The Department of Veterinary Physiology and Pharmacology is the only department of its kind in the state of Texas with a rich tradition of excellence in education, research and outreach to impact both veterinary and human medicine. The department has expertise in toxicology, reproductive science, cardiovascular science, tissue regeneration and bone biology.

The primary research focus areas within the department are extramurally funded, internationally renowned and significantly contribute to improving human and veterinary health. Extensive research collaborations with the Colleges of Agriculture and Life Sciences, Science, Engineering and Education and Human Development, as well as with the Texas A&M University Health Science Center, School of Public Health, Texas A&M AgriLife Research and the Texas A&M Engineering Experiment Station provide exceptional resources that enhance all departmental research efforts.

Our faculty, many of whom are leaders in their fields and key contributors to the scientific and educational literature, are also strong mentors that form the basis for a strong graduate research and education experience. Most importantly, they are accessible, focused and student-friendly with a deep understanding of the art and science of education and research.

**Faculty**

Bailey, Everett M, Professor  
Vet Physiology & Pharmacology  
PHD, Iowa State University, 1968  
DVM, Texas A&M University, 1964

Blue-McLendon, Alice, Clinical Associate Professor  
Vet Physiology & Pharmacology  
DVM, Texas A&M University, 1989

Brunauer, Regina, Research Assistant Professor  
Vet Physiology & Pharmacology  
PHD, Medical University Innsbruck, Austria, 2011

Clement, Tracy M, Assistant Professor  
Vet Physiology & Pharmacology  
PHD, Washington State University, 2009

Davis, Amanda R, Lecturer  
Vet Physiology & Pharmacology  
PHD, Texas A&M University, 2017

Dawson, Lindsay A, Research Assistant Professor  
Vet Physiology & Pharmacology  
PHD, Tulane University, 2014

Dongaonkar, Ranjeet M, Assistant Professor  
Vet Physiology & Pharmacology  
PHD, Texas A&M University, 2008

Fajt, Virginia R, Clinical Associate Professor  
Vet Physiology & Pharmacology  
PHD, Iowa State University, 2000  
DVM, Auburn University, 1995

Golding, Michael C, Associate Professor  
Vet Physiology & Pharmacology  
PHD, Texas A&M University, 2003

Han, Guichun, Clinical Assistant Professor  
Vet Physiology & Pharmacology  
PHD, Dalian Medical University, China, 2002

Heaps, Cristine L,  
Vet Physiology & Pharmacology  
PHD, University of Missouri - Columbia, 1999

Herman, James D, Clinical Professor  
Vet Physiology & Pharmacology  
PHD, Texas A&M University, 1995  
DVM, Texas A&M University, 1989

Hinrichs, Katrin, Professor  
Vet Physiology & Pharmacology  
PHD, University of Pennsylvania, 1988  
DVM, University of California, Davis, 1978

Ivanov, Ivan V, Clinical Associate Professor  
Vet Physiology & Pharmacology  
PHD, University of South Florida, 1999

Kraemer, Duane C, Senior Professor  
Vet Physiology & Pharmacology  
DVM, Agricultural & Mechanical College, 1966  
PHD, Agricultural & Mechanical College, 1966

Laine, Glen A, Professor  
Vet Physiology & Pharmacology  
PHD, Texas A&M University, 1980

Long, Charles R, Professor  
Vet Physiology & Pharmacology  
PHD, University of Massachusetts - Amherst, 1996

Muneoka, Ken, Professor  
Vet Physiology & Pharmacology  
PHD, University of California - Irvine, 1983

Newell-Fugate, Anne E, Assistant Professor  
Vet Physiology & Pharmacology  
PHD, University of Illinois-Urbana Champaign, 2012  
DVM, North Carolina State University, 2004

Patterson, Carly A, Clinical Assistant Professor  
Vet Physiology & Pharmacology  
DVM, University of Illinois, 2011

Quick, Christopher M, Professor  
Vet Physiology & Pharmacology  
PHD, Rutgers University, 1999

Ramadoss, Jayanth, Assistant Professor  
Vet Physiology & Pharmacology  
PHD, Texas A&M University, 2008
Courses

VTPP 605 Systemic Veterinary Physiology I
Credits 5. 5 Lecture Hours.
Aspects of cellular physiology, physiology of excitable membranes, physiology of body fluids, neurophysiology, and the physiology of smooth, cardiac and skeletal muscle; provides a basic understanding of mammalian physiology essential as a framework for advanced graduate studies.
Prerequisite: Graduate classification.

VTPP 606 Systemic Veterinary Physiology II
Credits 5. 5 Lecture Hours.
In-depth study covering cardiovascular, respiratory, renal physiology, gastrointestinal and endocrine physiology; provides a basic understanding of mammalian physiology essential as a framework for advanced graduate studies.
Prerequisite: VTPP 605.

VTPP 610 Physiology I
Credits 6. 5 Lecture Hours. 2 Lab Hours.
Introduction to physiology: cell physiology, cell signaling, cell cycle, body fluids, translocation of materials, membrane potentials, neurophysiology, autonomic nervous system, thermoregulation, cardiovascular, and muscle physiology.
Prerequisites: Enrollment in MS/PhD program in Veterinary Physiology and Pharmacology; approval of instructor.

VTPP 612 Physiology II
Credits 6. 5 Lecture Hours. 2 Lab Hours.
Blood and lymph, respiration, renal physiology, and acid-based balance, gastrointestinal physiology, metabolism, endocrinology, and reproduction.
Prerequisites: Enrollment in MS/PhD program in Veterinary Physiology and Pharmacology; approval of instructor.

VTPP 623 Biomedical Physiology I
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Physiological principles, review of cellular physiology, and development of an understanding of the nervous system and muscle, cardiovascular, and respiratory physiology; clinical applications related to organ systems.
Prerequisites: Graduate classification; BICH 410 and VIBS 305 recommended.

VTPP 624/VIBS 624 Endocrinology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Neuroendocrine control of puberty menstruation, ovulation, pregnancy, labor, lactation, female reproductive cycles, male reproductive functions, thyroid and parathyroid, adrenal and kidney, diabetes, obesity, sleep, memory, learning and aging, and their endocrine disorders; overview on biosynthesis, transport and signaling of peptide and neuropeptide hormones, steroids and prostaglandins.
Prerequisite: Graduate classification.
Cross Listing: VIBS 624/VTPP 624.

VTPP 625 Pharmacology
Credits 3. 3 Lecture Hours.
Introduction to pharmacokinetics and pharmacodynamics; survey of major pharmaceutical classes; uses, mechanisms of action and adverse reactions of selected agents.
Prerequisites: Graduate classification; VTPP 423 or approval of instructor.

VTPP 626 Systemic Physiology and Disease
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Investigation of functional changes during disease process and basic concepts related to the abnormal function and change in various organ systems in the face of disease; application of the knowledge of basic anatomy and physiology in understanding a loss or a change in normal structure and function of the body using common diseases and disorders centering on functional changes to etiology, clinical manifestations, diagnostic tests, treatment and complications.
Prerequisite: Graduate classification.

VTPP 627 Biomedical Physiology II
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Continuation of VTPP 623. Fluid balance and acid-base balance; development of an understanding of renal, gastrointestinal, endocrine and reproductive physiology using human and other mammalian models; clinical applications related to organ systems.
Prerequisites: Graduate classification; VTPP 623.

VTPP 628 Pharmacology I
Credits 5. 4 Lecture Hours. 2 Lab Hours.
Pharmacokinetics, pharmacodynamics, CNS pharmacology, autonomic pharmacology, antineoplastic agents, immunopharmacology, recombinant products, fluid and electrolyte therapy, diuretics, pharmacology of the integument.
Prerequisite: Approval of instructor.
VTTP 629 Pharmacology II
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Antimicrobials, endocrine pharmacology, eicosanoids, anti-inflammatory agents, respiratory pharmacology, anticoagulants and hematinsics, GI pharmacology, cardiovascular pharmacology.
Prerequisite: Approval of instructor.

VTTP 630 Pharmacology/Toxicology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Management and treatment of toxicosis, antidotal pharmacology, toxic plants, mycotoxins, chemical toxicants, metals, euthanasia.
Prerequisite: Approval of instructor.

VTTP 634 Physiology for Bioengineers I
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Cellular anatomy, cellular physiology and biochemistry; systems analysis of digestive, endocrine and musculoskeletal system function including information related to gross anatomy, histology and disease states; quantitative aspects of physiology and engineering applications to clinical medicine.
Prerequisite: Biomedical Engineering major or approval of instructor.

VTTP 635 Physiology for Bioengineers II
Credits 4. 3 Lecture Hours. 3 Lab Hours.
A systems analysis of nervous, cardiovascular, respiratory and urinary function including information related to gross anatomy, histology and disease states; quantitative aspects of physiology and engineering applications to clinical medicine.
Prerequisite: VTTP 634.

VTTP 638 Analysis of Genomic Signals
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Overview of current high throughput technology for data acquisition and analysis of genomic signals (e.g., mRNA or proteins); emphasis on microarray technology, methods for analyzing microarray data, and approaches to model the underlying phenomena from the systems biology perspective.
Prerequisites: BIOL 451 or GENE 320/BIMS 320/BIMS 320/GENE 320 or equivalent; STAT 651 or equivalent; or approval of instructor.

VTTP 639 Non-Coding RNAs
Credits 3. 3 Lecture Hours.
Roles of non-coding RNAs in regulating gene expression for physiological functions, development and diseases; includes a brief history of the field, various categories and definitions of non-coding RNAs, research methodologies and animal models, and break-through advances in clinical applications.
Prerequisite: Approval of instructor.

VTTP 650 Stem Cell Biology
Credits 3. 3 Lecture Hours.
Wide-range of topics related to stem cells and tissue engineering, including a brief history of the field, various categories and definitions of stem cells, research methodologies and animal models, as well as breakthrough advances in the area of engineered stem cells.
Prerequisite: Approval of instructor.

VTTP 651 Epigenetics & Systems Physiology
Credits 3. 3 Lecture Hours.
Epigenetics & Systems Physiology. Journal club format focusing on epigenetic regulation of physiological systems; assignment of papers from primary literature and weekly oral presentations detailing opinions on research; emphasis on fundamental concepts in epigenetics, physiology and the molecular techniques employed to address research hypotheses, discussions of scientific ethics and fraud.
Prerequisite: Graduate classification.

VTTP 652 Fetal and Embryo Physiology
Credits 3. 3 Lecture Hours.
Introduction to the physiologic processes driving embryonic development and pregnancy; focus on embryo implantation, establishment of the placenta, development of the fetal circulatory systems and the molecular processes governing embryo differentiation and development; special emphasis on the major organ systems affected by pediatric disease and on the actions of teratogens.
Prerequisites: Graduate classification.

VTTP 654 Molecular Endocrinology
Credits 3. 3 Lecture Hours.
Structure-function relationships of hormones, their receptors and biologic activities.
Prerequisites: VTTP 653 or BIOL 649 and BICH 410 or equivalent or approval of instructor.

VTTP 655 Vascular Physiology
Credits 4. 4 Lecture Hours.
Structure and function of blood vessels and vascular beds; molecular and cell biology of endothelium and vascular smooth muscle; microcirculation; capillary exchange; regulation of blood flow by local, neural and humoral signals.
Prerequisite: MPHY 901 or approval of department head.

VTTP 656 Physiology of the Heart
Credits 4. 4 Lecture Hours.
Structure and function of the heart; molecular and cell biology of cardiac myocytes; electrophysiology of myocardium, pacemaker cells and conducting tissue; cardiac mechanics; control of cardiac performance; coronary circulation.
Prerequisite: MPHY 901 or MPHY 604 or approval of department head.

VTTP 657 Cardiovascular Physiology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Physiological considerations of the circulatory system including general and integrative aspects of the heart and blood vessels.
Prerequisites: Approval of instructor.

VTTP 659 Gamete and Embryo Physiology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Physiology of gametes and preimplantation embryos in livestock and laboratory animals; oocyte growth and maturation in-vivo and in-vitro, fertilization in-vivo and in-vitro, embryo transfer, cryopreservation, nuclear transfer, chimera formation, gene transfer.

VTTP 667 Current Topics in Pharmacology
Credits 3. 3 Lecture Hours.
Discussions of literature regarding topics of current research interest; physiochemical or physiologic effects of drugs at sites from molecular to whole body.
Prerequisite: Approval of instructor.

VTTP 673 Metabolic and Detoxication Mechanisms
Credits 3. 3 Lecture Hours.
Fate of foreign compounds; their inhibitory and antagonistic action toward normal metabolic processes of the animal body.
Prerequisites: BICH 603; approval of instructor and department head.

VTTP 675 Industrial and Environmental Toxicology
Credits 3. 3 Lecture Hours.
Fundamentals of toxicology and risk assessment; effects of selected classes of hazardous chemicals encountered in the workplace or environment on human health will be considered.
Prerequisite: Approval of instructor.
VTTP 676 Genetic and Molecular Toxicology
Credits 3. 3 Lecture Hours.
Mechanisms of toxicant-induced target organ toxicity with emphasis on molecular control of mammalian and cell growth differentiation.
Prerequisite: Graduate course in cell biology and biochemistry.

VTTP 677 Fluorescence Detection: Steady State, Time Resolved and Imaging
Credits 4. 4 Lecture Hours.
Fluorescence spectroscopy and confocal/multiphoton microscopy in research; intro of pharmacology, life science, and physical science students to fluorophores, anisotropy, ligand binding, energy transfer, cytometry, lifetime imaging, correlation spectroscopy, immunocytochemistry, and image analysis with an emphasis on instrumental/sample artifacts, fluorescence application, literature evaluation, and communication of rationales to other scientists.
Prerequisite: Enrollment in the first year of professional DVM curriculum.

VTTP 681 Seminar
Credit 1. 1 Lecture Hour.
Review and discussion of current scientific work in physiology and related subjects.
Prerequisite: Approval of department head.

VTTP 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Problems in physiology, pharmacology or toxicology.
Prerequisite: Approval of instructor.

VTTP 689 Special Topics In...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of veterinary physiology and pharmacology. May be repeated for credit.
Prerequisite: Approval of instructor.

VTTP 690 Theory of Research
Credits 3. 3 Lecture Hours.
Theory and design of research related to current biomedical problems especially those involving study of animal disease; philosophical perspectives underlying historical advances in research pertaining to the study, prevention and treatment of disease. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Graduate classification.
Cross Listing: NRSC 690, VIBS 690 and VPAT 690.

VTTP 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Original investigations in veterinary physiology, pharmacology or toxicology to be submitted by writing of thesis or dissertation as partial fulfillment for MS or PhD degree.
Prerequisite: Approval of department head.

VTTP 914 Professional & Clinical Skills I
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Professional & Clinical Skills I. Integration and reinforcement of foundational knowledge offered in concurrent courses through critical thinking exercises, professional skills application activities (ethics/ contextual decision-making, leadership, skills for well-being, personal/ practice financial literacy, core communication skills) and application of technical skills; opportunities for learning include didactic, hands-on and case-based interactions utilizing simulation, models, animals, actors and case scenarios; part I of a VI part series.
Prerequisite: Enrollment in the first year of professional DVM curriculum.

VTTP 924 Pharmacology
Credits 3 to 5. 3 to 4 Lecture Hours. 0 to 2 Lab Hours.
Drug disposition, pharmacodynamics, drug regulations, critical appraisal of evidence about use of drugs, drugs that affect respiratory, reproductive, gastrointestinal, endocrine, immune, urinary, integumentary, cardiovascular, musculoskeletal, and nervous systems, and drugs for pain, anti-inflammatories, antineoplastics, antibiotics, and other antiinfectives in animals.
Prerequisite: Enrollment in the second year of professional DVM curriculum.

VTTP 925 Pharmacology/Toxicology II
Credits 3. 5 Lecture Hours. 2 Lab Hours.
Antimicrobials, endocrine pharmacology, eicosanoids, antiinflammatory agents, respiratory pharmacology, anticoagulants and hematinics, GI pharmacology, cardiovascular pharmacology.
Prerequisite: Enrollment in the second year of professional curriculum.

VTTP 926 Pharmacology/Toxicology III
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Management and treatment of toxicoses, antidotal pharmacology, toxic plants, mycotoxins and mycotoxicoses, chemical toxicants, metals, euthanasia.
Prerequisite: Enrollment in the second year of professional curriculum.

VTTP 948 Didactic Elective in Veterinary Physiology and Pharmacology
Credits 1 to 12. 1 to 12 Lecture Hours.
Elective course in physiology and pharmacology for professional students who wish to supplement required curriculum. May be repeated for credit.
Prerequisite: Enrollment in the fourth year of professional curriculum.

VTTP 985 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed, individual study of selected problems in physiology, pharmacology or toxicology. May be repeated for credit.
Prerequisite: Approval of instructor and department head.

VTTP 989 Special Topics In...
Credits 1 to 4. 1 to 4 Other Hours.
Selected topics in an identified area of veterinary physiology and pharmacology. May be repeated for credit.