Urban Planning
See Environmental Science and Policy, on page 300.

Urology
See Medicine, School of, on page 396.

Vegetable Crops
See Plant Sciences, on page 476.

Veterinary Medicine, School of
Michel D. Laimore, D.V.M., Ph.D., Dean of the School
Patricia A. Conrad, D.V.M., Ph.D., Associate Dean—Global Programs
Jan E. Ilkiw, B.V.Sc., Ph.D., Associate Dean—Academic Programs
Karl E. Jandrey, D.V.M., Director, Continuing Professional Education Center
Terry W. Lehenbauer, D.V.M., M.P.V.M., Ph.D., Director, Veterinary Medicine Teaching and Research Center, Tulare
Sean D. OwensD.V.M., Associate Dean—Student Programs
John R. Pascoe, B.V.Sc., Ph.D., Executive Associate Dean
Isaac N. Pessah, Ph.D., Associate Dean—Research and Graduate Education Programs
W. David Wilson, B.V.M.S., Director, Veterinary Medical Teaching Hospital
School Office. 5307521360; http://www.vetmed.ucdavis.edu

Departmental Courses

Anatomy, Physiology and Cell Biology (APC)

Lower Division
92. Internship (1-12)
Internship—3-26 hours. Prerequisite: lower division standing; consent of instructor. Internship experience may be repeated for credit. (S/U grading only.—I, II, III, I, II, III.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division
100. Comparative Vertebrate Organology (4)
Lecture—2 hours; laboratory—2 hours. Prerequisite: Biological Science 1A and 1B or 2A and 2B. Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to tissue level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Same course as Neurobiology, Physiology, and Behavior 123.)—II, III. (I, II, III.)

192. Internship (1-15)
Internship—3-45 hours. Prerequisite: upper division standing, approval of internship. Internship experience may be repeated for credit if topic differs. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate

286. Basics of Microscopy and Cellular Imaging (2)
Lecture—1 hour; laboratory—2 hours. Prerequisite: graduate standing. Practical applications of basic microscope techniques used to image cells and tissues with the goal of using these techniques to generate publication quality images. Principles of light, epifluorescent, confocal and electron microscopy, their applications and limitations. Restricted enrollment. Offered in alternate years. —II. Van Winkle

290. Seminar (1)
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (P/NP grading only.—I, II, III, I, II, III.)

291. Topics in Biology of Respiratory System (1)
Seminar—1 hour. Prerequisite: graduate standing; consent of instructor. Topics concerning structure and function of respiratory system. Possible topics include: lung growth, pulmonary reaction to toxins, pulmonary inflammation, lung metabolism, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. May be repeated for credit. (S/U grading only.—I, II, III, I, II, III.)

295. Group Study (1-5)
Laboratory—6-15 hours. Prerequisite: consent of instructor.

299. Research (1-12)
Laboratory—6-36 hours. Prerequisite: consent of instructor. (S/U grading only.)

Medicine and Epidemiology (VME)

Upper Division
158. Infectious Disease in Ecology and Conservation (3)
Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or Veterinary Medicine 409 or equivalent. Introduction to the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Basic epidemiological models and application to field data. Scientists’ role in developing disease control policies. —II, III. Foley

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate

201. Emerging Issues at the Interface of Ecosystem, Animal and Human Health (3)
Lecture—1 hour; discussion—2 hours. Prerequisite: Active student status in MPVM, Master of Public Health programs or graduate groups in Epidemiology, Ecology, Public Health, Comparative Pathology, or consent of instructor. Restricted to 20 students. Principles of one health with emphasis on the relationships and interdependence of environmental, animal and human health. Exploration of critical data gaps needed to achieve sustainability in ecosystem and disease prevention. —II, III. Johnson

217. Evaluation and Application of Diagnostic Tests (2)
Lecture/discussion—17 sessions; laboratory—3 sessions. Prerequisite: introductory courses in probability (e.g., Preventive Veterinary Medicine 402 or Statistics 102) and epidemiology (e.g., Preventive Veterinary Medicine 405 or Epidemiology 205); a working knowledge of immunological principles beneficial but not essential to understanding technical material associated with diagnostic tests. Topics include sensitivity, specificity, predictive values, Bayes’ Theorem, ROC analysis, measuring agreement between tests, series and parallel testing strategies. Emphasis on rational evaluation, interpretation and presentation of test results for individuals and aggregates. Offered in alternate years.—III.

225. Retroviral Pathogenesis Seminar/ Journal Club (1)
Discussion—1 hour. Prerequisite: graduate student status in the Comparative Pathology, Microbiology or Immunology graduate groups. Participatory seminar addressing the mechanisms of retroviral pathogenesis in a journal club forum. Focus on the review of current scientific journal papers concerning viral pathogenesis, immunology and virology with a special focus on retroviruses. May be repeated 12 times for credit. (S/U grading only.—I, II, III, I, II, III.)

258. Infectious Disease in Ecology and Conservation (1)
Discussion—2 hours. Prerequisite: course 158 (must be taken concurrently). Presentation, analysis and discussion of primary literature on the dynamics and control of infectious diseases in wildlife, including zoonotic diseases and those threatening endangered species. Multidisciplinary approach combines perspectives of ecology and veterinary medicine. (S/U grading only.—II, III. Foley)

298. Group Study (1-5)
Prerequisite: student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Urban Planning

See Environmental Science and Policy, on page 300.
Molecular Biosciences (VMB)

Lower Division

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/NP grading only)

101Y. Principles of Pharmacology and Toxicology (S)
Laboratory—1 hour; web virtual lecture—1 hour; web electronic discussion—0.5 hour; autotutorial—5 hours. Prerequisite: upper division standing in a science major; Chemistry through organic, general chemistry, or consent from instructor; good standing with university; computing capability using MS Word, Excel, and PowerPoint, menu driven software programs, SmartSite; computer, or ready access to a computer, with broadband Internet access. Restricted to upper division undergraduate students in good standing with school and fulfill course prerequisites. Hybrid course provides training in core concepts of pharmacological and toxicological sciences. Develop higher-order problem solving and critical thinking skills. GE credit: OL, SE, SL—III. (III.) Puschine

Upper Division

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units of course work. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only)

Graduate

234. Current Topics in Neurotoxicology (3)
Lecture—3 hours. Prerequisite: core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students who have permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxins and the contribution of neurotoxic compounds to complex neurological disorders and neurodegenerative diseases. (Same course as Environmental Toxicology 234 and Molecular, Cellular, and Integrative Physiology 234.)—III. (III.) Lehn

253. Metabolism of Toxicants and Drugs (2)
Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201, 202, 203; general biochemistry or consent of instructor. Significance of chemical pathways of toxicants and drug metabolism, enzymology and molecular aspects of P450 and flavin monooxygenases, hydroxylases and phase 2 transferases and experimental approaches for metabolism studies. Offered in alternate years.—II.

254. Toxicology of the Respiratory System (3)
Lecture—3 hours; discussion. Prerequisite: Pharmacology and Toxicology 201, 202, 203, or consent of instructor. Survey of structure and function of the respiratory system, the pathophysiology of major lung diseases, the interactions of toxicants with the lung and response of this organ to injury. Offered in alternate years.—II.

255. Pharmacokinetics and Biopharmaceuticals (2)
Lecture—16 sessions; discussion—4 sessions. In-depth study of pharmacokinetics, including the fundamentals of pharmacokinetics, how to design a pharmacokinetic study and how to use both compartmental and non-compartmental analysis to interpret the data. Offered in alternate years.—II. (Krzych

200. Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor Topics in nutrition, pharmacology/toxicology, and biochemistry. May be repeated for credit. (S/U grading only)—I, II, III. (I, II, III).

297T. Tutoring in Graduate Molecular Biosciences (1-5)
Prerequisite: graduate or professional student standing and consent of instructor. Assist in preparation and teaching of courses in Nutrition, Pharmacology and Toxicology, or other courses offered by the department under direct supervision of the instructor. Designed for graduate or professional students who desire teaching experience in graduate courses. May be repeated up to 5 units of credit. (S/U grading only)—I, II, III. (I, II, III)

298. Group Study (1-5)
(S/U grading only)

299. Research (1-12)
(S/U grading only)

Professional

397T. Tutoring in Molecular Biosciences (1-5)
Discussion—1.5 hours. Prerequisite: graduate or professional standing and consent of instructor. Experience in professional curriculum for graduate or professional students, not teaching assistants, under direct supervision of instructor. May be repeated up to 5 units of credit. (S/U grading only)—I, II, III. (I, II, III).

Pathology, Microbiology, and Immunology (PMI)

Lower Division

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only)

Upper Division

126. Fundamentals of Immunology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102 or the equivalent or consent of instructor. Overview of immune system including components of the immune system, initiation and regulation of the immune response, infection and immunity, hypersensitivity and immunodeficiency. Clinical immunologic techniques, immunodeficiency and vaccinology.—II. (II.) Stott

126L. Immunology Laboratory (2)
Laboratory—6 hours. Prerequisite: course 126 or the equivalent (may be taken with consent of instructor). Laboratory procedures in clinical immunology. Cells of the innate and adaptive systems. Quantitative and qualitative characterization of the immune response.—II. (II.) Stott

127. Medical Bacteria and Fungi (5)
Lecture—3 hours; laboratory—5 hours. Prerequisite: general microbiology (Microbiology 102 and 102L), basic immunology (course 126 or Medical Microbiology 1B). Literature, clinical and pathogenic aspects of infectious disease. (III.) LeFebvre

128. Biology of Animal Viruses (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102. Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of viral infections in man and animals. Immunity to virus diseases and anecognitive properties of animal viruses. Two units of credit to students who have completed Microbiology 162. (III. (III.) Miller

129Y. One Health: Human, Animal & Environment Interfaces (3)
Lecture/discussion—3 hours; web electronic discussion. Class size limited to upper division undergraduates in good standing with the school and who fulfill the course prerequisites below. Enrollment limited to 100 students. Emphasis on fundamentals, challenges, and opportunities in One Health using local and global health case studies. Animal, human, and environmental health problems, along with tools and transdisciplinary approaches, will be introduced to foster innovative thinking that addresses complex issues. GE credit: SciEng or SocSci | OL, SE or SS, SL—III. (III.) Miller, Papa-georgiou

188. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only)

189. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only)

Graduate

201. Integrative Pathobiology Core I (5)
Lecture—3 hours; discussion—2 hours. Overview of molecular biology techniques, tissue structure and function, cell membrane pathology and cellular mechanisms of disease including cellular responses and adaptations to stress, cell cycle, cell death, cell biomechanics, vascular disturbances, and mechanisms of neoplasia and tumorigenesis.—II. (II.)

202. Integrative Pathobiology Core II (4)
Lecture—2 hours; discussion—2 hours. The second required core course in the graduate group with topics in inflammation, host-pathogen interaction, regenerative medicine, integrative pathology and population and ecosystem health.—III. (III.) Foley

203. Experimental Design and Data Analysis in Pathobiology (2)
Lecture—1 hour, lecture/laboratory—2 hours. Follows two required core courses in courses 201 and 202, for Ph.D. and M.S. students. Goal is to bridge gap between statistics and real-world pathobiology to increase students’ skills and independence in experimental design and data analysis.—I. (I.)

214. Vector-borne Infectious Diseases: Changing Patterns (2)
Lecture/discussion—2 hours. Prerequisite: graduate student standing (PhD or MS). Restricted to 10 students. Vector-borne infectious diseases especially as they relate to changing patterns associated with climate changes, trade and population movement. Prerequisite: consent of instructor. (S/U grading only)—I. (I.) Lanzaro

221. Topics in Virus Research (1) Discussion—1 hour. Prerequisite: graduate student standing (PhD or MS) Restricted to 10 students. Discussion based seminar covering graduate student virology research. Informal presentations and discussion of technical problems in research design and experimentation are encouraged. Current stage of the research project is not important. (S/U grading only)—I. (I.) Murphy

270. Advanced Immunology (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Introductory course in immunology. Graduate student status in the Comparative Pathology Graduate Student Group. All other students will require consent of instructor. Current concepts of immunology with an emphasis on interactions between the host, the environment and the pathogen. These interactions will include those that are protective and successful for the host as well as those that are deleterious.—II. (II.) Stott

290. Seminar (1)
Seminar—1 hour. Prerequisite: graduate level standing. Topics in pathology, microbiology or immunology. May be repeated for credit. (S/U grading only)—I, II, III. (I, II, III.)