Comparative Medicine


The Department of Comparative Medicine is a clinical department that offers residency training in laboratory animal medicine for veterinarians. Its faculty offer courses at the undergraduate and graduate levels. Clinical faculty and basic science faculty in the Department of Comparative Medicine accept students to participate in research projects.

The discipline of Comparative Medicine studies the differences and similarities among species to elucidate biological and disease mechanisms. The research interests of faculty include neuroscience, infectious diseases, tick-borne bacterial infections, neuropathology, cancer, molecular genetics, hematopoiesis, comparative hematology, and laboratory animal science.

Chair: Sherrill Green

Professors: Donna M. Bouley, Paul Buckmaster, Sherrill Green, Shaul Hestrin

Associate Professors: Corinna Darian-Smith, Joseph Garner

Assistant Professors: Megan Albertelli, Stephen Felt, Jennifer Johns, Claude Nagamine, Cholawat Pacharinsak

Courtesy Professor: Hannes Vogel

Courtesy Associate Professor: Mehrdad Shamloo

Courses

COMPMED 10SC. Comparative Anatomy and Physiology of Mammals. 2 Units.

This course introduces the student to common laboratory, domestic, and exotic mammals through lectures, dissection labs and student presentations. Using a comparative approach, investigates the unique adaptations of species in terms of their morphological, anatomical, and behavioral characteristics. Focus on how these species interact with their own and other species (including humans), discuss basic evolution, and the devastating impact of habitat destruction on wild animals. Class provides the student with a deeper appreciation for the diversity of the mammalian orders, along with the fundamentals of comparative anatomy, physiology, and basic dissection techniques. A large collection of skulls, bones and plastinated organs facilitate learning mammalian anatomy, and a field trip to a local zoo enables students to appreciate behavior and locomotion of assorted mammals in their native habitats.

COMPMED 11SC. Life in the Zoo: Behavior, Welfare and Enrichment. 2 Units.

Emphasis is on how animal welfare sciences provide an evidence-based approach to optimize and balance each of these demands so that “good welfare is good business.” Topics include how to apply principles of animal behavior to design environmental enrichments beneficial to both animals and complex mission of the zoo; assessing exhibits from the point of view of animal behavior and well-being, educational opportunities and guest experience; developing an enrichment plan; designing and building enrichments for animals; interacting with the public as docents; assessing overall effectiveness of new enrichment. Class includes experience at San Francisco Zoo.

COMPMED 80N. Introduction to Animal Behavior. 3 Units.

Preference to freshman. Behavior is what makes animals special (thirsty plants don't walk to water), but why do animals behave the way they do? What does their behavior tell us about their inner lives, and about ourselves? What do lipstick and cuckoos and fireflies have in common? Why would nobody want to be a penguin? What do mice say to each other in their pee-mail? Learning how to think about questions like these gives us a unique perspective on the natural world. Format: Discussion and criticism of video examples, documentaries, and research papers. Topics: History and approaches to animal behavior; development of behavior, from genetics to learning; mechanisms of behavior, from neurons to motivation; function of behavior, from honest signals to selfish genes; the phylogeny of behavior, from domestication to specialization; and modern applications of behavior, from abnormal behavior, to conservation, to animal welfare, and animal consciousness.

COMPMED 81N. Comparative Anatomy and Physiology of Mammals. 3 Units.

Preference to freshmen. Emphasis is on a comparative approach to anatomy and physiology of a wide range of mammals, the unique adaptations of each species in terms of its anatomical, and behavioral characteristics, and how these species interact with human beings and other animals. Dissection required. Class size is limited to 16.

COMPMED 84Q. Globally Emerging Zoonotic Diseases. 3 Units.

Preference to sophomores. Infectious diseases impacting veterinary and human health around the world today. Mechanisms of disease, epidemiology, and underlying diagnostic, treatment and control principles associated with these pathogens.

COMPMED 85N. Animal Use in Biomedical Research. 3 Units.

Preference to freshmen. How and why animals are used in biomedical science. Addresses human and animal disease entities and how animal research has contributed to the treatment and cure of disease. Significant portions of this course are devoted to documenting the humane care and treatment of laboratory animals in research, including, but not limited to such topics as laws and ethics, animal behavior, animal modeling, and the animal activist movement. Course topics will also include: What advances have been made as a result of the use of animals in research? Who conducts animal research? Predominant animal species used in biomedical research, facts and myths; the regulation of biomedical research; housing and care of laboratory animals; why new drugs must be tested; animal use in stem cell research, cancer research and genetically engineered mice; career choices in biomedical research.

COMPMED 87Q. Introduction to the Mouse in Biomedical Research. 3 Units.

Preference to sophomores. Focus is on the laboratory mouse, a widely used and important research model. Topics include the ethics of animal use in research; the natural history, origin and husbandry of the mouse; characteristics of key mouse strains; its anatomy and physiology; common diseases and their effects on research; coat color genetics relative to human diseases; immunodeficient mouse models; and genetic engineering of mice. The laboratory includes necropsy, handling, anesthesia, identification methods, and common research techniques using live and dead mice. Enrollment limited to 14 students.
COMPMED 88Q. Blood Cells- The Basics. 3 Units.
Preference to sophomores. The essential and constant production of new blood cells by the bone marrow. Focus is on fundamentals of the three blood cell types along with white blood cell subtypes. Topics include the microscopic appearance of blood cells in mammalian and non-mammalian species, common morphologic abnormalities of blood cells, and shifts in blood cells that occur in several major diseases of humans and animals. Ideally suited for premed, prevet and Bio-X students, but no biology specialty background required.

COMPMED 89Q. Ouch it Hurts! The Comparative Neurobiology of Pain. 3 Units.
Preference to sophomores. Focus is on understanding the basic neurobiology of pain pathways. Topics include the physiology, pharmacology, and clinical aspects of effective pain management. In both humans and animals pain is part of the protective mechanisms that prevent further injury to the body. However, if the pain process continues unchecked, it can become extremely detrimental.

COMPMED 110. Pre-Vet Advisory. 1 Unit.
For students interested in a career in veterinary medicine. How to meet the academic and practical experience prerequisites for admission to veterinary school. Networking with other pre-vet students. Periodic group meetings with guest speakers presenting career options in veterinary medicine. Prerequisite: consent of instructor.

COMPMED 121. Imaging Anatomy in Animal Models. 3 Units.
(Same as RADO 121) Introduces engineering and physical science majors to the basic laboratory animal anatomy visualized and targeted with biomedical imaging. Topics include: various imaging modalities (PET, CT, Radiology, MRI, and other optical imaging) and associated depiction of normal organs and skeletal structures in pigs, dogs, rabbits and rodents. Course includes didactic lectures, discussion, imaging labs and gross cadaver examination.

COMPMED 198. Undergraduate Directed Reading in Comparative Medicine. 1-3 Unit.
May be taken as a prelude to research and may also involve participation in a lab or research group seminar and/or library research.

COMPMED 199. Undergraduate Research. 1-3 Unit.
Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

COMPMED 207. Comparative Brain Evolution. 4 Units.
Functional organization and evolution of the vertebrate nervous system. Topics include paleoneurology, cladistic analysis, allometry, mosaic versus concerted evolution, and evolution of brain region structure, connectivity, and neurons. Comparisons between structure and function of vertebrate forebrains including hippocampi. Evolution of the primate visual and sensorimotor central nervous system as related to vocalization, socialization, and intelligence.

COMPMED 215. Synaptic Properties and Neuronal Circuits. 2-3 Units.
Focus is on synapses and circuits in the central nervous system. Objective is to demonstrate how the specific properties of different synapses play a role in the function of neuronal circuits. The main types of synapses are covered, including both ionotropic and metabotropic-receptor-dependent synapses and their related circuits in the CNS. Lectures and student presentations. If taken for 3 units qualifies as a Core Course satisfying requirements in Cellular, Molecular & Developmental Neuroscience in the Neurosciences Graduate Program. Students enrolling for 3 units write an NIH-style proposal on a selected synapse, proposing a study of its properties and related function and presenting the proposal to the class for critique and discussion.

COMPMED 299. Directed Reading in Comparative Medicine. 1-18 Unit.
Prerequisite: consent of instructor. (Staff).

COMPMED 370. Medical Scholars Research. 4-18 Units.
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

COMPMED 399. Graduate Research. 1-18 Unit.
Investigations sponsored by individual faculty members. Opportunities are available in comparative medicine and pathology, immuno-histochemistry, electron microscopy, molecular genetics, quantitative morphometry, neuroanatomy and neurophysiology of the hippocampus, pathogenesis of intestinal infections, immunopathology, biology of laboratory rodents, anesthesiology of laboratory animals, gene therapy of animal models of neurodegenerative diseases, and development and characterization of transgenic animal models. Prerequisite: consent of instructor.