104F. Writing in the Professions: Health (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent; upper division standing. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. Not open for credit to students who have completed English 104F. GE credit: Wrt.—I, II, III. (I, II, III.)

104I. Writing in the Professions: Internships (4)
Lecture/discussion—3 hours. Prerequisite: course 1 or English 3 or the equivalent and upper division standing; restricted to students concurrently enrolled in an internship and to Contemporary Leadership minors. Advanced instruction in writing in the workplace, including public and private sectors, government agencies, profit and non-profit organizations. Collaborative work and practice in effective styles of communication. Not open for credit to students who have completed English 102A or course 102A. GE credit: Wrt.—III. (III.)

192. Internship in Writing (1-12)
Internship—3-36 hours. Prerequisite: course 1 or English 3 or the equivalent. Internships in fields where students can practice their skills. May be repeated up to 12 units for credit. (P/NP grading only.)

197T. Tutoring in Writing (1-5)
Tutoring—1-5 hours. Prerequisite: upper division standing; consent of instructor. Tutoring one-on-one or leading small voluntary discussion groups affiliated with a writing course. May be repeated up to 10 units for credit. (P/NP grading only.)

197TC. Community Tutoring in Writing (1-4)
Tutoring—1-4 hours. Prerequisite: upper division standing; consent of instructor. Field experience, with individuals or in K-12 classroom instruction, focusing on reading- and writing-to-learn strategies in any subject area. May be repeated up to 10 units for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: course 1 or English 3 or the equivalent; consent of instructor. May be repeated up to 10 units for credit. (P/NP grading only.)

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

Graduate Courses

298. Directed Group Study (1-5)
Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

299. Individual Study (1-12)
Prerequisite: consent of instructor; graduate standing. (S/U grading only.)

Professional Courses

390. Theory and Practice of University-Level Composition Instruction (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing; appointment as Teaching Assistant in the Composition Program. Examination of current theories about the teaching of writing and their practical application to undergraduate writing courses at UC Davis. Not open for credit to students who have completed English 390. (S/U grading only.)—III. (III.)

392. Teaching Expository Writing (2)
Discussion—2 hours. Prerequisite: graduate standing, appointment as Teaching Assistant in the Composition Program; completion of course 390 or the equivalent. Discussion of problems related to teaching expository writing at the university level, with special emphasis on teaching reading and writing skills and responding to student papers. (S/U grading only.)—I. (I.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing; consent of instructor. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Urban Planning

See Environmental Science and Policy, on page 281.

Urology

See Medicine, School of, on page 367.

Vegetable Crops

See Plant Sciences, on page 448.

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Veterinary Medicine (VMD)

Lower Division Course

92. Internship in Veterinary Science (1-12)
Discussion/laboratory—1-4 hours; clinical experience—3-36 hours. Prerequisite: approval of project by faculty sponsor prior to period of internship. Students in this program will be under the supervision of faculty in the School of Veterinary Medicine whose expertise is appropriate for the proposed project. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Ilkiw

Upper Division Courses

192. Internship in Veterinary Science (1-12)
Discussion/laboratory and clinic—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in veterinary medicine. (P/NP grading only.) Ilkiw

Graduate Courses

298. Group Study (1-5)
Prerequisite: consent of instructor.
(S/U grading only.)

299. Research (1-12)
Prerequisite: consent of instructor.
(S/U grading only.)

Professional Courses

400A. Freshman Doctoring (2.5)
Lecture—11 sessions; laboratory—3 sessions; workshop—5 sessions; lecture/discussion—6 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine; consent of instructor. Introduction to the "art" of veterinary medicine, focusing on essential skills (communication, team-building, leadership, conflict management, stress management, financial management). Emphasis on practical application of these skills to function efficiently and effectively in practice, academia, industry, government or other career. (S/U grading only.)—I. (I.) Klingborg

400B. Sophomore Doctoring (2.6)
Lecture—8 sessions; lecture/discussion—10 sessions; project—3 sessions; laboratory—5 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine; consent of instructor. Further the development of new technical skills that will prepare students for life-long learning and successful veterinary practice management. Emphasis will be on hands-on learning through participation. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) Klingborg

400C. Junior Doctoring (1.8)
Lecture—3 sessions; laboratory—2 sessions; lecture/discussion—10 sessions; project—3 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; consent of instructor. Introduction to the "art" of veterinary medicine, focusing on essential skills (communication, team-building, leadership, conflict management, stress management, financial management). Emphasis on practical application of these skills to function efficiently and effectively in practice, academia, industry, government or other career. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) Klingborg

401A. The Normal Anatomy of the Canine Locomotor System (3.4)
Lecture—16 sessions; laboratory—18 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Normal canine anatomy of bones, joints, muscles, ligaments, tendons, nerves and vessels of the vertebral column and limbs; musculoskeletal physiology and biomechanics.—I. (I.) Meyers

401B. The Normal Anatomy of the Canine Head (1.7)
Lecture—7 sessions; laboratory—8 sessions; discussion—2 sessions. Prerequisite: first-year standing the School of Veterinary Medicine. Normal canine anatomy with comparison to other species of bones, joints, muscles, ligaments, tendons, nerves and vessels of the head including the eye and ear.—II. (II.) Kasper

402. Structure and Function of the Cardiovascular and Respiratory Systems (4.5)
Lecture—32 sessions; laboratory—13 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Integrated view of cardiovascular and respiratory anatomy and physiology. (Deferred grading only, pending completion of sequence.)—I, II. (I, II.) Jones

402D. Structure and Function of the Urinary System and Body Fluids (2.3)
Lecture—17 sessions; laboratory—6 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine; consent of instructor. Basic understanding of the structure and function of the urinary system plus physiology of body fluids and acid-base balance. Structure and function are correlated.—III. (III.) Schelegle

403. Physiological Chemistry (5.9)
Lecture—52 sessions; discussion—7 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Biochemical principles used to analyze problems and to evaluate metabolic relationships important in animal health and pathophysiology. Integrative approach, emphasizing controls of major metabolic pathways, molecular basis of gene expression, tumorigenesis and signal transduction.—I. (I.) Cortopassi

405. Veterinary Parasitology (3.6)
Lecture—26 sessions; laboratory—10 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Biological and clinical aspects of parasites and the diseases they cause in animals.—III. (III.) Conrad, Boyce

406. Principles of Behavior (0.7)
Lecture—7 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Overview of animal behavior with relevance to veterinary medicine.—I. (I.) Bain

407. Principles and Techniques of Operative Surgery and Anesthesia (2.4)
Lecture—24 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; course 426. Introduction to operative and anesthetic skills and foundation in the importance of regional anatomy in the planning and conduct of surgical practice.—I. (I.) J. Pascoe, Ilkiw

407L. Principles and Techniques of Surgery and Anesthesia Laboratory (1.4)
Laboratory—14 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Introduction to surgical anatomy, operative and anesthetic skills. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) J. Pascoe, Ilkiw

408. Nutrition and Nutritional Diseases in Animals (2.9)
Lecture—27 sessions; laboratory—2 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Principles of nutrition and their application to the solution of nutritional disorders of animals.—II. (II.) Ramsey

409. Epidemiology (1.7)
Lecture—11 sessions; discussion—6 sessions. Prerequisite: first-year standing in School of Veterinary Medicine. Introduction to epidemiologic effect measures, causal inference, experimental and non-experimental study design, and clinical epidemiology, with applications in veterinary medicine.—I. (I.) Kass

412. Fundamentals of Zoonoses (1.1)
Lecture—11 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Major zoonotic infections transmitted mainly by domestic animals, especially pets and particularly in North America. A short review of symptoms in animals and humans, epidemiology, diagnostic tests, treatment and prevention will be presented for each animal species and each infection or infestation. Some zoonotic diseases, subject to USDA rules and regulations, will be studied in more detail (i.e., rabies, brucellosis, tuberculosis, avian chlamydiosis).—III. (III.) Chomel

413. Veterinary Food Safety (1.3)
Lecture—13 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. The food system and diseases transmitted by food. Topics include sources of contaminants, the function of processing in food safety, and the role of veterinarians in pre-harvest food safety and in food protection in general.—III. (III.)

414A. Principles of Veterinary Pharmacology and Toxicology (2.5)
Lecture—20 sessions; discussion—4 sessions; laboratory—1 session. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to the principles of pharmacology and toxicology. Pharmaco-/toxicokinetics, pharmaco-/toxicodynamics and chemotherapy of bacterial, neoplastic, fungal and viral diseases.—I. (I.) Buckpitt

414B. Veterinary Pharmacology (2.5)
Lecture—23 sessions; discussion—2 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Basic principles for the use of drugs affecting the autonomic and central nervous systems as well as compounds affecting the cardiovascular system.—II (II.) Vulliet

414C. Veterinary Toxicology (1.9)
Lecture—16 sessions; discussion—2 sessions; laboratory—1 session. Prerequisite: second-year standing in the School of Veterinary Medicine. Toxicants of major importance in veterinary medicine. Basic principles and mechanism of action of toxicants, therapeutic and diagnostic approach.—III. (III.) Puschner

415A. Freshman Clinical Skills (1.1)
Lecture—1 session; lab—10 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Development of clinical skills by learning procedures that are important to the practice of veterinary medicine in a variety of species in both a laboratory and clinical environment. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) Ilkiw

415B. Sophomore Clinical Skills (1.2)
Lecture—1 session; lab—11 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Development of clinical skills by learning procedures that are important to the practice of veterinary medicine in a variety of species in both a

laboratory and clinical environment. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) Ilkiw

415C. Junior Clinical Skills (1.9)
Lecture—1 session; lab—18 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Development of clinical skills by learning procedures that are important to the practice of veterinary medicine in a variety of species in both a laboratory and clinical environment. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) Ilkiw

419. Virology (2.7)
Lecture—27 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to the classification, morphology, and the strategy of replication of animal viruses, covering the molecular pathogenesis of animal viruses at the cellular level with emphasis on agents of infectious diseases of domestic animals.—I. (I.) Yilma

420. Immunology (3)
Lecture—21 sessions; laboratory—9 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Concepts of immunology. Emphasis is on the principles of vaccination, responses to pathogenic agents, and the development of hypersensitivity and autoimmune reactions.—III. (III.) Gershwin

421. Principles of Neurosciences (2.7)
Lecture—22 sessions; laboratory—5 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. An integrated study of normal neurobiology, neuroanatomy and neurophysiology, to enable students to engage in studies of neurologic disorders and clinical neurology.—II. (II.) LeCouteur

422. Veterinary Ophthalmology (1.9)
Lecture—17 sessions; laboratory—2 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. The eye and related structures. Basic anatomy and physiology with clinically relevant aspects emphasized. Presentation of clinical appearance of common pathological changes. Specific diseases frequently encountered in general practice, including signs, causes, diagnostic approach, and treatment philosophy.—II. (II.) Hollingsworth

425. Veterinary Genetics (1.8)
Lecture—16 sessions; discussion—2 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction to genetics as it applies to the practice of veterinary medicine.—III. (III.) Bannasch, Lyons

426. Principles of Veterinary Anesthesiology and Critical Patient Care (1.7)
Lecture—15 sessions; laboratory—2 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Basic principles of veterinary anesthesiology including techniques of monitoring and management of animals under anesthesia.—III. (III.) P. Pascoe

427. Cell and Tissue Structure and Function (3.3)
Lecture—24 sessions; laboratory—9 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Relationship between structure and function of animal tissues, emphasizing the molecular and cellular processes which integrate normal physiological activity. Mechanisms of cell division, differentiation and locomotion. Microscopic anatomy and organization of cells and extracellular molecules to form specialized differentiated tissues.—I. (I.) Tablin

430. Principles of Radiography and Radiologic Interpretation (3.6)
Lecture—24 sessions; laboratory—2 sessions; discussion—10 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Physical principles of x-ray production and x-ray matter interactions as they pertain to diagnostic medical imaging and radiation safety. Principles of radiologic interpretation. Principles of ultrasound physics and interpretation. (Deferred grading only, pending completion of sequence.)—I, II, III. (I, II, III.) Wisner

431. Endocrinology (1.8)
Lecture—17 sessions; laboratory—1 session. Prerequisite: first-year standing in the School of Veterinary Medicine. The structure and function of endocrine glands and how hormones and cytokines influence physiological processes.—III. (III.) Raybould

432. Structure and Function of the Gastrointestinal and Mammary Systems (3.2)
Lecture—22 sessions; laboratory—10 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Basic understanding and correlation of the structure and function of the gastrointestinal and mammary systems. Multiple species' differences examined.—II. (II.) Lloyd

433. Veterinary Oncology (1.2)
Lecture—12 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Relationships between pathology, hematology, cytology, immunology, and the clinical manifestations of neoplastic diseases in animals.—I. (I.) Kent

434. Introduction to Veterinary Hematology (1.4)
Lecture—10 sessions; laboratory—4 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. The regulation of production of blood cells, the morphology of bone marrow and hematopoietic cells, the morphology and function of blood cells and the activities of hemostasis.—III. (III.) W. Vernau

435. Veterinary Clinical Pathology (3.9)
Lecture—13 sessions; laboratory/discussion—26 sessions. Prerequisite: second-year standing in School of Veterinary Medicine. The principles, selection, use, interpretation, and limitations of laboratory tests used for the diagnosis and monitoring of disease in animals. (Deferred grading only, pending completion of sequence.)—II, III. (I, III.) Borjesson

436. Veterinary Ethics and Law (1.2)
Discussion—12 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Ethical and legal issues critical to successful and ethical veterinary practice. Processes through which ethical and legal questions are approached and resolved. Background reading materials and discussions are supplemented with problem-based learning.—I. (I.) Tannenbaum

437. Veterinary Ethics and Law (2)
Lecture—16 sessions; discussion—4 sessions. Prerequisite: consent of instructor; third-year standing in the School of Veterinary Medicine. Ethical and legal issues critical to successful and ethical veterinary practice. Processes through which ethical and legal questions are approached and resolved. Reading and discussions supplemented with problem-based learning.—III. (III.) Tannenbaum

440. Veterinary Neurology (2.7)
Lecture—21 sessions; laboratory—6 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Integrated study of the relationship between microanatomy, neurophysiology, neuropathology, and the clinical manifestations and diagnosis of neurological diseases, and the use of the various neurodiagnostic aids.—I. (I.) Dickinson

444. Clinical Endocrinology (1.5)
Lecture—12 sessions; discussion—3 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. A correlated review of common endocrinology disorders affecting the dog and cat.—II. (II.) Feldman

446. Veterinary Reproduction (4)
Lecture—30 sessions; laboratory—10 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Structural, functional, pathological, and clinical aspects of reproduction in animals.—II. (II.) Conley

447. Introduction to Public Veterinary Practice and Foreign Animal Diseases (1)
Lecture—10 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Overview of the importance of foreign animal diseases and the veterinary responsibilities associated with the prevention, detection and reporting of these diseases in the United States.—I. (I.) Hietala, Wetherall

451. Veterinary Bacteriology and Mycology (4.9)
Lecture—34 sessions; laboratory—15 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to the bacterial and fungal agents of animal diseases. Specifically, each microorganism will be discussed with respect to overall significance to animal disease; structural and functional aspects including morphology, cellular composition, and products of medical interest.—I. (I.) LeFebvre

452. General Pathology (3.1)
Lecture—18 sessions; laboratory—13 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Basic principles of disease and in particular the fundamental mechanisms responsible for creating a disease situation. Illustrations of how the application of general pathological principles is used to determine disease pathogenesis and prognosis.—I. (I.) Mohr

459. Systemic Pathology (5.8)
Lecture—44 sessions; laboratory—14 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Basic understanding of the pathobiology of major organ systems relevant to a variety of animal species. Emphasis on mechanisms of injury, patterns of response to injury and on balance between damage and repair.—II. (II.) Moore

460. Fundamentals of Clinical Orthopedics (1)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and consent of instructor. Fundamental concepts of veterinary orthopedics, including differentials of bone disease, diagnostics for bone disease, bone biomechanics, principles of fracture repair, applied joint anatomy, principles of joint disease, applied tendon and ligament anatomy, and principles of tendon and ligament disease.—I. (I.) MacDonald

480. Senior Clinic (15)
Clinical activity—60 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Integration of knowledge and development of clinical judgement and skills in the diagnosis, treatment, and prevention of animal disease. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III, IV. (I, II, III, IV.) W.D. Wilson

Departmental Courses

Anatomy, Physiology and Cell Biology (APC)

Lower Division Courses

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Internship experience off and on campus in all subject areas offered in the Department of Anatomy, Physiology & Cell Biology. Internships are supervised by a member of the faculty. (P/NP grading only.)

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

Upper Division Courses

100. Comparative Vertebrate Organology (4)
Lecture—3 hours; laboratory—3 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 gross 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. (II.) Werner

192. Internship (1-15)
Internship—3-45 hours. Prerequisite: upper division standing, approval of internship. Internship experience off and on campus in all subject areas offered

in the Department of Anatomy, Physiology and Cell Biology. Internships are supervised by a member of the faculty. 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 Courses

284. Ruminant Nutrition and Physiology (3)
Lecture—27 sessions; laboratory—3 sessions. Prerequisite: graduate or first-year standing in School of Veterinary Medicine. Basic and applied aspects of ruminant nutrition and physiology, nutritional and metabolic disorders of ruminants.—III. (III.)

285. Morphometry of Cells, Tissues and Organs (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent; Statistics 13. Stereological estimation of volumes, surfaces and lengths of organs/components; estimation of number of cells in an organ or tissue, their volumes, products and gene expression. Practical application of stereology and avoidance of most common biases of histological measurements. Offered in alternate years.—II. Hyde

286. Basics of Microscopy and Cellular Imaging (2)
Lecture—1 hour; laboratory—2 hours. Prerequisite: graduate standing; consent of instructor. 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.—III. 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 and consent of instructor. Topics concerning structure and function of respiratory system. Possible topics include: lung growth, pulmonary reaction to toxicants, 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.) Hyde, Wu, Pinkerton

292. Topics in Neuroscience Research (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Students will examine current topics in neuroscience research literature, as well as evaluate rationale, methods, results, interpretation of data, and relevance of studies. Possible topics include pain, autonomic nervous system, neuroendocrinology, neurotransmitter regulation of gene expression, neuroendocrine-immune interactions, stress. (S/U grading only.)

298. 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.)

Professional Course

410. Equine Locomotor Anatomy (1.8)
Lecture—9 sessions; laboratory—9 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Normal anatomy of the equine fore and hind limb bones, joints, muscles, ligaments, tendons, nerves and vessels with emphasis on clinically applicable structures.—III. (III.) Stover

Medicine and Epidemiology (VME)

Upper Division Courses

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. Offered in alternate years.—(II.) 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 Courses

217. Evaluation and Application of Diagnostic Tests (2)
Lecture/discussion—17 sessions; laboratory—3 sessions. Prerequisite: consent of instructor; 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. Gardner

219. Clinical Experimental Design (3)
Lecture—15 sessions. Prerequisite: biostatistics, ecology, epidemiology, experience in clinical medicine or microbiology recommended. Design and construction of experiments, hypothesis testing, exploratory data analysis, controls, inferring causation, and the performance of scientific research. Offered in alternate years.—II. Foley

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 disease in wildlife, including zoonotic diseases and those threatening endangered species. Multidisciplinary approach combines perspectives of ecology and veterinary medicine. Offered in alternate years. (S/U grading only.)—II. Foley

290C. Research Group Conference (1)
Conference—10 sessions. Prerequisite: consent of instructor; first-, second- or third-year standing in the School of Veterinary Medicine. Current research topics relevant to veterinary clinical pharmacology. May be repeated two times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Tell

294B. Conservation Biology and Veterinary Medicine (1)
Seminar—10 sessions. Prerequisite: first-, second- or third-year standing in the School of Veterinary Medicine or graduate student standing. Current topics in conservation biology as they relate to veterinary medicine, wildlife population management and ecosystem health. May be repeated two times for credit if topic differs. (S/U grading only.)—II. (II.) Mazet

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.)

Professional Courses

401. Introduction to Ecosystem Health (1.0)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Core principles and approaches for assessing ecosystem health with emphasis on relationships between environmental, animal and human health. Topics include ecosystem change and human/animal impacts, emerging infectious disease, wildlife zoonoses, ecotoxicology, and indicators of ecosystem health.—I. (I.) Johnson

410. Husbandry, Feeding and Management of Captive Animals (2)
Lecture—20 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction of management and husbandry dynamics as a prerequisite for preventive health programs in zoos, aquaria, vivaria, and other environments for exotic pets and wild animals.—III. (III.) Tell

412. Laboratory Animal Medicine (2)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. The role of an institutional laboratory animal veterinarian. Emphasis on the role of the attending veterinarian, mouse genetics, vivarium management, health monitoring programs, experimental design and animal models.—II. (II.)

413. Medical Primatology (2)
Lecture—20 sessions. Prerequisite: second- and third-year standing in School of Veterinary Medicine; consent of instructor. Major diseases, medical management and husbandry of captive non-human primates. Offered in alternate yeas. (S/U grading only.)—III. (III) Lerche

415. Management and Diseases of Captive Wildlife (2)
Lecture—20 sessions. Prerequisite: second- or third-year standing in the School of Veterinary Medicine. Introduction to the roles of a zoological veterinarian and the most common topics encountered. Emphasis on taxonomy, husbandry, preventive medicine and the most common diseases seen in common captive wildlife species.—I. (I.) Wack

416. Diseases of Fish (2.1)
Lecture—18 sessions; laboratory—3 sessions. Prerequisite: second- or third-year standing in the School of Veterinary Medicine. Etiology, pathology, diagnosis, treatment and prevention of diseases of fish. Preventive management of diseases in aquaculture and aquaria. Offered in alternate years.—III. Hedrick

417. Companion Avian Medicine (2)
Lecture—20 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Diseases, diagnostics, medical management and surgery of psittacine species. Avian nutrition, husbandry, and management.—II (II.). Tell

419. Companion Exotic Small Animal Medicine and Surgery (3.4)
Lecture—34 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. The etiology, clinical presentation, diagnostic evaluation, treatment, prevention, and control of medical diseases of companion small exotic mammals, amphibians and reptiles.—I. (I.) Hawkins

424. Shelter Medicine (1)
Seminar—10 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine. Shelter medicine is a newly emerging specialty in veterinary medicine building on the clever solutions and experience of hundreds of shelter veterinarian, managers, technicians, rescue and foster homes, and others, who have learned their skill in the trenches. (S/U grading only.)—III. (III.) Hurley

427. Introduction to Food Animal Herd Health Medicine (1.9)
Lecture—17 sessions; laboratory—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 463A and 463B (concurrently) or consent of instructor. Introduction to current problem solving concepts, approaches, and issues addressed in subsequent food animal medi-

cine courses; contexts for developing problem solving skills through on-site, field investigation of herd and flock health problems.—I. (I.) Hoar

428. Food Animal Surgery (1.6)
Lecture—16 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Selected topics in surgical diseases of food animals.—III. (III.) Lane

428L. Food Animal Surgery Laboratory (0.8)
Laboratory—8 sessions. Prerequisite: third-year standing in School of Veterinary Medicine; course 428 (concurrently). Representative surgeries of food animals performed by groups of students. Limited enrollment. (S/U grading only.)—III. (III.) Lane

429A. Sheep Herd Health (1)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 463A, 463B, 427, course 463C concurrently, or consent of instructor. The application of problem-solving and epidemiologic methods to sheep diseases and their control.—II. (II.) Lane

429B. Beef Herd Health (1)
Lecture—10 sessions. Prerequisites: third-year standing in the School of Veterinary Medicine, course 463A, 463B, 427, 463C concurrently or consent of instructor. The application of problem-solving methods to diseases of grazing beef cattle and their control.—II. (II.) Hoar

429C. Swine Herd Health (1)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 463A, 463B, 427, course 463C concurrently, or consent of instructor. The application of problem-solving and epidemiologic methods to swine diseases and their control.—II. (II.) Gardner

430. Raptor Medicine and Rehabilitation (2)
Lecture—20 sessions. Prerequisite: first-, second- or third-year standing in the School of Veterinary Medicine. Biology, behavior, parasites, diseases, toxins, iatropenic conditions, diagnostics, treatments, nursing, housing, nutrition, rehabilitation and release techniques for eggs, orphans and adult native California raptors.—III. (III.) Tell

432. Medical and Husbandry Procedures for Raptors (1)
Laboratory—1 hour. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine or consent of instructor. Serves as student treatment crew for the Raptor Center providing hands-on experience with handling, restraint and treatment for ill and injured birds of prey with the goal of rehabilitation and release back into their native habitat. May be repeated once for credit with consent of instructor.—I, II, III. (I, II, III.) Tell

446. Small Animal Reproduction (1)
Lecture—7 sessions; discussion—1 session; laboratory—2 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Provides a complete description (history, physical examination, laboratory abnormalities, etc.) of the common abnormalities associated with the genital tract of male and female dogs and cats.—III. (III.) Feldman

450. Small Animal Clinical Immunology (1.7)
Lecture—17 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; consent of instructor. Review of the basic mechanisms of immunologic diseases in small companion animals and a description of common immunologic diseases organized by body system, including clinical presentation, diagnosis and treatment.—III. (III.) Sykes

454. International Veterinary Medicine Baja California Fieldwork (2)
Fieldwork—40 hours. Prerequisite: MPVM; first-, second-, third- or fourth-year standing in the School of Veterinary Medicine or consent of instructor. Students in the School of Veterinary Medicine or consent of instructor. Livestock diseases responsible for limiting trade across the U.S./Mexico border, how knowledge is extended to ranchers, and how veterinarians are educated in Mexico. Offered during Spring break. (S/U grading only.)—III. (III.) Hird

455. Beginning Veterinary Spanish (2)
Lecture/discussion—3 hours. Prerequisite: first-, second-, third-year or MPVM standing in the School of Veterinary Medicine. Preparation to converse with clients (e.g. companion animal owners) and livestock managers in Spanish in clinical settings. (S/U grading only.)—II. (II.) Hird

456. Intermediate Veterinary Spanish (1)
Discussion—10 sessions. Prerequisite: first-, second-, third-year or MPVM standing in the School of Veterinary Medicine. May be repeated two times for credit. Presentations on veterinary-related topics in Spanish by native speakers and others and discussion to prepare students to converse with clients (e.g., companion animal owners and livestock managers) in Spanish. (S/U grading only.)—III. (III.) Hird

458. Behavior Therapy in Companion Animals (2.0)
Lecture—20 sessions. Prerequisite: second- and third-year standing in the School of Veterinary Medicine. Clinical application of behavior modification procedures, management and drug therapy to resolve common behavioral problems of companion animals including dogs, cats, horses and birds.—III. (III.) Bain

461A. Small Animal Medicine—Level I (3.6)
Lecture—32 sessions; lab—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches to the medical diseases of dogs and cats. Course is a core option for the professional veterinary curriculum and preparatory for advanced courses in small medical diagnoses and therapeutics.—III. (III.) Johnson

461B. Small Animal Medicine—Level I (3.3)
Lecture—33 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and completion of course 461A, if Small Animal Medicine is your core or consent of instructor. Continuation of fundamental principles, clinical manifestations, diagnostic methods, and therapeutic approaches to the medical diseases of dogs and cats.—I. (I.) Marks

461C. Small Animal Medicine—Level I (3.7)
Lecture—37 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 461A, 461B (Small Animal Medicine core only), or consent of instructor. Continuation of fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches to the medical diseases of dogs and cats.—II. (II.) Outerbridge, White

462. Small Animal Medicine, Level II (2)
Discussion—20 sessions. Prerequisite: course 461A, 461B, 461C, third-year standing in the School of Veterinary Medicine or consent of instructor. Emphasis on differential diagnosis covering diseases of the skin, cardiovascular, respiratory, gastrointestinal and urinary systems, plus infectious diseases affecting various organ systems. The course is a bridge between didactic teaching and the use of that knowledge in a clinical setting.—III. (III.) Ihrke

463A. Food Animal Medicine, Level I (3.6)
Lecture—36 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Fundamentals of food animal medicine presented in a lecture format with integrated case discussion to illustrate the context and application of material presented and to promote development of problem-solving skills.—III. (III.) Angelos

463B. Food Animal Medicine, Level I (3.4)
Lecture—34 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and completion of course 463A, if Food Animal Medicine is your core or consent of instructor. Fundamentals of food animal medicine with integrated case discussions to illustrate the context and application of material presented and to promote development of problem-solving skills.—I. (I.) Angelos

463C. Food Animal Medicine, Level I (3.3)
Lecture—31 sessions; laboratory—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine (and courses 463A, B if Food Animal Medicine is fulfilling your core requirement) or consent of instructor. Continuation of the fundamentals of food animal medicine with integrated case discussions to illustrate the context and application of material presented and to promote development of problem-solving skills.—II. (II.) Angelos

464A. Equine Medicine, Level I (3.2)
Lecture—28 sessions; laboratory—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. The etiology, pathophysiology, epidemiology, clinical presentation, diagnostic evaluation, treatment, presentation, and control of important infectious and non-infectious diseases of horses. Emphasis on problem-based approach to differential diagnosis.—III. (III.) W.D. Wilson

464B. Equine Medicine, Level I (3.7)
Lecture—35 sessions; discussion—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and completion of course 464A (Equine Medicine core), or consent of instructor. Continuation in instruction in the etiology, pathophysiology, epidemiology, clinical presentation, diagnostic evaluation, treatment, prevention, and control of important infectious and noninfectious diseases of horses. A problem-based approach to differential diagnosis is emphasized.—I. (I.) Spier

464C. Equine Medicine, Level I (3.4)
Lecture—33 sessions; discussion—1 session. Prerequisite: third-year standing in the School of Veterinary Medicine (and completion of courses 464A and 464B if Equine Medicine is fulfilling your core requirement); consent of instructor. Continuation in instruction in the etiology, pathophysiology, epidemiology, clinical presentation, diagnostic evaluation, treatment, prevention and control of important infectious and non-infectious diseases of horses. A problem-based approach to differential diagnosis emphasized.—II. (II.) Pusterla

465. Advanced Equine Medicine, Level II (3.6)
Lecture—36 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; courses 464A, 464B, and 464C. An approach to commonly encountered problems of horses held as individuals and farm settings. Development of problem-solving skills related to the medical management of horses and their problems.—III. (III.) Watson

465L. Advanced Equine Medicine Level II Laboratory (0.8)
Laboratory—8 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; courses 464A, B, C; concurrent enrollment in course 465. Clinical presentation and instruction in treatment of the medical aspects of equine practice. (S/U grading only.)—III. (III.) Watson

466. Equine Critical Care (2)
Lecture—10 sessions; discussion—10 sessions. Prerequisite: course 464A, 464B, 464C, or consent of instructor, third-year standing in the School of Veterinary Medicine. Focus on common equine emergencies and their initial life-support management strategies. Rational approach to diagnosis and management of emergency and critically ill equine patients in clinical practice. Pathophysiology of Systemic Inflammatory Response Syndrome (SIRS), Multiple Organ Dysfunction Syndrome (MODS), and critical illness.—III. (III.) Magdesian

468. Advanced Feline Medicine (2)
Lecture—20 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Fundamental principles, clinical manifestations, diagnostic methods, and therapeutic approaches to medical diseases of cats. Diseases unique to cats and diseases whose clinical presentations and diagnostic evaluations are fundamentally different in cats versus dogs.—III. (III.) Westropp

481. Clinical Rounds (1)
Discussion—10 sessions. Prerequisite: first- or second-year standing in the School of Veterinary Medicine or consent of instructor. Discussion of selected small and large animal cases from the Veterinary Medical Teaching Hospital. May be repeated once for credit. (S/U grading only.)—I, II. (I, II.) W.D. Wilson

486. Equine Clinical Neonatology (1)
Discussion—10 sessions. Prerequisite: first-, second- and third-year standing in the School of Veterinary Medicine. Discussion of methods of equine neonatal intensive care and disease pathophysiology in a case format. (S/U grading only.)—III. (III.) Madigan, Magdesian

487. Comparative Anatomy and Physiology of Non-Domestic Animals (2)
Lecture—20 sessions. Prerequisite: first-, second- or third-year standing in the School of Veterinary Medicine. Comparative anatomy and physiology of non-domestic species, including captive and free-ranging wildlife, exotic pets, laboratory animals, and species in apiculture, aquaculture, and viculture. Basis for understanding husbandry, diseases, and other veterinary concerns of multiple taxa. (S/U grading only.)—II. (II.) Larsen

493. Seminar in Veterinary Medicine (1)
Seminar—2 hours. Prerequisite: professional standing; resident in Veterinary Medical Teaching Hospital. Seminars given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Residents will assist in the presentation of seminar material. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

494. International Programs Seminar (1)
Seminar—10 sessions. Prerequisite: first-, second-, or third-year standing or MPVM standing in the School of Veterinary Medicine. Discussion by veterinarians around the world of aspects of veterinary medicine in their countries and regions, ranging from livestock to wildlife medicine to companion animal practice. May be repeated twice for credit. (S/U grading only.)—II. (II.) Tell

Molecular Biosciences (VMB)

Lower Division Course

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.)

Upper Division Courses

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units 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.)

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

Graduate Courses

247. Natural Toxicants (2)
Lecture—2 hours. Prerequisite: organic chemistry, Biological Sciences 102 and 103, or consent of instructor. Toxicity and metabolism of natural toxicants with emphasis on the toxic plants present in the western United States. General pathways of metabolism plus the relationship between chemical properties and biologic activity of natural toxicants are discussed. Offered in alternate years.—III.

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

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. Buckpitt

266. Mass Spectrometry in Biological Sciences: Basics, Applications and Communication Tools (4)
Lecture—22 sessions; discussion—7 sessions; laboratory—1 sessions. Prerequisite: Math 16C or equivalent, one year college chemistry or equivalent, one year college physics or equivalent; consent of instructor. Deliver working knowledge and communication tools of mass spectrometry focusing on samples with biological origin: instrumentation, ionization technique selection, scanning techniques, signal detection, quantification and structure elucidation. Way of generating and understanding mass spectral information.—III. Lango

290. 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.)—I, II, III, IV. (I, II, III, IV.)

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

Professional Course

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.).

Professional Courses

475. Case Studies in Large Animal Clinical Toxicology (1.5)
Discussion—15 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical systematic approach to poisoning problems in horses, cattle, sheep, goats, lamoids and other livestock emphasizing their diagnosis and treatment.—I. (I.) Puschner

480. Case Studies in Small and Exotic Animal Clinical Toxicology (1.5)
Discussion—15 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine Clinical systematic approach to poisoning problems in small and exotic animals emphasizing diagnosis and treatment.—II. (II.) Jandrey, Poppenga

485. Advanced Clinical Nutrition (2)
Lecture—14 sessions; laboratory—1 session; discussion—4 sessions; project. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Advanced training in the principles and application of small animal clinical nutrition. (S/U grading only.)—I. (I.) Fascetti

Pathology, Microbiology, and Immunology (PMI)

Lower Division Course

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

Upper Division Courses

101. Comparative Hematology (2)
Lecture—2 hours. Prerequisite: Biological Sciences 1A, 1B, Neurobiology, Physiology, and Behavior 101, Biological Sciences 102; or consent of instructor. An overview of the production, function and morphology of vertebrate blood cells, their alteration in health and disease, and the basic principles of laboratory testing in hematology. For students interested in medical technology or animal health. Offered in alternate years.

126. Fundamentals of Immunology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102 or the equivalent or consent of instructor. Overview of immunology including components of the immune system, initiation and regulation of the immune response, infection and immunity, hypersensitivity and immune dysfunction. 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 concurrently). Laboratory procedures in clinical immunology. Laboratory animal immunization/bleeding. Quantitative and qualitative characterization of the immune response. Cells of the immune system.—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 188). An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic 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 oncogenic properties of animal viruses. Two units of credit to students who have completed Microbiology 162.—I. (I.) Miller

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 Courses

250. Philosophy and Ethics of Biomedical Science (1)
Seminar—1 hour. Prerequisite: graduate-level standing. Presentations by faculty and guest speakers followed by discussions of relevant current events by graduate students. (S/U grading only.)—III. (III.) Galland

270. Advanced Immunology (3)
Lecture—3 hours. Prerequisite: introductory course in immunology. Current concepts in lymphocyte biology, ontogeny, cooperation, functional attributes and protective immune response(s), mechanisms of immunologic disease, immunological unresponsiveness and host-evasion mechanisms of viral, bacterial, and parasitic pathogens. Strategies in immunomodulation and immunotherapy. Advanced methodologies in immunologic research. Offered in alternate years.—II. (II.) Stott

275. Comparative Pathology of Organ Systems (4)
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: graduate level standing and consent of instructor. Correlative alterations in structure and function of organ response to injury presented in context of major disease syndromes. Emphasis on general responses to disease in both humans and animals. Introductory material on the mechanisms of viral, bacterial and parasite pathogenesis.—I. (I.) Affolter

280A. The Mouse as an Experimental Model for Human and Animal Diseases I (3)
Lecture—3 hours. Prerequisite: graduate level standing in the biological sciences, first-, second-, or third-year standing in the School of Veterinary Medicine, or professional standing in the School of Medicine. Mice as models in biomedical research. Basic mouse biology, including reproduction and development, embryology, functional anatomy, ecology and genetics.—I. (I.) Wasson

280B. The Mouse as an Experimental Model for Human and Animal Diseases II (3)
Lecture—3 hours. Prerequisite: course 280A. Mice as models in biomedical research. Emphasis on mouse genomics, experimental pathology, immunology, physiology and other uses of experimental mouse models. Current technologies for establishment and evaluation of mouse models.—III. (III.) Wasson

283. Comparative Avian Anatomy and Pathology (1-3)
Lecture—3 hours. Prerequisite: Anatomy section (1 unit): upper division undergraduate standing, veterinary students, or graduate standing, and consent of instructor; Pathology section: third- or fourth-year standing in the School of Veterinary Medicine or graduate standing and consent of instructor. Ten lectures outline gross/microscopic functional anatomy of a wide range of avian species as appropriate for students interested in avian biology. The remaining 20 lectures encompass comparative aspects of avian pathobiology and disease manifestations for students interested in avian diseases.—I. (I.) Lowenstine

285. Cellular Basis of Disease (3)
Lecture—3 hours. Prerequisite: Biological Sciences 104, Veterinary Medicine 452, course 275, or Medical Pathology 210. Application of cell biology, biochemistry and molecular biology to the understanding of the basic nature of disease. Cellular injury and mechanisms of adaptation, host-defense and vascular responses, and cellular transformation. Offered in alternate years.—(II.) Mohr, Wu

287. Comparative Pathology of Laboratory Animals (3)
Lecture—3 hours. Prerequisite: general and systemic pathology; second-, third-, or fourth-year standing in the School of Veterinary Medicine or graduate student standing, or consent of instructor. Recognition of lesions and understanding of pathogenesis of diseases of animals commonly kept in laboratory settings. Species covered include rodents, lagomorphs, amphibians, nonhuman primates, genetically manipulated animals and novel animal models. Offered in alternate years.—(III.) Lowenstine

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, IV. (I, II, III, IV.)

291A. Seminar in Immunology (1)
Seminar—1 hour. Prerequisite: course 126 or the equivalent. Students choose topic for each quarter. Individual or pairs of students choose a paper for all to read and present a seminar based on the subject of the paper. All students participate in discussion. May be repeated for credit. (S/U grading only.)—I, III. (I, III.) Gershwin

292A. Seminar in Animal Virology (1)
Seminar—1 hour. Prerequisite: graduate-level standing or consent of instructor. A discussion of the current topics in animal virology. (Same course as Microbiology 296.) May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Marthas, Miller

292B. Surgical Pathology Conference (1)
Discussion—1 hour. Prerequisite: graduate student standing or consent of instructor. Diagnosis and discussion of current surgical pathology cases based on clinical records and microscopic study. May be repeated for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Munson

293A. Seminar in Infectious Diseases (1)
Seminar—1 hour. Prerequisite: current enrollment in health science professional school or graduate standing in biological sciences. Discussion of current topics and cases of infectious diseases. May be repeated one time for credit if topic differs. (S/U grading only.)—I, II, III. (I, II, III.) Byrne

293B. Necropsy and Surgical Pathology (2-4)
Laboratory—6-12 hours. Prerequisite: graduate student standing and consent of instructor. Responsible diagnostic casework. Performance of necropsies, slide reading, and case reporting. May be repeated for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Munson

296. Microbiological Diagnosis (2-5)
Laboratory—5-14 hours; discussion—1 hour. Prerequisite: laboratory course in veterinary or medical microbiology or equivalent or consent of Chief of Microbiology, VM Teaching Hospital. Laboratory diagnosis of infectious diseases involving case work at the VM Teaching Hospital. (S/U grading only.) I, II, III. (I, II, III.) Byrne

298. Group Study (1-5)
Prerequisite: consent of instructor.
(S/U grading only.)

299. Research (1-12)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

418. Health and Disease in Terrestrial Wildlife (2)
Lecture—20 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine or consent of instructor. Ecology and epidemiology of disease in free-ranging terrestrial wildlife. Offered in alternate years. (S/U grading only.)—II. Ziccardi

419. Field Techniques for Assessment of Wildlife and Ecosystem Health (2)
Fieldwork—7 sessions. Prerequisite: first-, second-, third-year or MPVM standing in the School of Veterinary Medicine or consent of instructor. Introduction to the concepts and technical skills necessary to conduct field studies pertaining to wildlife/ecosystem health. Emphasis will be on Southern California ecosystem. Limited enrollment. (S/U grading only.)—III. (III.) Ziccardi

476. Comparative Pathology of Non-Mammalian Vertebrates (2)
Lecture—20 sessions. Prerequisite: second- or third-year standing in the School of Veterinary Medicine or consent of instructor; Medicine and Epidemiology 410, 487. Mechanisms of disease in non-mammalian vertebrates (fish, amphibians, reptiles, and birds) that differ from mammalian species including tissue response to injury, repair and neoplasia. Gross lesions of common diseases affecting non-mammalian vertebrates.—III. (III.)

Population Health and Reproduction (PHR)

Lower Division Course

92. Internship in Veterinary Science (1-4)
Discussion/laboratory—1-4 hours; clinic—3-36 hours; final report. Prerequisite: approval of project prior to period of internship by faculty sponsor. Supervised work experience in reproduction. (P/NP grading only.)

Upper Division Courses

106. Human-Animal Interactions: Benefits and Issues (2)
Lecture—9 sessions; discussion—9 sessions; laboratory—1 session. Prerequisite: upper division standing or consent of instructor. The contributions of animals to human society, including historic, anthropologic, developmental, human health and therapeutic perspectives, as well as effects of humans on animals. One field trip required.—II. (II.) Hart

111. Food Animals and the Public's Health (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1 or consent of instructor. Causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease.—II. (II.) Moore

192. Internship in Veterinary Science (1-12)
Discussion/laboratory—1-12 hours; clinic—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in Reproduction. May be repeated for credit. (P/NP grading only.)

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

Graduate Courses

202. Sampling in Health-Related Research (3)
Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 403 or the equivalent; consent of instructor. A very thorough coverage of simple random sampling, stratified sampling, cluster sampling, systematic sampling and other sampling methods applied extensively in epidemiology and other health-related disciplines. Emphasis on application of the sampling methods. Offered in alternate years.—II. Farver

203. Multivariate Biostatistics (3)
Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 403 and 404, or the equivalent; consent of instructor. Multivariate procedures covered are principal component analysis, factor analysis, Two-group and k-group multivariate ANOVA, multivariate regression, Two-group and k-group discriminant analysis and repeated measures analysis, cluster analysis, and canonical analysis. Emphasis is on application of procedures. Offered in alternate years.—(II.) Farver

212. Epidemiology of the Zoonoses (4)
Lecture—35 sessions; discussion—5 sessions. Prerequisite: graduate standing or third-year standing in the School of Veterinary Medicine or consent of instructor. Epidemiological, biological and ecological features of some major infections shared by humans and other animals. Wildlife and domestic animals zoonoses of major health and economic significance are presented to illustrate how knowledge of zoonoses epidemiology is essential for implementing control measures.—II. (II.) Chomel

213. Food Safety (1)
Lecture—10 sessions. Prerequisite: graduate standing or consent of instructor. Food-borne disease hazards from producer to consumer; types and causes of food-borne illness; measures for prevention of food-borne disease and enhancement of food safety.

214. Vector-Borne Infectious Diseases: Changing Patterns (2)
Lecture/discussion—2 hours. Prerequisite: Open to graduate students, MPVM and MPH students, DVM and medical students with second- or third-year standing. Open to upper division undergraduate students with consent of instructor. Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. (Same course as Entomology 214.)—I. (I.) Chomel

220. Avian Medicine (3)
Lecture—3 hours. Prerequisite: second-year standing or MPVM standing in the School of Veterinary Medicine or graduate standing or consent of instructor. Instruction on the methods of prevention of the major diseases of domestic poultry.

222. Avian Immunology (3)
Lecture—3 hours. Prerequisite: second-year, third-year, or MPVM standing in the School of Veterinary Medicine; or basic immunology course or consent of instructor. Normal structure of the avian immune system, a quick review of basic immunology, comparison between mammalian and avian immune systems and generation of immune responses, immunodiagnostics and vaccination.

225. Preventive Avian Medical Practice (3)
Lecture—3 hours. Prerequisite: first-, second-, third-year, or MPVM standing in the School of Veterinary Medicine or consent of instructor. Economic structure of broiler, commercial egg and turkey industries, delivery of preventive veterinary medical services within these industries. Specific prevention, eradication programs pertaining to diseases of economic importance are covered. Environmental, OSHA, regulatory and agroterrorism.

232. Advanced Reproductive Biology (3)
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: neurobiology, physiology and behavior 121 and 130; graduate standing or consent of instructor. Examination of or challenge to established and emerging concepts at the molecular, cellular and organismal levels. Reproductive development, the male, the non-pregnant female and the pregnant or senescent female. Offered in alternate years.—(III.) Conley

241. Advanced Topics in Canine Genetics and Genomics (2)
Discussion—2 hours. Prerequisite: Genetics 201A, 201C (or equivalents, with consent of instructor). In-depth study of topics in canine genomics and genetics. Topics will vary annually, but can include positional cloning, whole genome association, complex traits and linkage disequilibrium. Students will lead discussions on assigned readings. May be repeated for credit when topic differs. Limited enrollment.—I. (I.) Bannasch

242. Ecological Genetics: Applied Genetics for Ecology, Health, and Conservation of Natural Populations (3)
Lecture—2 hours; discussion—0.5 hours; laboratory—0.5 hours. Prerequisite: undergraduate genetics and ecology/conservation biology courses recommended. Introduction to the field of applied ecological genetics to include applications in conservation ecology, population genetics, population biology, wildlife health and disease ecology. Limited enrollment. Offered in alternate years. (Same course as Ecology 242.)—(II.) Ernest

250. Foodborne Infections and Intoxications (4)
Lecture—4 hours. Prerequisite: Food Science and Technology 104 or Pathology, Microbiology, and Immunology 127 or second or third-year standing in the School of Veterinary Medicine. Prevalence and characteristics of those diseases of humans which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of people to these agents; prevention of foodborne diseases. Not open for credit to students who have taken course 150.

266. Applied Analytic Epidemiology (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: Preventive Veterinary Medicine 404 or consent of instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Same course as Master of Public Health 266.)—III. (III.) Kass

290A. Seminar (1)
Seminar—1 hour. Discussion of current topics in animal reproduction and medicine, as well as presentation of research findings by graduate students and faculty. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Ball

290B. Current Topics in Avian Medicine (1)
Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for discussion and interpretation. May be repeated for credit.—I, II, III. (I, II, III.)

292. Current Topics in Reproduction (1)
Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current scientific literature in reproduction, as well as presentation of research findings by graduate students and faculty. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor.

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

406. Human-Animal Interactions in Veterinary Science (1)
Lecture—9 sessions; laboratory—1 session. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine. Human relationships with companion animals, and, secondarily, on food, laboratory, and wild animals from the perspectives of veterinarians and their clients' needs. Emphasis on the benefits of companion animals for human mental and physical well-being, the role of animals in the human life cycle, societal traditions in keeping animals, and types of specialized and more typical relationships with animals.—II. (II.) Hart

408. Behavior and Biology of Mice as Domestic Animals (1)
Lecture—10 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine, or graduate standing in psychology, animal science, animal behavior, or consent of instructor. Laboratory mouse biology and welfare, including the development and purposes of specialized strains of mice, constraints for their care and environmental enrichment, legislation and regulation, and the human benefits of their use.—II. (II.) Hart

409. Animal Health Policy (1)
Lecture—8.5 hours; laboratory—7 hours; discussion—3 hours. Prerequisite: consent of instructor; MPVM standing in the School of Veterinary Medicine. Focus on the interactions between science, opinion, legislation, and regulation that result in our current animal health policy to include the process, strategies and tactics for affecting the creation of policy. Limited enrollment. (S/U grading only.)—I. (I.) Klingborg

420. Zoonoses of Non-Human Primates (2)
Lecture—20 sessions. Prerequisite: second- or third-year standing in the School of Veterinary Medicine. Epidemiological, clinical, and biological features of zoonoses of non-human primates. Emphasis given to major zoonoses which are threatening to human health and their treatment and prevention. Focus also on management of non-human primates in research, zoological gardens and in the wild. Offered in alternate years.—(II.) Chomel

429D. Dairy Herd Health Management (4)
Lecture—40 sessions. Prerequisite: Medicine and Epidemiology 427, 463A, 463B, 463C, third-year standing in School of Veterinary Medicine, or consent of instructor. Practical systems for delivering veterinary services to dairy farms with emphasis on disease prevention and improved herd performance.—III. (III.) Cullor

429DL. Dairy Herd Health Management Laboratory (0.6)
Laboratory—6 sessions. Prerequisite: third-year standing in School of Veterinary Medicine; course 429D concurrently or consent of instructor. Practical systems for delivering veterinary services to dairy farms with emphasis on disease prevention and improved herd performance. Field trips and computer laboratories to practice skills in animal observations, facilities observations and use of the computer for nutrition services and dairy records analysis. (S/U grading only.)—III. (III.) Cullor

429E. Dairy Goat Herd Health (1)
Lecture—10 sessions. Prerequisite: Medicine and Epidemiology 427, 463A, 463B, 463C, third-year standing in School of Veterinary Medicine, or consent of instructor. The application of problem-solving and epidemiologic methods to dairy goat diseases and their control.—III. (III.) Rowe

432. Reproductive Technology in Mammals and Birds (0.8)
Lecture—5 sessions; discussion—3 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Introductory course in the application of technology to the reproductive process in mammals and birds. Emphasis on domestic animals, but birds and non-domestic mammals also discussed. Exposure of students to some of the "sexier" aspects of population/ reproduction management. (S/U grading only.)—III. (III.) Chebel

432L. Reproductive Technology in Mammals and Birds, Laboratory (0.2)
Laboratory—2 sessions. Prerequisite: course 432 concurrently, first-year standing in the School of Veterinary Medicine. Laboratory demonstrations and exercises in gamete freezing, thawing, and handling; artificial insemination of cattle; artificial insemination and other applications of reproductive technology in small ruminants. (S/U grading only.)—III. (III.) Chebel

440. Ruminant Clinical Nutrition (1.9)
Lecture—19 sessions. Prerequisite: Veterinary Medicine 408, second- or third-year standing in the School of Veterinary Medicine or consent of instructor. Nutritional related disorders in ruminants with a herd basis approach. Nutritionally related disorders that affect modern cattle production. Emphasis on understanding the problem and preventing it through nutritional management.—II. (III.)

442. Equine Theriogenology (2)
Lecture—20 sessions. Prerequisite: third-year standing in School of Veterinary Medicine; consent of instructor. Discussions of abnormal conditions and physiologic function in equine reproduction with emphasis on methods of diagnosis and interpretation of clinical and laboratory findings associated with the abnormalities.—I. (I.) Ball

442L. Equine Theriogenology Laboratory (1)
Laboratory—10 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Hands-on diagnosis and implementation of techniques related to reproductive examination of horses. Routine and current procedures performed on the farm. Designed to maximize the opportunity for assessment of the normal reproductive anatomy, the diagnosis and interpretations of physiologic conditions and for becoming comfortable in performing the various routine procedures. I. (I.) Ball

445. Food Animal Theriogenology and Reproductive Performance (2)
Lecture—20 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Physiological, pathophysiological, and management factors affecting the reproductive health and performance of food animals, with emphasis on dairy, beef cattle, and sheep. Minor emphasis on swine and goats. Assessment of, and intervention strategies for, herd reproductive performance.—II. (II.)

445L. Food Animal Theriogenology Laboratory (1)
Laboratory—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 445 concurrently or consent of instructor. Obstetrical and gynecological diagnosis and treatment for food animals; breeding soundness examination of males; analysis and on-farm use of computerized reproductive records; embryo technology. (S/U grading only.)—II. (II.)

446A. Food Animal Reproduction (1)
Lecture—6 sessions; laboratory—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on symptomatology, pathophysiology, treatment, control, prevention, and herd health applications.—III. (III.) Rowe

446B. Equine Reproduction (1)
Lecture—6 sessions; laboratory—4 sessions. Prerequisite: consent of instructor; second-year standing in the School of Veterinary Medicine. Introduction to clinical equine reproduction with emphasis on methods of diagnosis and the interpretation of clinical and laboratory findings.—III. (III.) Ball

446C. Non-Domestic Reproduction (1)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Follows course 446A. Information relating to reproduction in non-domestic mammals, birds, and reptile species. Concepts relating to the evaluation of reproductive status, diagnosis of infertility, assisted reproduction and contraception will be presented.—III. (III.) Bon-Durant

450. HACCP & Rick Assessment in Pre and Postharvest Food Safety (3)
Lecture/discussion—3 hours. Prerequisite: first-, second-, third-year or MPVM standing in the School of Veterinary Medicine; Master` of Public Health students, advanced undergraduate and graduate students from Food Science and Animal Science or consent of instructor. Application of the Hazard Analysis-Critical Control Point (HACCP) system in the food industry, for regulatory agencies; and in the preharvest area of food production. Development of HACCP plans. (S/U grading only.)—II. (II.) Cliver, Hajmeer

452. On-Farm Food Safety/Veterinary Public Health (2)
Lecture—20 sessions. Prerequisite: Master's of Preventive Veterinary Medicine (MPVM) students or consent of instructor. The organizations and regulations responsible for ensuring food safety, pathogens that may be on the farm and cause public health concerns, management systems that affect animal health, and key topics regarding environmental health relating to animal agriculture.—III. (III.) Chomel, Cullor

457. Veterinary Practice Management (2)
Lecture—20 sessions. Prerequisite: first-, second-, and third-year standing in the School of Veterinary Medicine or consent of instructor. Information essential to the successful management of a veterinary practice. Topics include basic accounting, medical recordkeeping, money management, business and personal insurance, client relations and tax law. (S/U grading only.)—III. (III.) Klingborg

483. Pet Loss Support Hotline and End of Life Issues (2)
Discussion/laboratory—3-6 hours. Prerequisite: first-, second-, or third-year standing the School of Veterinary Medicine. Training and experience in addressing end-of-life issues for companion animals, including hospice, decision-making and pet loss support. Responding to pet loss hotline callers who are anticipating or experiencing the end of a relationship with a beloved companion animal. Communication skills, especially supportive listening, and referral to community resources. (S/U grading only.)—I, II, III. (I, II, III.) Hart

Preventive Veterinary Medicine (MPM)

Professional Courses

402. Medical Statistics I (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Statistics in clinical, laboratory and population medicine: graphical and tabular presentation of data; probability; binomial; Poisson, normal, t-, F-, and Chi-square distributions; elementary nonparametric methods; simple linear regression and correlation; life tables. Microcomputer applications of statistical procedures in population medicine.—IV. (IV.) Farver

403. Medical Statistics II (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: MPVM standing in the School of Veterinary Medicine and/or successful completion of course 402 (or equivalent) or consent of instructor. Continuation of course 402. Analysis of variance in biomedical sciences; nonparametric methods; multiple regression; biomedical applications of statistical methods. Microcomputer applications to reinforce principles that are taught in lecture.—I. (I.) Farver

404. Medical Statistics III (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: MPVM standing in the School of Veterinary Medicine and/or successful completion of course 403 (or equivalent) or consent of instructor. Continuation of course 403. Analysis of time dependent variation and trends, analysis of multiway frequency tables; logistic regression; survival analysis selecting the best regression equation; biomedical applications.—II. (II.) Farver

405. Principles of Epidemiology (4)
Lecture—4 hours. Prerequisite: course 402 or consent of instructor. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduction to epidemiologic study design and surveillance. (Same course as Epidemiology 205A.)—I. (I.) Miller

405L. Epidemiology Laboratory (1)
Laboratory—10 hours. Prerequisite: course 405 (may be taken concurrently) with grade of C or better, course 412 with grade B- or better. A practical application of epidemiological methods using the microcomputer as a tool to solve problems. Utilizes spreadsheets and databases as tools to organize and analyze data. Emphasis on epidemiological methods introduced in course 405. Data sets provided.—I. (I.) Case

406A. Epidemiologic Study Design (3)
Lecture—1.5 hours; discussion—0.9 hours; laboratory—1.8 hours. Prerequisite: course 405/Epidemiology 205A, Epidemiology 205B. Builds on concepts presented in course 405. Concepts of epidemiologic study design—clinical trials, observational cohort studies, case control studies—introduced in course 405 and covered in more depth, using a problem-based format. Discussion of published epidemiologic studies. (Same course as Epidemiology 206.)—II. (II.) Hird

408A. Veterinary Research: Planning and Reporting (2)
Lecture—20 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Planning, critical analysis, ethics, and written and oral communication of veterinary research.—Foley, Ziccardi

408B. Veterinary Research: Planning and Reporting (1)
Lecture—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Planning, critical analysis, ethics, and written and oral communication of veterinary research.—I. (I.) Foley, Ziccardi

410. Animal Health Policy and Risk Communication (1)
Discussion—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. International, national and state policy issues affecting veterinary medicine, how policy is made, organizational cultures, the role of science in policy-making, ten best practices in risk/crisis communication, message-mapping for the public and policy-makers, and effective meeting management.—I. (I.) Mazet

412. Introduction to Information Management (3)
Lecture—10 sessions; laboratory—20 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Introduction to information management. Emphasis on data quality and design of data applications. Specific topics include library fundamentals and managing human resources for project management, data collection, organization, storage, analysis and communication. Limited enrollment.—IV. (IV.)

426. Applied Epidemiologic Problem Solving (1.0)
Laboratory—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Integration of epidemiologic and statistical methodology in a problem-solving approach to contemporary animal population health issues. Data validation and manipulation; descriptive statistical analysis using spreadsheets, database management, and Epi Info software. Builds on skills learned in courses 405L and 406.—II. (II.) Gardner

Surgical and Radiological Sciences (VSR)

Lower Division Course

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

Upper Division Course

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

Graduate Courses

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

400. Equine Radiographic Anatomy (1)
Autotutorial—1 hour. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine. Self-study of the radiographic anatomy displayed on the standard radiographic projections of the musculoskeletal system of the horse. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Wisner

401. Small Animal Radiology Case Discussions (1)
Discussion—10 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine. The role of diagnostic radiology in the clinical setting and student interpretation of radiographs. May be repeated one time for credit. (S/U grading only.)—I, II, III. (I, II, III.) Spriet

402. Large Animal Radiology Case Discussions (1)
Discussion—10 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine. The role of diagnostic radiology in the clinical setting and student interpretation of radiographs. May be repeated one time for credit. (S/U grading only.)—I, II, III. (I, II, III.) Spriet

404A. Small Animal Radiology (2.9)
Lecture—17 sessions; discussion—12 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine and consent of instructor. Registration in course 404A is required at the begin-

ning of both winter and spring quarters for this two quarter course. Students may audit the course, but retroactive adds after the examination has been administered at the end of each quarter are not allowed. Course 404A is required for students who intend to rotate through the Small Animal Radiology Service during their senior year. Introduction to radiographic interpretation as it relates to muscoskeletal, thoracic, and abdominal disorders of small animals. Assignment of unknown cases as practice in interpreting radiographic patterns described in lecture. (Deferred grading only, pending completion of sequence.)—II, III. (II, III.) Zwingenberger

404B. Large Animal Radiology (1.6)
Lecture—12 sessions; discussion—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Radiographic manifestations of common equine orthopedic, upper airway and thoracic diseases. Common radiographic abnormalities in non-equine large animal patients. Equine and other large animal radiographic pattern recognition and differential diagnosis generation based on the identified pattern.—II. (II.) Puchalski

405. Advanced Small Animal Abdominal Ultrasound (2.1)
Lecture—12 sessions; discussion—6 sessions; laboratory—3 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; consent of instructor.The use of ultrasound for the diagnosis of common clinical diseases in both the abdomen and thorax. Examination techniques of the thorax and the abdomen covered in the laboratory sessions and examples of the abnormal presented in discussion.—II. (II.) Pollard

406. Small Animal Diagnostic Ultrasound (1)
Lecture—7 sessions; discussion—1 session; laboratory—2 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Ultrasound imaging principles.—I. (I.) Pollard

407R. Comparative Dentistry and Oral Surgery (2)
Discussion—2 hours. Prerequisite: residents in the Veterinary Medical Teaching Hospital; graduate students, veterinarians enrolled in training programs leading to board-certification in veterinary dentistry, AVDC Diplomates and dentists with consent of instructor. Review of current literature pertaining to comparative oral biology, surgery and medicine and related basic sciences; half of sessions based on topics assigned by course leader while other half consist of critical reviews of recent papers chosen by the participants. May be repeated once for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Verstraete

409R. Known Case Conference—Imaging (1.5)
Discussion—15 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital; consent of instructor. Film review of current and past Veterinary Medical Teaching Hospital proven cases. Intended for radiology residents and others with background in diagnostic imaging. May be repeated three times for credit. (S/U grading only.)—I, II. III. (I, II, III.) Wisner

411R. Small Animal Orthopedics Conference (0.9)
Discussion—9 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital; consent of instructor. Current cases and literature pertaining to small animal orthopedics. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Kapatkin

413. Small Animal Dentistry (2.4)
Lecture—19 sessions; discussion—5 sessions. Prerequisite: consent of instructor; third-year standing in School of Veterinary Medicine. Introduction to the principles of oral examination, pathophysiology and treatment of periodontitis, exodontics, basic oral soft tissue surgery dental emergencies, orthodontics, developmental and regressive dental conditions, endodontics, prosthodontics, advanced periodontal therapy, oral medicine and advanced oral surgery. (Deferred grading only, pending completion of sequence. S/U grading only.)—II, III. (II, III.) Verstraete

413L. Small Animal Dentistry Lab (0.3)
Lab—3 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; concurrent enrollment in course 413; consent of instructor. Principles of oral examination, oral radiography, routine periodontal treatment and dental extraction techniques. (Deferred grading only, pending completion of sequence. S/U grading only.)—II, III. (II, III.) Verstraete

415. Small Animal Orthopedics (1.5)
Lecture—13 sessions; laboratory—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Common conditions of small animal lameness and basic principles of small animal traumatology.—III. (III.) Kapatkin

416. Equine Ultrasonology (1)
Lecture—8 sessions; discussion—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and consent of instructor. Familiarize students with ultrasonographic diagnostic methodology and with ultrasonologic features of common diseases of the major equine organ systems.—III. (III.) Whitcomb

416L. Equine Ultrasonology Lab (0.4)
Laboratory—4 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, concurrent enrollment in course 416. Familiarize students with ultrasonographic diagnostic methodology and with ultrasonologic features of common diseases of the major equine organ systems.—III. (III.) Whitcomb

418R. Topics in Surgery/Oncology (0.4)
Discussion—4 sessions. Prerequisite: resident status at the Veterinary Medical Teaching Hospital; consent of instructor. Discussion of topics relevant to surgery and oncology with special focus on new treatments, recommendations, and modalities. May be repeated up to 16 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Kent, MacLeod

423. Diagnostic Ophthalmology (1.5)
Lecture—15 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor; successful completion of Veterinary Medicine 422. The pathogenesis and diagnosis of commonly encountered eye diseases of common domestic animals.—II. (II.) Maggs

424. Clinical Veterinary Oncology (1)
Lecture—10 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine; consent of instructor. The internal medicine subspecialty of oncology. Clinical considerations and basic tenets of tumor biology. (S/U grading only.)—I. (I.) Théon

425R. Veterinary Cancer Biology: Clinical Applications (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital; consent of instructor. Survey of contemporary literature regarding the clinical management of important tumors in domestic animals and focus on diagnosis and treatment. (S/U grading only.)—I. (I.) Kent

426R. Veterinary Cancer Biology: Mechanisms of Disease (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital; consent of instructor. Survey of contemporary literature regarding the biology of cancer with particular reference to mechanisms underlying tumorigenesis in domestic animals. (S/U grading only.)—III. (III.) Kent

431R. Graduate Veterinary Neurology/ Neurosurgery (2)
Seminar—4 hours. Prerequisite: resident status in the Veterinary Medical Teaching Hospital or consent of instructor. Lectures/discussions/literature reviews of diagnosis and medical/surgical treatment of neurological diseases of animals to include relevant neurologic and neurosurgical topics from human medicine. May be repeated for credit up to 12 times for 24 units of credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Sturges, Vernau

432R. Advanced Veterinary Neurosurgery Seminar (1.5)
Lecture/laboratory—15 sessions. Prerequisite: resident status in Small Animal Surgery or Neurology/ Neurosurgery in the Veterinary Medical Teaching Hospital or consent of instructor. Overview of the diagnosis and treatment of neurological disease in small animals with an emphasis on neurosurgery. Laboratory sessions allow residents to develop familiarity with anatomical landmarks and the neurosurgical skills. May be repeated six times for credit. (S/U grading only.)—II, III. (II, III.) Sturges

433R. Clinical Neuromuscular/ Neuropathology Conference (1)
Seminar—1 hour. Prerequisite: resident status at the Veterinary Medical Teaching Hospital or consent of instructor. Case discussions and review of neuropathology and neuromuscular disease. May be repeated twelve times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) LeCouteur, Vernau

441R. Small Animal Emergency/Critical Care Journal Discussion (1)
Discussion—1 hour. Prerequisite: resident status at the Veterinary Medical Teaching Hospital. Review of current medical and veterinary emergency and critical care literature. Focus on scientific methodology, content and relevance to clinical practice. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Jandrey

442R. Small Animal Emergency/Critical Care Physiology Rounds (3)
Seminar—3 hours. Prerequisite: resident status at the Veterinary Medical Teaching Hospital; consent of instructor. Review of physiology and topics pertinent to small animal emergency and critical care. May be repeated twelve times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Burkitt

450R. Veterinary Ophthalmology Slide Review (1)
Discussion—1 hour. Prerequisite: resident in Veterinary Medical Teaching Hospital Ophthalmology program or consent of instructor. Review and critical evaluation of 35 mm projection slides involving clinical and microscopic depictions of normal and abnormal conditions seen in the field of veterinary ophthalmology. Discussion of current treatment modalities, diagnostic capabilities and other related and relevant issues. (S/U grading only.)—I, II, III. (I, II, III.) Maggs, Hollingsworth

451R. Veterinary Ophthalmology Literature Review (1)
Discussion—1 hour. Prerequisite: resident in Veterinary Medical Teaching Hospital Ophthalmology program or consent of instructor. Survey and critical evaluation of contemporary literature in or related to the field of veterinary ophthalmology. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Maggs, Hollingsworth

459R. Renal Transplantation (0.5)
Lecture/discussion—5 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital and consent of instructor required. Topics related to renal transplant cases. May be repeated up to 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Mehl

460. Emergency and Critical Patient Care (2)
Lecture—20 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to the essential and practical concepts of care for emergency and critically ill patients.—III. (III.). Hopper, Mellema

462. Radiographic Diagnosis: Small Animal (1)
Lecture—1 session; discussion—9 sessions. Prerequisite: course 404A, third-year standing in the School of Veterinary Medicine. Small animal radiographic case studies. Presentation and discussion of assigned cases before knowing the actual diagnosis. (S/U grading only.)—III. (III.) Wisner

463. Soft Tissue Surgery (1.8)
Lecture—18 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Pathophysiology and surgical treatment of selected soft tissue diseases.—III. (III.) MacLeod

464R. Principles of Veterinary Radiation Oncology (2)
Lecture—2 hours. Prerequisite: house officers in the Veterinary Medical Teaching Hospital. Graduate students or veterinary students with consent of instructor. Principles and practice of veterinary radiation therapy. Topics include physical methods of radiation therapy, biological effects of therapeutic radiation and applications in veterinary patients. (S/U grading only.) Offered in alternate years.—I. Théon

465R. Biology and Practice of Veterinary Radiation Oncology (2)
Lecture—2 hours. Prerequisite: house officers in the Veterinary Medical Teaching Hospital. Graduate students or veterinary students with consent of instructor. Principles and practice of veterinary radiation therapy. Topics include physical methods of radiation therapy, biologic effects of therapeutic radiation and applications in veterinary patients. (S/U grading only.) Offered in alternate years.—II. Theon

466. Large Animal Applied Anesthesiology (1.5)
Lecture—15 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Applied clinical anesthesiology. Special techniques and consideration for anesthetizing a variety of species including horses, swine, ruminants, camelids, and large non-domestic species.—II. (II.) Brosnan

467. Small Animal Anesthesiology (2)
Lecture—20 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. The safe clinical administration of anesthetic drugs to small animals. Clinical applications, indications and contraindications, methods of use of common anesthetic drugs and techniques will be discussed.—II. (II.) Ilkiw

468. Equine Lameness and Radiology (4)
Lecture—40 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Principles for the clinical evaluation and radiographic interpretation of lameness disorders of the fore- and hindlimbs of horses. Methods used in large animal radiography and the latest techniques for managing and treating equine lameness. Anatomy and pathology of some areas of the musculoskeletal system.—III. (III.) MacDonald

468L. Equine Lameness and Radiology Laboratory (1.1)
Laboratory—11 sessions. Prerequisite: course 468 concurrently, third-year standing in School of Veterinary Medicine. Focus on clinical gait evaluation, and various diagnostic strategies for localizing lameness disorders in the fore- and hindlimbs of horses. Radiographs from clinical cases. Clinical evaluation and treatment of various disorders of the foot. Equine chiropractic and acupuncture therapy.—III. (III.) Galuppo

469. Equine Surgery (3)
Lecture—30 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Appropriate methods of diagnosis for surgical diseases, provide an understanding of different treatment options, and develop a framework for establishing a prognosis for the disease considering particular uses of horses.—II. (II.) Nieto

469L. Equine Surgery Laboratory (1.4)
Laboratory—8 sessions; discussion—6 sessions. Prerequisite: course 469 concurrently, third-year standing in School of Veterinary Medicine. Common equine surgical procedures and other techniques useful in equine practice. (S/U grading only.)—II. (II.) Snyder

470R. Equine Surgery Journal Discussion (1)
Discussion—1 hour. Prerequisite: course 471R concurrently, resident in Veterinary Medical Teaching Hospital or consent of instructor. Current veterinary literature and other related topics in preparation for board certification in the American College of Veterinary Surgeons. Critical evaluation of journal articles for content, methodology and statistical methods. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Galuppo

471R. Equine Surgery Case Management Conference (1)
Discussion—1.5 hours. Prerequisite: course 470R concurrently, resident in Veterinary Medical Teaching Hospital or consent of instructor. Discussion of soft tissue, orthopedic and lameness clinical disorders that focus on pathophysiology of disease, appropriate treatment options, and evaluation of prognosis. Simulation of mock oral examination for the American College of Veterinary Surgeons board examination. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Galuppo

481R. Clinical Soft Tissue Surgery Conference (1)
Discussion—1 hour. Prerequisite: open to students with D.V.M. or equivalent degree who are residents in specialty training. Graduate students in a related discipline with consent of instructor. Review current medical literature and discuss presentation, diagnosis and treatment of small animal surgical conditions, review the morbidity and mortality of clinical cases and provide mock examinations in preparation for ACVS specialty boards. May be repeated for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

491R. Anesthesia/Critical Care Basic Science Management Conference (1.2)
Discussion—12 sessions. Prerequisite: residents in the Veterinary Medical Teaching Hospital or students with consent of instructor. Physiology, pharmacology and clinical practice as it relates to anesthetic management of veterinary patients. May be repeated three times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Pypendop

493R. Anesthesia/Critical Care Case Management Conference (1.2)
Discussion—12 sessions. Prerequisite: residents in the Veterinary Medical Teaching Hospital or students with consent of instructor. Discussion of VMTH case material to illustrate specific medical problems and their preventive and corrective management as it pertains to anesthesia and critical care. May be repeated three times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Pypendop

494R. Anesthesia/Critical Patient Care Journal Discussion (1)
Discussion—1 hour. Prerequisite: resident status at the Veterinary Medical Teaching Hospital. Review of current medical and veterinary anesthesia literature. Discussion will focus on scientific methodology, content and relevance to clinical practice. May be repeated 16 times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Pypendop

Viticulture and Enology

(College of Agricultural and Environmental Sciences)

Andrew L. Waterhouse, Ph.D., Interim Chairperson of the Department

Department Office. 1162 RMI North Building (530) 752-0380; *http://wineserver.ucdavis.edu*

Faculty

Douglas O. Adams, Ph.D., Professor
Linda F. Bisson, Ph.D., Professor
David E. Block, Ph.D., Professor
(Viticulture and Enology, Chemical Engineering)
Roger B. Boulton, Ph.D., Professor
(Viticulture and Enology, Chemical Engineering)
Susan E. Ebeler, Ph.D., Professor
Hildegarde Heymann, Ph.D., Professor
Mark A. Matthews, Ph.D., Professor
David A. Mills, Ph.D., Professor
David R. Smart, Ph.D., Associate Professor
M. Andrew Walker, Ph.D., Professor
Andrew L. Waterhouse, Ph.D., Professor
Larry E. Williams, Ph.D., Professor

Emeriti Faculty

L. Peter Christensen, Cooperative Extension Specialist, Emeritus
W. Mark Kliewer, Ph.D., Professor Emeritus
Ralph E. Kunkee, Ph.D., Professor Emeritus
Lloyd A. Lider, Ph.D., Professor Emeritus
Carole P. Meredith, Ph.D., Professor Emerita
Ann C. Noble, Ph.D., Professor Emerita
Cornelius S. Ough, D.Sc., Professor Emeritus
Vernon L. Singleton, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award

Affiliated Faculty

Matthew W. Fidelibus, Ph.D., Associate Specialist in Cooperative Extension
James T. Lapsley, Ph.D., Associate Adjunct Professor
Andrew J. McElrone, Ph.D., Assistant Adjunct Professor
Kerri L. Steenwerth, Ph.D., Assistant Adjunct Professor
James A. Wolpert, Ph.D., Specialist in Cooperative Extension

The Major Program

The Viticulture and Enology major provides an interdisciplinary education in the biological and physical principles underlying grape and wine production as well as practical knowledge of grape growing (viticulture) and wine making (enology). This program provides the knowledge base for problem-solving and decision-making in commercial grape and wine production.

Preparatory Requirements. Before transferring into the Viticulture and Enology major, students must complete the following courses with a grade of *C-* or better and with a combined grade point average of at least 2.500 at the University of California (at least 3.000 for similar courses taken at community college) for these and all other preparatory courses. In addition, students' overall GPA must be 2.250 or higher. All courses must be taken for a letter grade.

Biological Sciences 1A or 2A.....4-5 units
Chemistry 2A, 2B, 2C, 8A ..... 17 units
Mathematics 16A ..... 3 units
Physics 1A, 1B or 7A.....4-6 units

Recommendations. Completion of UC Davis equivalents of the following preparatory courses for the major are not required for entry but are highly recommended. Failure to complete these will delay entry into required upper division courses and may thus delay graduation. Some courses may be available at UC Davis during Summer Session.

Chemistry 8B ..... 4 units
Mathematics 16B..... 3 units
Biological Sciences 1C or Plant Sciences 2 .....4-5 units
Biological Sciences 102 ..... 3 units

The Program. The curriculum builds upon a foundation of biology, chemistry, biochemistry and mathematics with specialized courses related to grape and wine production. To complete the program, students may choose to place particular emphasis on viticulture, enology or economics. Credit may also be earned for foreign language study and internships.

Career Alternatives. Graduates are qualified for a variety of vineyard and winery positions, including production management, quality control and research. Additionally they may work in related fields such as pest management, nursery production and analytical services.

B.S. Major Requirements:

UNITS

English Composition Requirement 0-8
See College requirement.....0-8
Breadth/General Education.....24
See General Education requirement.