

*Cross Listing:* ABG 255.

*Grade Mode:* Letter.

### **MCP 261A – Topics in Vision: Eyes & Retinal Mechanisms (2 units)**

*Course Description:* Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing.

*Prerequisite(s):* NPB 100 or NPB 112; or the equivalent; graduate standing.

*Learning Activities:* Lecture/Discussion 2 hour(s).

*Cross Listing:* NSC 261A, NPB 261A.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### **MCP 261B – Topics in Vision: Systems, Psychophysics, Computational Models (2 units)**

*Course Description:* Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system.

*Prerequisite(s):* Consent of instructor; MCP 261A recommended.

*Learning Activities:* Lecture/Discussion 2 hour(s).

*Cross Listing:* NSC 261B, NPB 261B.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### **MCP 261C – Topics in Vision: Clinical Vision Science (2 units)**

*Course Description:* Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease.

*Prerequisite(s):* MCP 261A; MCP 261B; or consent of instructor.

*Learning Activities:* Lecture/Discussion 2 hour(s).

*Cross Listing:* NSC 261C, NPB 261C.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### **MCP 275 – Neurohumoral Regulatory Mechanisms of Thermogenesis (3 units)**

*Course Description:* Designed for graduate and advanced undergraduate students, examines thermogenic systems in homeotherms (primarily mammals) with respect to regulation (hormonal and central nervous control) and effector mechanisms (basis of heat generation at the target cell).

*Prerequisite(s):* BIS 104; BIS 102; or equivalent courses, and consent of instructor.

*Learning Activities:* Lecture 2 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

### **MCP 290 – Seminar (1 unit)**

*Course Description:* Discussion and critical evaluation of advanced topics and current trends in research.

*Learning Activities:* Seminar 1 hour(s).

*Grade Mode:* Pass/No Pass only.

**MCP 290C – Research Conference in Physiology (1 unit)**

*Course Description:* Presentation and discussion of faculty and graduate student research in physiology.

*Prerequisite(s):* Consent of instructor. Graduate standing.

*Learning Activities:* Discussion 1 hour(s).

*Repeat Credit:* May be repeated.

*Grade Mode:* Pass/No Pass only.

**MCP 291B – Seminar in Cellular Mechanisms of Adaptation (1 unit)**

*Course Description:* Review and evaluation of current literature and research in cellular adaptations to the environment.

*Prerequisite(s):* BIS 103; NPB 100B; consent of instructor.

*Learning Activities:* Discussion 0.50 hour(s), Seminar 0.50 hour(s).

*Repeat Credit:* May be repeated when topic differs.

*Grade Mode:* Pass/No Pass only.

**MCP 291D – Research Approaches in Physiology (2 units)**

*Course Description:* Current research in physiology. Overall design of experiments and particular research areas.

*Learning Activities:* Seminar 2 hour(s).

*Grade Mode:* Pass/No Pass only.

**MCP 293 – Current Progress in Physiology (1 unit)**

*Course Description:* Seminars presented by guest lecturers describing their current research activities.

*Prerequisite(s):* Consent of instructor; graduate standing.

*Learning Activities:* Seminar 1 hour(s).

*Repeat Credit:* May be repeated.

*Grade Mode:* Pass/No Pass only.

**MCP 298 – Group Study (1-5 units)**

*Course Description:* Group study.

*Learning Activities:* Variable.

*Grade Mode:* Letter.

**MCP 299 – Research (1-12 units)**

*Course Description:* Research.

*Learning Activities:* Variable.

*Grade Mode:* Satisfactory/Unsatisfactory only.