

COMPARATIVE BIOSCIENCES (COMP BIO)

COMP BIO 500 – FUNDAMENTAL PRINCIPLES OF VETERINARY ANATOMY

5 credits.

A detailed consideration of gross anatomical structure with emphasis on major anatomical patterns present in species important to veterinary medicine. The dog is used as a model domestic mammal and comparisons with other species are considered. All body systems are dissected. Clinical implications of these dissections are emphasized.

Requisites: Declared in Doctor of Veterinary Medicine with first year standing

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Fall 2024

Learning Outcomes: 1. Use correct anatomical terminology to identify gross anatomical structures of the dog and cat

Audience: Undergraduate

2. Recognize anatomical principles and patterns that can be applied to future study of other veterinary species

Audience: Undergraduate

3. Describe topographical relationships between anatomical structures

Audience: Undergraduate

4. Explain the relationship between structure and function

Audience: Undergraduate

5. Apply the scientific method and critical thinking to the study of anatomy

Audience: Undergraduate

COMP BIO 501 – VETERINARY HISTOLOGY

5 credits.

Light and digital microscopy are used to study the anatomy of organs and tissues at the cellular level. Microanatomic features of all major organ systems are identified, and pertinent physiologic concepts are discussed to correlate structure with function. Mammalian systems are emphasized, and comparisons to non-mammalian species are considered. Direct applications to clinical medicine are included.

Requisites: Declared in Doctor of Veterinary Medicine with first year standing

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Describe the characteristic cellular structure of the basic tissue types and major organs

Audience: Undergraduate

2. Identify tissues and organs by their histologic features

Audience: Undergraduate

3. Extrapolate the 3D microarchitecture of an organ from 2D histologic specimens

Audience: Undergraduate

4. Discuss how tissue composition and cellular organization of an organ facilitates its function

Audience: Undergraduate

5. Make basic predictions of how disruption of normal cellular architecture results in disease

Audience: Undergraduate

COMP BIO 502 – MOLECULAR AND METABOLIC BASIS OF MEDICINE

3 credits.

Covers metabolism with a more advanced incorporation of concepts of chemistry, cell biology and physiology. Clinical correlations in veterinary medicine are also covered.

Requisites: Declared in Doctor of Veterinary Medicine with first year standing

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Explain how and why metabolism is altered in response to perturbations such as nutrient deprivation, stress, hormonal imbalance, or effectively any other pathological condition that a veterinarian might encounter.

Audience: Undergraduate

2. Apply molecular biology and genetics to elucidate the molecular basis of disease.

Audience: Undergraduate

3. Demonstrate understanding of current and potential uses of biotechnology in diagnosis and treatment of disease.

Audience: Undergraduate

4. Illustrate molecular/biochemical mechanisms of commonly used drugs.

Audience: Undergraduate

5. Apply scientific principles underlying veterinary medicine and recognize the importance of research in advancing the profession.

Audience: Undergraduate

6. Utilize effective communication, demonstrate sound problem-solving and critical-thinking skills, and apply evidence-based decision-making.

Audience: Undergraduate

COMP BIO 503 – VETERINARY DEVELOPMENTAL ANATOMY

2 credits.

Principles of development and organogenesis in domestic animals. Normal developmental patterns are related to adult anatomy. Clinical implications of common congenital defects are discussed.

Requisites: Declared in Doctor of Veterinary Medicine with first year standing

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Illustrate how morphogenetic processes in development can explain common developmental defects and adult anatomic structures.

Audience: Undergraduate

2. Organize adult cell types and anatomical structures to their embryonic cellular origins.

Audience: Undergraduate

3. Predict effects of perturbing key molecular and cellular pathways on embryogenesis.

Audience: Undergraduate

4. Given a clinical presentation of a developmental defect, propose a plausible molecular or cellular mechanism.

Audience: Undergraduate

5. Explain the basis of presented molecular biology techniques and apply them appropriately to research and clinical scenarios

Audience: Undergraduate

6. Apply the SVM problem solving paradigm to clinical scenarios and basic science questions presented in class.

Audience: Undergraduate

7. Identify and critically evaluate primary veterinary literature to enhance your understanding of developmental anatomy concepts and their clinical implications.

Audience: Undergraduate

COMP BIO 505 – VETERINARY NEUROANATOMY AND NEUROPHYSIOLOGY

3 credits.

A comparative approach to the morphological and physiological properties of the central nervous system of animals, particularly those of veterinary importance.

Requisites: Declared in Doctor of Veterinary Medicine with first year standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2025

Learning Outcomes: 1. Describe three dimensional relationships of the central nervous system in relevant veterinary species.

Audience: Graduate

2. Identify the structure and function of the major divisions of the central nervous system as a basis for lesion localization.

Audience: Graduate

3. Explain key aspects of a neurologic exam and analyze and interpret the results from a neurologic evaluation.

Audience: Graduate

4. Localize lesions in the nervous system using results from neurologic assessment.

Audience: Graduate

5. Recognize the value of current neuroscience research and its potential applications to clinical veterinary neurology.

Audience: Graduate

COMP BIO 506 – VETERINARY PHYSIOLOGY B

4 credits.

Covers comparative veterinary physiology covering digestive, endocrine, and reproductive systems.

Requisites: Declared in Doctor of Veterinary Medicine with first year standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Summarize the processes involved in the absorption of dietary nutrients and water, and examine the role these mechanisms play in support of important bodily functions.

Audience: Graduate

2. Apply the principles of gastrointestinal physiology to identify causes and propose treatments for gastrointestinal tract disorders in animals.

Audience: Graduate

3. Describe the functions of mammalian endocrine systems and the dynamic methods of hormone regulation.

Audience: Graduate

4. Define the major endocrine glands, their hormones, and the functions of those hormones that contribute to homeostasis throughout the body.

Audience: Graduate

5. Discuss how disruptions in balance of the major hormones manifest as clinical disease, and apply this understanding to predict outcomes of basic diagnostic testing and therapeutic approaches to correct disease states.

Audience: Graduate

6. Summarize the events that occur in male and female animals which leads to the generation of healthy gametes.

Audience: Graduate

7. Describe the processes involved in the orchestration and regulation of fertilization, pregnancy, parturition, lactation and the provision of neonatal health of mammals.

Audience: Graduate

8. Predict the effects that interventions and therapeutic approaches will have on animal reproduction.

Audience: Graduate

COMP BIO 550 – ANATOMY OF THE LARGE DOMESTIC ANIMALS

2 credits.

A study of the horse and the ox with special emphasis on the anatomical specializations of these species with extensive comparisons to the anatomy of the small domestic animals. Other large domestic animals, including swine, will be considered as appropriate to demonstrate anatomical variation.

Requisites: Declared in Doctor of Veterinary Medicine with first year standing

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Identify and describe functionally important and clinically relevant anatomical specializations in the horse and ox (and the pig, as applicable).

Audience: Undergraduate

2. Identify and describe topographical relationships, including external landmarks, in the ox and horse, and use external landmarks to locate anatomical structures when performing a physical exam.

Audience: Undergraduate

3. Use anatomic and associated common terminology interchangeably as it relates to large animals.

Audience: Undergraduate

4. Compare the anatomy of small and large animals and draw conclusions regarding fundamental anatomical principles which can be applied to many other species encountered in the curriculum and beyond.

Audience: Undergraduate

5. Engage in peer teaching to facilitate learning for all while developing the intellectual curiosity that fosters independent learning required as future professionals.

Audience: Undergraduate

COMP BIO 551 – VETERINARY PHYSIOLOGY A

4 credits.

Covers comparative veterinary physiology covering electrophysiology, and muscle, cardiovascular, respiratory, renal and acid-base physiology.

Requisites: Declared in Doctor of Veterinary Medicine with first year standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Use basic physiological principles to explain how neurological, cardiorespiratory, and renal systems function to maintain homeostasis in healthy animals

Audience: Graduate

2. Describe how neuroendocrine systems regulate organ function and integrate appropriate responses to physiological and environmental challenges

Audience: Graduate

3. Predict changes in physiological variables during pathological conditions and diseases

Audience: Graduate

4. Use fundamental equations to solve quantitative physiological problems and interpret the results appropriately.

Audience: Graduate

COMP BIO 555 – VETERINARY TOXICOLOGY

2 credits.

Science of toxicology as it relates to veterinary practice. The principles of toxicology and the mechanism and treatment of toxicants commonly encountered in small and large animals will be presented.

Requisites: Declared in Doctor of Veterinary Medicine with second year standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Identify major classes of toxicants affecting small and large animals, birds, and other species

Audience: Graduate

2. Identify common toxicant exposure conditions

Audience: Graduate

3. Recall major biochemical, physiological, and dietary factors that cause variations in cell and tissue sensitivity and that may explain species-, sex-, and age-related differences in toxicity

Audience: Graduate

4. Integrate basic toxicological mechanisms and cellular adaptation responses with likely clinical signs and tissue lesions

Audience: Graduate

5. Select appropriate steps in emergency treatment, select appropriate tests to confirm diagnosis, and recall appropriate antidotal therapy to be used.

Audience: Graduate

COMP BIO 556 – VETERINARY PHARMACOLOGY

4 credits.

Basic pharmacology of various drug classes used in veterinary medicine together with examples of clinical drug use. Important species variations in drug use and drug response will be stressed.

Requisites: Declared in Doctor of Veterinary Medicine with second year standing

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Apply the principles of pharmacology (absorption, distribution, metabolism and excretion) to serve as the basis for selecting classes of drugs for clinical use.

Audience: Undergraduate

2. Predict the therapeutic and toxic effects of drugs based on their mechanisms of action, pharmaceutical properties and patient characteristics (species, age, food animal, etc.).

Audience: Undergraduate

3. Calculate correct drug dosages from a variety of different starting materials, define metric system prefixes, and describe various solution types that constitute drug formulations.

Audience: Undergraduate

4. Identify pre-existing patient conditions that impact drug efficacy, metabolism and excretion.

Audience: Undergraduate

5. Outline major therapeutic drug classes used to modulate the function of multiple organ systems (including cardiac, vascular, pulmonary, renal, urinary, endocrine, GI, CNS, and eye) as well as major drug classes used to treat inflammation, and reduce bacterial and parasite infections.

Audience: Undergraduate

6. Define cellular pathways and molecules that serve as drug targets for clinical therapy.

Audience: Undergraduate

COMP BIO 675 – SPECIAL TOPICS

1-5 credits.

Requisites: Declared in Doctor of Veterinary Medicine

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Fall 2022

Learning Outcomes: 1. Develop competence and professional skills in veterinary medicine

Audience: Undergraduate

2. Explore current topics and trends in veterinary medicine

Audience: Undergraduate

3. Developing breadths of experiences related to veterinary medicine

Audience: Undergraduate

COMP BIO 699 – DIRECTED STUDY

1-5 credits.

Projects in the laboratory and/or through library work in specific subject area under the direct guidance of faculty member.

Requisites: Consent of instructor

Course Designation: Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Summer 2025

Learning Outcomes: 1. Apply foundational veterinary knowledge and critical thinking to identify problems in veterinary medicine

Audience: Undergraduate

2. Develop professional veterinary medicine skills of interest by performing select techniques and procedures

Audience: Undergraduate

3. Communicate in written and/or verbal reports to veterinary colleagues and supervisors

Audience: Undergraduate

COMP BIO 775 – EXTERNSHIP

1-24 credits.

Offers opportunities for faculty coordinated experience in the veterinary medical profession outside School of Veterinary Medicine.

Requisites: Declared in Doctor of Veterinary Medicine with fourth year standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2023

Learning Outcomes: 1. Understand real-world applications of foundational veterinary medical knowledge and skills

Audience: Graduate

2. Apply foundational veterinary knowledge and critical thinking to solve real-world problems

Audience: Graduate

3. Perform select techniques and procedures to develop various skills professional in veterinary medicine

Audience: Graduate

COMP BIO/PATH-BIO 812 – RESEARCH ETHICS AND CAREER DEVELOPMENT

2 credits.

Provides instruction in principles and concepts of research ethics through presentations and discussion of case studies. Topics pertinent to development of a successful career in research are also included.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Analyze the complexities of ethical issues in research and the factors that can influence perceptions of ethical behavior.

Audience: Graduate

2. Develop a framework for making ethical decisions in research.

Audience: Graduate

3. Identify areas to apply best practices in responsible conduct of research to guide decision-making.

Audience: Graduate

4. Explain where to seek guidance for improving scientific communication skills.

Audience: Graduate

5. Develop the ability to effectively convey research results and findings.

Audience: Graduate

6. Recognize the importance of ethical conduct in research.

Audience: Graduate

7. Discuss the potential consequences of unethical behavior in research.

Audience: Graduate

8. Develop a sense of personal responsibility for maintaining ethical standards in research.

Audience: Graduate

9. Recognize the importance of safe research environments.

Audience: Graduate

COMP BIO 990 – RESEARCH

1-12 credits.

Research.

Requisites: Consent of instructor

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Summer 2025

Learning Outcomes: 1. Exhibit a broad understanding of general comparative bioscience principles

Audience: Graduate

2. Conduct independent research using a variety of approaches

Audience: Graduate

3. Think critically to address research challenges

Audience: Graduate

4. Exhibit and foster professional and ethical conduct in their research

Audience: Graduate

5. Collaborate with other investigators within or outside the thesis lab

Audience: Graduate