DEPARTMENT OF VETERINARY INTEGRATIVE BIO SCIENCES

Head: E. Tiffany-Castiglioni

The Department of Veterinary Integrative Biosciences (VIBS) offers graduate degree programs aimed at educating students to advance biomedical science through original research and to disseminate that knowledge for the protection and promotion of animal and human health. The department awards the interdepartmental MS and PhD degrees in Biomedical Sciences (with specialties in cell/molecular biology, developmental biology/embryology, toxicology, epidemiology, reproduction, and neuroscience). Also managed and awarded by the department are the interdepartmental MS degree in Science and Technology Journalism and the departmental MS degree in Veterinary Public Health-Epidemiology.

Many of the department faculty participate in University-wide graduate training programs in Neuroscience, Reproductive Biology, Genetics, Toxicology, and Biotechnology.

In addition to developing research expertise in their specialty, students have the opportunity to learn anatomy, public health practices, and genomics in a variety of domestic species, wildlife species, and laboratory animals. Training in anatomy spans histology, histochemistry, neuroanatomy, and state-of-the-art interactive laser microscopy. Training in public health emphasizes epidemiology, food safety, food toxicology and control of zoonotic diseases. Training in genomics emphasizes genetics of health and disease, phylogeny of mammalian species, bioinformatics and comparative genomics.

The Master of Science in Science and Technology Journalism is a distinctive program to prepare students for careers as science and technology writers, reporters and editors in the public media, government, industry, academia and other sectors. It also can serve as a foundation for doctoral study.

The Master of Science in Veterinary Public Health-Epidemiology is designed to serve the needs of veterinarians wishing to go into some aspects of government service, military veterinary personnel seeking advanced training in public health and students with a career goal of academia or research.

Students prepare degree plans that fit their area of study and professional or research goals in consultation with a committee of graduate faculty members led by a faculty mentor/chairperson. The general procedural rules are those specified in this catalog. More details on core course requirements, degree plans, and administrative matters are available in the college's "Graduate Student Handbook."

Faculty

Abbott, Louise C, Professor
Vet Integrative Biosciences
DVM, Washington State University, 1988
PHD, University of Washington, 1982

Andersson, Leif B, Professor
Vet Integrative Biosciences
PHD, Swedish University of Agricultural Sciences, 1984

Arosh, Joe A, Professor
Vet Integrative Biosciences
DVM, Universite Laval, 2004

Arosh, Sakhila B, Associate Professor
Vet Integrative Biosciences
PHD, Laval University, 2002

Bergthorsson, Ulfar, Visiting Associate Professor
Vet Integrative Biosciences
PHD, University of Rochester, 1998

Budke, Christine M, Associate Professor
Vet Integrative Biosciences
PHD, Philosophisch-Naturwissenschaftliche Fakultat der Universitat Basel, 2004
DVM, Purdue University, 2001

Burghardt, Robert C, Professor
Vet Integrative Biosciences
PHD, Wayne State University, 1976

Cai, Jing, Associate Professor
Vet Integrative Biosciences
PHD, University of Hong Kong, 2006

Cannon, Marvin S, Visiting Professor
Vet Integrative Biosciences
PHD, The Ohio State University, 1969

Chiu, Weihsueh A, Professor
Vet Integrative Biosciences
PHD, Princeton University, 1998

Cummings, Kevin J, Associate Professor
Vet Integrative Biosciences
PHD, Cornell University, 2010
DVM, Cornell University, 1996

Curley, Kevin O, Instructional Assistant Professor
Vet Integrative Biosciences
PHD, Texas A&M University, 2012
DVM, Cornell University, 1996

Dees, William L, Senior Professor
Vet Integrative Biosciences
PHD, Texas A&M University, 1982

Frank-Cannon, Tammy C, Clinical Assistant Professor
Vet Integrative Biosciences
PHD, Texas A&M University, 2005
DVM, Texas A&M University, 1996

Gaddy, Dana, Professor
Vet Integrative Biosciences
PHD, Baylor College of Medicine, 1991

Gastel, Barbara J, Professor
Vet Integrative Biosciences
MD, Johns Hopkins University, 1978
Hamer, Sarah A, Associate Professor  
Vet Integrative Biosciences  
DVM, Michigan State University, 2011  
PHD, Michigan State University, 2010

Hartberg, Yasha M, Lecturer  
Vet Integrative Biosciences  
PHD, State University of New York at Binghamton, 2016

Herman, Cheryl L, Clinical Associate Professor  
Vet Integrative Biosciences  
DVM, University of Saskatchewan, 1987

Hiney, Jill K, Research Assistant Professor  
Vet Integrative Biosciences  
PHD, Texas A&M University, 1996

Hoffman, Anton G, Clinical Professor  
Vet Integrative Biosciences  
PHD, Texas A&M University, 1992  
DVM, Texas A&M University, 1986

Johnson, Gregory A, Professor  
Vet Integrative Biosciences  
PHD, University of Wyoming, 1997

Johnson, Larry, Professor  
Vet Integrative Biosciences  
PHD, Colorado State University, 1978

Katju, Vaishali, Associate Professor  
Vet Integrative Biosciences  
PHD, Indiana University, 2004

Keefe, Lisa M, Instructional Assistant Professor  
Vet Integrative Biosciences  
PHD, Purdue University, 2013

Kim, Sun J, Research Assistant Professor  
Vet Integrative Biosciences  
PHD, Sogang University, 2006

Klemm, William R, Senior Professor  
Vet Integrative Biosciences  
PHD, University of Notre Dame, 1963  
DVM, Auburn University, 1958

Kneese, Dana A, Lecturer  
Vet Integrative Biosciences  
DVM, Texas A&M University, 2013  
PHD, Texas A&M University, 2009

Ko, Gladys Y, Associate Professor  
Vet Integrative Biosciences  
PHD, Kent State University, 1996

Ko, Michael L, Research Assistant Professor  
Vet Integrative Biosciences  
PHD, Kent State University, 1997

Kornegay, Joe N, Professor  
Vet Integrative Biosciences  
PHD, University of Georgia, 1982

Langford, Candice L, Research Assistant Professor  
Vet Integrative Biosciences  
PHD, Texas A&M University, 2006

Li, Jianrong, Associate Professor  
Vet Integrative Biosciences  
PHD, University of Hawaii at Manoa, 1997

Li, Qinglei, Associate Professor  
Vet Integrative Biosciences  
PHD, Harbin Medical University, 2001

Lyczak, Kristin C, Clinical Assistant Professor  
Vet Integrative Biosciences  
DVM, Colorado State University, 2003

Mouneimne, Roula, Research Professor  
Vet Integrative Biosciences  
PHD, Lyon I University, 1984

Murphy, William J, Professor  
Vet Integrative Biosciences  
PHD, The University of Tulsa, 1997

Nghiem, Peter P, Assistant Professor  
Vet Integrative Biosciences  
PHD, The George Washington University, 2014  
DVM, Texas A&M University, 2008

Norman, Keri N, Assistant Professor  
Vet Integrative Biosciences  
PHD, Texas A&M University, 2016

Phillips, Timothy D, Professor  
Vet Integrative Biosciences  
PHD, University of Southern Mississippi, 1975

Pine, Michelle D, Clinical Associate Professor  
Vet Integrative Biosciences  
PHD, Texas A&M University, 2002  
DVM, University of Missouri-Columbia, 1991

Porter, Weston W, Professor  
Vet Integrative Biosciences  
PHD, Texas A&M University, 1997

Qian, Yongchang, Research Associate Professor  
Vet Integrative Biosciences  
PHD, Shanghai Institutes for Biological Sciences, 1990

Raudsepp, Terje, Professor  
Vet Integrative Biosciences  
PHD, Swedish University of Agricultural Sciences, 1999

Rijnkels, Monique G, Research Assistant Professor  
Vet Integrative Biosciences  
PHD, Leiden University, 1997

Ritter, Nicola L, Instructional Assistant Professor  
Vet Integrative Biosciences  
PHD, Texas A&M University, 2016

Roy Sarkar, Tapasree, Research Assistant Professor  
Vet Integrative Biosciences  
PHD, Purdue University, 2008
Courses

**VIBS 601 Anatomy**
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Topographical dissection of one of the following domestic animals: horse, ox, dog or cat. May be taken more than once but not to exceed 12 hours of credit toward a graduate degree.
**Prerequisite:** VIBS 912 or 305 or equivalent.

**VIBS 602 Histology**
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Molecular phenomena placed in context with tissues, organs and organ systems; cell and tissue structures visualized by light microscopy and electron micrographs for functional relationships; clinical correlations reveal relevance of histology in specific disease states; conceptual thinking exercises facilitate problem-solving skills.
**Prerequisite:** Graduate classification.

**VIBS 603/NRSC 603 Neuroanatomy**
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Gross, developmental and microscopic anatomy of nervous system of selected laboratory and domestic animals.
**Prerequisite:** Approval of instructor.
**Cross Listing:** NRSC 603/VIBS 603.

**VIBS 604/NRSC 604 Biomedical Neuroendocrinology and Endocrine Disorders**
Credits 3. 3 Lecture Hours.
**Prerequisite:** Approval of instructor.
**Cross Listing:** NRSC 604/VIBS 604.

**VIBS 605 Chemical Hazard Assessment**
Credits 3. 3 Lecture Hours.
Chemical and biological methods for testing hazardous chemicals and complex mixtures; chemical analysis; microbial bioassays; developmental toxicity; enzyme induction; mammalian cell culture.
**Prerequisite:** Graduate classification.

**VIBS 606/NRSC 605 Neuroanatomical Systems**
Credits 3. 3 Lecture Hours.
Emphasis on major neural systems that govern identifiable physiological functions, behavior and neurodegenerative disease; whole-brain anatomy is approached from a "systems" perspective, wherein components of defined functional systems are described in terms of their location, inputs and outputs, and physiological /behavioral significance in health and disease.
**Prerequisite:** Approval of instructor.
**Cross Listing:** NRSC 605/VIBS 606.

**VIBS 607 Applied Epidemiology**
Credits 4. 3 Lecture Hours. 3 Lab Hours.
An introductory course of the application of epidemiological concepts to the study of disease occurrence in populations of lower animals and man. The purpose of epidemiology is to identify the host, agent and environmental determinants and dynamics of disease spread that provide the basis for successful preventive medicine and public health programs.

**VIBS 608 Epidemiology Methods I**
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Epidemiology concepts and methods used in the investigation of determinants of health or disease in populations; stressing basic methods for experimental design, conduct and analysis of both observational and experimental studies.
**Prerequisite:** STAT 651 or equivalent.
VIBS 609 Anatomy of Reproductive Systems
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Gross and microscopic anatomy of the reproductive systems of domestic animals.
Prerequisite: VIBS 601 or VIBS 602 or VIBS 910 or equivalent. (Offered in alternate years.)

VIBS 610 Epidemiologic Methods II and Data Analysis
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Principles and methods for the analysis of data from epidemiologic studies including the purpose of data analysis and role of statistics, sampling distributions, probability distributions, analysis of crude, stratified and matched data, and the use of linear and logistic regression methods.
Prerequisites: VIBS 608 and STAT 651 or approval of instructor.

VIBS 611 Tumor Cell Biology and Carcinogenesis
Credits 3. 3 Lecture Hours.
Basic principles of tumor biology; role of gene-environment interactions; molecular mechanisms regulating cancer initiation and progression; therapeutic treatment of cancer.
Prerequisites: BIMS 320/GENE 320 or equivalent; graduate classification.

VIBS 612 Mammalian Embryology
Credits 3. 3 Lecture Hours.
Embryology of domestic mammals; gametogenesis, fertilization, cell proliferation and differentiation, and organogenesis; selected commonly occurring congenital defects of domestic animals used to emphasize embryologic sequences and processes.
Prerequisite: Approval of instructor.

VIBS 613 Evolutionary Bioinformatics
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Principles and concepts in molecular evolution, population genetics, and evolutionary genomics; applications of quantitative approaches (computation, statistics, and mathematics) in analyzing large and complex biological data sets; algorithm design and development of scientific software using high-level high-performance computer languages; emerging techniques for integrative data analysis, and the assumptions, advantages, and limitations of these techniques.
Prerequisites: BIOL 451 or GENE 320/BIMS 320/BIMS 320/GENE 320 or equivalent; or approval of instructor.

VIBS 615 Food Hygiene
Credits 4. 3 Lecture Hours. 4 Lab Hours.
Clinical description, pathogenesis, diagnosis, source, epidemiology and prevention or control of food borne diseases caused by biological, chemical and natural hazards.
Prerequisite: Graduate classification.

VIBS 616 Advanced Developmental Neurotoxicology
Credits 3. 3 Lecture Hours.
Study of mechanisms of toxicity of substances potentially devastating to the developing brain and spinal cord including lead, mercury and other heavy metals, alcohol, nicotine (smoking), pesticides, flame retardants, and others.
Prerequisite: Approval of instructor.

VIBS 617 Cell Biology
Credits 1 to 5. 1 to 5 Lecture Hours.
Series of five 1-hour credit modules focusing on selected aspects of structure, function, and signal transduction in eukaryotic cells through critical analysis of recent literature in the field. Each module listed as separate course section; students may enroll in up to five 1-hour module sections per semester.
Prerequisite: Approval of instructor.
VI9S 633 Animal Diseases in Comparative Medicine  
Credits 3. 3 Lecture Hours.  
Study of major zoonotic diseases, including frequency of occurrence,  
clinical signs, diagnosis, epidemiology, bioterrorism concerns and the  
prevention or control in animals and humans.  
Prerequisite: Graduate classification.

VI9S 640/NRSC 640 Neurobiology  
Credits 1 to 5. 1 to 5 Lecture Hours.  
Biology of the mammalian central nervous system with emphasis  
on cellular and molecular interactions; contemporary research  
topics in areas such as neuron-glia interactions, neuroimmunology,  
neuroendocrinology, developmental neurobiology and neurogenetics;  
extensive readings from primary literature.  
Prerequisites: Undergraduate or graduate cell biology, genetics and  
biochemistry or approval of instructor.  
Cross Listing: NRSC 640/VI9S 640.

VI9S 641 Principles of Human Health Risk Assessment of Chemicals  
Credits 3. 3 Lecture Hours.  
Principles of toxicology and environmental health with the basic  
concepts and approaches for conducting human health risk assessment  
of chemicals; use of different types of data and analysis approaches  
to conduct both qualitative and quantitative assessments of exposure,  
human health hazard, dose-response, and risk from chemicals in the  
environment; introduction to how risk assessment informs risk  
management decisions such as pollution regulations or hazardous waste  
cleanup.

Prerequisites: Graduate classification in toxicology, public health and  
related disciplines; VT9P 673, VI9S 670, PHE9 605, PHE9 610, PHE9 600,  
PHEB 605, or equivalent, or concurrent enrollment; PHE9 602, PHE9 603,  
STAT 651, or equivalent; or approval of instructor.

VI9S 645 Practice of Evaluating Human Health Risks of Chemicals  
Credits 3. 3 Lecture Hours.  
Basic principles of toxicology and environmental health with real-life  
examples of how diverse types of information are integrated for the  
purpose of judging what chemical exposures may pose a risk to human  
health; the complex process of qualitative evaluation and quantitative  
estimation of the risks that chemicals in the environment may pose  
to humans; integration of knowledge across epidemiology, toxicology,  
exposure assessment and other disciplines necessary to paint a  
comprehensive picture of what chemicals may pose hazard, what level of  
exposure may be considered safe, and what are the mechanisms of the  
 adverse effects of exposures to a particular hazardous agent.  
Prerequisites: BICH 601, BICH 602, VT9P 625, or similar; VT9P 673,  
VI9S 670, or similar; and VI9S 641.

VI9S 650 Education in a Veterinary Medical and Biomedical Environment  
Credits 1 to 3. 1 to 3 Lecture Hours.  
Philosophical, stylistic and methodological consideration for designing,  
planning implementing and evaluating effective veterinary medical and  
biomedical teaching and learning. Orientation for graduate school.  
Prerequisite: Graduate classification.

VI9S 655 Methods of Specialized Journalism  
Credits 3. 3 Lecture Hours.  
Writing and placement of magazine and journal articles in specialized  
areas of media content such as agriculture, ecology, science, business,  
education, natural resources; individual projects directed to student’s  
field of interest.
VIBS 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in one of the department’s areas of specialization (anatomy, cellular and molecular biology, epidemiology, food safety, genetics, informatics, neuroscience, public health concepts, reproduction/developmental biology, toxicology, zoonoses, science and technology journalism).

VIBS 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.
Prerequisite: Graduate classification.
Cross Listing: VTPP 690 and VPAT 690.

VIBS 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research reported by writing of thesis or dissertation as partial requirement for MS or PhD degree.
Prerequisite: Approval of department head.

VIBS 910 Small Animal Anatomy
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Nomenclature, structures and principles of functional anatomy of dogs and cats; emphasis on topographical, radiographic and functional anatomy of structures with clinical importance.
Prerequisite: Enrollment in first year of professional DVM curriculum.

VIBS 911 Histology
Credit 1. 1 Lecture Hour.
Clinical application of histological content; basic tissues and major organ systems of common domestic species; normal microscopic appearance of cells, tissues and organs with the introduction of normal tissue and organ cytology; content correlates gross anatomy, microscopic anatomy and the physiological state of common domestic species.
Prerequisite: Enrollment in first year of professional DVM curriculum.

VIBS 912 Clinical Anatomy of Large Animals
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Gross and topographical anatomy of domestic livestock including equine, ruminant, porcine and avian gross anatomy through use of cadavers, models and images; emphasis on structures of clinical importance, relationships to common medical and surgical procedures and functions in the animal body.
Prerequisite: Enrollment in first year of professional DVM curriculum.

VIBS 913 Microscopic Anatomy II
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Developmental anatomy of domestic animals with special emphasis on structural congenital defects; functional neuroanatomy and clinical neurology of domestic animals; essential clinical skills for the theory and practice of veterinary neurology.
Prerequisite: Enrollment in first year of professional curriculum.

VIBS 914 Professional & Clinical Skills II
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Professional & Clinical Skills II. 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 II of a VI part series.
Prerequisites: Enrollment in the first year of professional DVM curriculum.

VIBS 926 Introduction to Public Health Concepts
Credit 1. 1 Lecture Hour.
Basic concepts and issues of public health as they relate to the veterinary medical profession.
Prerequisite: Enrollment in first year of the professional curriculum.

VIBS 928 Public Health, Epidemiology and Evidence-Based Medicine
Credits 3. 3 Lecture Hours.
Basic principles of epidemiology, public health, zoonoses and introduction to evidence-based medicine methodology, its application in clinical decision making; emphasis on synthesis of basic principles; application of evidence-based medicine; and epidemiological skills within the context of private and public veterinary practice.
Prerequisites: Enrollment in the second year of professional curriculum.

VIBS 930 Public Health
Credits 4. 4 Lecture Hours.
Principles and applications of epidemiology in veterinary medicine and the literature; history, epidemiology, symptoms, prevention and control of diseases transmitted between animals and humans; emphasis on emerging zoonotic diseases presenting occupational hazards for veterinary medicine; safety of foods of animal origin including foodborne illnesses.
Prerequisite: Enrollment in third year of professional curriculum or enrollment in graduate studies with approval of instructor.

VIBS 936 Veterinarians in Society
Credits 2. 2 Lecture Hours.
The breadth of career opportunities in veterinary medicine; the diversity of roles that veterinarians play in society including companion animal practice, large animal practice, public health, biomedical research, conservation medicine, emergency response and shelter medicine.
Prerequisite: Enrollment in first year of professional DVM curriculum.

VIBS 948 Didactic Electives in Veterinary Anatomy
Credits 1 to 12. 1 to 12 Lecture Hours.
Elective course in veterinary anatomy (with emphasis on neuroscience, cell biology, genetics, reproduction, developmental biology, marine mammal anatomy) for professional students who wish to supplement required curriculum. May be repeated for credit.
Prerequisite: Enrollment in third year of professional curriculum.

VIBS 985 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of a selected problem in veterinary anatomy (with emphasis on neuroscience, cell biology, genetics, reproductive biology, developmental biology, or marine mammal anatomy) or directed individual study of advanced topics in veterinary public health or epidemiology (with emphasis on food safety, toxicology, informatics, or zoonoses). May be repeated for credit.
Prerequisite: Matriculation in veterinary professional curriculum.
VIBS 989 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of veterinary anatomy (with emphasis on neuroscience, cell biology, genetics, reproductive biology, developmental biology or marine mammal anatomy) or selected topics in veterinary public health, epidemiology, zoonoses, food hygiene and food toxicology.
Prerequisite: Matriculation in veterinary professional curriculum.