Guidelines and Policies

for

Graduate Study

in the

Department

of

Veterinary Integrative Biosciences

Texas A&M University

Guidelines and Policies for Graduate Study in the Department of Veterinary Integrative Biosciences (VIBS)

These guidelines supplement, but cannot supersede, the University rules and regulations, as specified in the official Graduate Catalog of Texas A&M University in effect at the time of a student's enrollment in a graduate program. Please see pages 1-138 of the current Graduate Catalog for further rules and regulations. **Updated 01/2012**

Table of Contents

Section A
Welcome to the Department of Veterinary Integrative Biosciences

Texas A&M University Graduate Philosophy

Texas A&M University is a public institution dedicated to the development and dissemination of knowledge in many diversified academic and professional fields of study. The University is committed to assist students in their search for knowledge, to help them understand themselves and their cultural and physical environments, and to assist them in developing the wisdom and skills needed to assume responsibility in a democratic society. The University assumes as its historic trust the maintenance and enhancement of the human mind and spirit. Such endeavors are also paramount in the Department of Veterinary Integrative Biosciences.

The University aspires to preeminence in teaching, research, and service. In keeping with these objectives, the department strives:

1) To serve as advocate for graduate education within and outside of the University.

2) To establish procedures to guarantee that the graduate-level educational experience is of the highest quality.

3) To foster and facilitate interdisciplinary/intercollegiate graduate programs and research activities.

4) To strive to maintain and enhance an environment conducive to creative scholarship and scientific inquiry.

General Introduction

The departmental graduate programs in Veterinary Integrative Biosciences (VIBS) are 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. Course subjects include macroscopic anatomy, microscopic anatomy, neuroanatomy, neurobiology, genetics, cell biology, ultrastructural anatomy, epidemiology, food safety, food toxicology, public health concepts, medical and scientific journalism. The diverse nature of the research endeavors of the VIBS faculty allow a degree of flexibility for the degree plan of each graduate student. The department offers both Master of Science (M.S.) and Doctor of Philosophy (PhD) degrees in (with major specialty areas of cell/molecular biology, developmental biology/embryology, reproduction and neuroscience). The M.S. degree is awarded in Epidemiology and in Veterinary Public Health (with major specialty areas of epidemiology, food safety and security and public health). The department also offers the MS Degree in Science and Technology Journalism. Both M.S. and PhD degrees are also offered through the Interdisciplinary programs of Genetics and Toxicology.

Students have the opportunity to receive didactic instruction and specialized research training from departmental faculty, **several of whom hold University and/or national research awards**, who have expertise in cell biology, developmental anatomy, microscopic anatomy, macroscopic anatomy, ultrastructural techniques, image analysis, molecular genetics, mammalian genomics, biochemistry, neuroendocrinology, neuroscience, toxicology, public health, and epidemiology. Furthermore, the interdisciplinary nature of epidemiology and public health provides for interaction with the other emphasized fields. Research techniques available in the department include, but are not limited to, immunocytochemistry, radioimmunoassay, cell and organ culture technology, pre- and post-implantation embryo culture techniques, autoradiography, transmission electron microscopy, image analysis technology, laser cytometry, confocal microscopy, HPLC techniques, gas chromatography, DNA adduct isolation and analysis, *in situ* hybridization, gene mapping, cDNA probe analysis, DNA manipulation technology, messenger RNA isolation, transcription analysis, gene microarray analysis, laser capture microdissection,

stem cell isolation and manipulation, tissue and cell fractionation, isozyme isolation and analysis, whole-animal perfusion and dissection, routine and specialized histological techniques, microbiological techniques, remediation techniques, stereotaxic surgical techniques, neuron recording technology, and neurophysiological techniques. The training in public health emphasizes companion and food animal epidemiology, food safety, food toxicology and the study of zoonotic diseases. Study programs are prepared in consultation with the student and a committee of Graduate Faculty members under the guidance of its chairperson. The general procedural rules are those specified in the Graduate Catalog.

Research support laboratories and cores. VIBS supports seven foundation laboratories and support services that are essential to the research and teaching missions of the CVM: the multi-user Image Analysis Laboratory, the Epidemiology academic division, the Histology Laboratory, Trace Elements Laboratory, Veterinary Medical Park, Animal genomics and molecular cytogenetics, and Animal Genetics Laboratory. The Department generally receives in excess of $3 million dollars in extramural funding each fiscal year.

Current research activities in VIBS. The research mission of the CVM is to "*create and disseminate new knowledge, new therapies, and new learning opportunities in veterinary, biomedical, and biological disciplines by scholarly and scientific investigation*." VIBS carries out mutually supportive research endeavors in five areas: Epidemiology/Public Health, Toxicology, Neuroscience, Reproductive Biology, and Genomics/Genetics. Each of these areas interfaces with the other five to form interdisciplinary collaborations in Neurotoxicology, Neuroendocrinology, Reproductive Biotechnology, Developmental Neurobiology, and Genetic Toxicology. The major research activities in these areas are summarized below:

1. Epidemiology, Public Health and Environmental Toxicology VIBS faculty in Toxicology and Food Safety carry out research in fundamental and applied food toxicology (cellular toxicology, diagnostics, detection methods, and development of patentable devices), bioremediation (chemical and biological methods for toxicant removal from organisms and/or the environment), epidemiology (disease incidence and frequency, as well as risk factors), and marine mammal toxicology (cell-culture systems for mechanisms of toxicity, as well as body burdens of toxicants in marine mammals). This research is conducted in conjunction with the Center for Environmental Rural Health (CERH) funded by the National Institutes of Environmental Health Science or the Food Safety Inspection Service (FSIS, USDA) and the Center for Food Safety.

The epidemiology faculty members perform research in partnership with multiple agencies in academic, public, and private sectors. Multi-disciplinary collaborations (e.g.., with food safety, toxicology, genetics, molecular and chronic diseases, epidemiology, infectious disease, and production medicine) are the hallmark of epidemiological research projects conducted at the CVM. This faculty unit facilitates research endeavors by other investigators by providing expertise in study design and statistical analysis. The research areas that are currently supported by collaboration with VIBS epidemiologists include: determining the incidence, prevalence and risk factors for a multitude of infectious and non-infectious diseases of animals and humans; infectious disease modeling and surveillance; diagnostic test validation; environmental epidemiology; feral cat and animal shelter epidemiology; veterinary public health; the natural history and ecology of companion and food animal diseases; zoonotic disease research; food safety; comparative medicine; and antimicrobial resistance.

Several members of the VIBS faculty conduct research at the interfaces between Toxicology and the other major research focuses in the department. Research in Neurotoxicology addresses the neurotoxicity of heavy metals, alcohol, and environmental pollutants that are potential neurotoxicants. Much of this work involves the development and validation of *in vitro* models for screening potential neurotoxicants. The interaction of environmental contaminants with genetic susceptibility to defects in neural tube closure is another important focus within the Neurotoxicology area. Research in Reproductive Toxicology addresses the possible effects of environmental toxicants on reduced sperm counts in men and the delay of puberty in females by alcohol and the effects of endogenous and exogenous estrogens on conceptus development.

Research in Genetic Toxicology focuses on DNA adduct formation by mycotoxins and other food toxins, as well as mutagenesis and carcinogenesis resulting from a variety of food toxins and environmental contaminants.

2. Neuroscience - The VIBS Faculty of Neuroscience carry out research in neuroimmunology (interactions of immune cells and glia in a virally-induced mouse model of multiple sclerosis), molecular neurobiology (molecular determinants of neuronal maturation and function), glial cell biology (functions of neuroglia in normal and diseased brain tissue), circadian neurobiology and synaptic plasticity. Research in Neuroendocrinology, at the interface between Neuroscience and Reproductive Biology, addresses the delay of puberty in the female by alcohol, brain control of the pituitary gland, and neural control of the ovary. Research in Developmental Neurobiology, at the interface between Neuroscience and Genetics, addresses cerebellar maturation, neural tube development, and neurogenetics.

3. Reproductive Biology - The VIBS Faculty of Reproductive Biology carry out research in multiple areas including spermatogenesis (effects of aging in men and seasonal breeding in stallions), uterine biology (implantation biology, maternal recognition of pregnancy, cell signaling, uterine smooth muscle physiology), biology of the conceptus (role of steroids and growth factors in development, conceptus/uterine interactions) and biology of the ovary (neuroendocrine control of ovarian development) and cancers of the reproductive system. Multiple collaborations exist with investigators in the Departments of Animal Science (ANSC), Large Animal Medicine and Surgery (VLAM) and Veterinary Physiology and Pharmacology (VTPP). Research in this area interfaces with the Veterinary Biotechnology emphasis. This interface, designated Reproductive Biotechnology, addresses conceptus/uterine adhesion and implantation, as well as somatic cell nuclear transfer (cloning).

4. Biomedical Genetics/Genomics - The VIBS faculty involved in the Center for Animal Biotechnology (CAB) within the Institute of Biosciences & Technology (IBT) apply molecular genetic and genomic approaches to veterinary medicine for the improvement of animal health. VIBS members of this group conduct research on structural and functional genomics, animal models of human disease, and conservation/evolutionary applications to exotic relatives of companion/livestock species. This group has strengths in genomic analysis of equine, bovine, feline, marsupial and canine models in the following areas: genome mapping, reproductive genetics, functional genomics, disease gene identification and mapping, disease-association studies, immunogenetics, breed identification, and conservation.

The Department provides leadership, training and analytical support for the college Image Analysis Laboratory. This facility contains equipment for both state-of-the-art optical microscopy and electron microscopy. This includes several confocal and multiphoton microscopes, live-cell imaging workstations, laser capture microdissection, digital imaging and fluorescence deconvolution workstations, laser cytometer, fluorescence/absorbance/luminescence plate readers, along with a variety of specimen preparation support equipment (e.g., cryostats, microtomes, tissue culture facilities, etc.).

The Department collaborates with ***Environmental and Life Sciences*** programs in the Colleges of Medicine, Agriculture and Life Sciences, Engineering, and Science. Research initiatives jointly developed with these colleges focus on applications of cell biology and toxicology in evaluating the health hazards associated with industrial pollution and hazardous waste. These initiatives include programs in biosystems, biochemical engineering, engineering toxicology, industrial hygiene, nuclear biology, bio- and chemical remediation, and epidemiology. Departmental collaborations also exist with other major research institutions within the state, as well as nationally and internationally.

Students in VIBS may enter departmental graduate programs in **biomedical sciences**, **epidemiology**, or **public health** or interdisciplinary graduate programs in **toxicology**, **genetics**, or **food science and nutrition**. No matter which graduate program the student chooses, he/she becomes a part of the departmental graduate student body and works under the leadership of a member of the VIBS graduate

faculty. Students who opt for departmental programs should follow the specific guidelines found in the section titled "Requirements for MS and PhD Degrees in Veterinary Integrative Biosciences" of this handbook.

The department offers both MS and PhD degrees in Biomedical Sciences (with major specialty areas of **cell/molecular biology**, **developmental biology/embryology**, **epidemiology and public health, reproduction, and neuroscience).** Students who select interdisciplinary programs should follow the guidelines established by the faculty of that interdisciplinary program, except that all students are expected to present at the departmental student symposium regardless of their program choice. (See Oral Presentation section)

Study programs are prepared in consultation with the student and a committee of Graduate Faculty members under the guidance of a chairperson. The general procedural rules are those specified in the Graduate Catalog.

The Department follows the guidelines of the University's Office of Graduate Studies (OGS), as described in the Graduate College Catalog. The OGS gives departments certain options, and this Department's policies regarding those options differ as follows:

In some departments, graduate students must meet the following requirements that are **NOT** required by this Department:

1. Comprehensive exams prior to and in addition to the official preliminary examination.
2. Foreign language proficiency.

OGS permits, but does not require, certain policies. This Department:

1. Will NOT waive the final MS examination.

Mission Statement for Graduate Faculty/Students

The faculty of the Department of Veterinary Integrative Biosciences believe that **education must be viewed as a life-long process**. We further believe that education of students is a shared task involving inter-departmental and inter-college faculty efforts, broad disciplinary interactions, and the efforts of the students themselves. As a primary member of the educational team in Veterinary Medicine at Texas A&M University, the departmental faculty serve both directly in the instruction and guidance of students and indirectly in discovering new knowledge.

Section B

Goals and Objectives for Graduate Faculty and Students

We are dedicated to achieving the following goals for the graduate students in the Department:

1. Ensure that students receive a comprehensive theoretical base in veterinary anatomy, cell biology, molecular biology, reproductive biology, neuroscience, veterinary public health, epidemiology, or their chosen interdisciplinary field (toxicology, food science, or genetics).

2. Provide students the opportunity to develop teaching skills.

3. Provide students the opportunity to develop communication skills.

4. Enable students to achieve competency in modern laboratory technology.

5. Familiarize students with grantsmanship so they can successfully compete for research funds from the National Institutes of Health (NIH), National Science Foundation (NSF), U.S. Department of Agriculture (USDA), and other extramural funding sources.

6. Provide students with skills in interpretation of the published literature to prepare them to assimilate and incorporate new developments into research and clinical activities.

The faculty strives to gain and maintain a reputation for honor and integrity in all aspects of academic pursuits that, by itself, provides a strong recommendation of its graduates to potential employers.

Teaching Focus

Students are offered courses that provide a framework of fact and theory on which they can build a basic foundation of knowledge; which, with effective utilization, will allow them to launch into fruitful discovery. Course subjects include macroscopic anatomy, microscopic anatomy, neuroanatomy, neurobiology, embryology, developmental biology, genetics, cell biology, ultrastructural anatomy, epidemiology, food safety, food toxicology, public health concepts, and comparative medicine. The Department has a long history of high-quality instruction evidenced by the fact that a number of faculty members hold the coveted national Norden Teaching Award, Wiley Professorships, the University Faculty Distinguished Achievement Teaching Award, and the Texas Veterinary Medical Association Award for Teaching. Faculty members believe that graduate students should have strong interdisciplinary training with proficiency in multiple areas such as anatomy, cell and molecular biology, epidemiology, or public health. The degree plan of each graduate student is formulated with this in mind.

Research Focus

Please see page four of the handbook.

Career Opportunities in Veterinary Integrative Biosciences

Veterinary Integrative Biosciences covers a multitude of disciplines from the molecular level to whole animal and population research and involves the macroscopic, microscopic, developmental, cellular, and molecular structure of all body systems of animals, from conception to maturity. The purpose of graduate course offerings in veterinary integrative biosciences is to provide both a broad and in-depth understanding of gross anatomy, microscopic anatomy, neuroanatomy, developmental anatomy, and cellular structure and function in animals. The research training is focused on a number of areas: cellular and molecular structure and function in the immune system, the reproductive system and the nervous system. Graduate offerings in

this department also address the cellular and molecular effects of environmental toxicants on target tissues (i.e. reproductive toxicology, neurotoxicology, and developmental toxicology).

Career Opportunities in Veterinary Public Health and Epidemiology

Emphasis is placed on attaining a good match between the student's preference and career opportunities in the rapidly expanding fields of public health practice: Food Science and Technology, Toxicology, Veterinary Public Health, and Epidemiology. Graduates find employment opportunities with government and industry or in academia.

There is currently an urgent need to expand the number of public health and epidemiology graduates who are capable of working effectively in public agencies, private corporations and animal production industries in both the domestic and international settings. Students pursuing graduate training in epidemiology and public health will be well suited to meet the expanding needs and opportunities for practitioners of community health in public and private corporate settings. User needs for public health and epidemiology graduates include academic, public and private corporate practice. These needs exist in organizations ranging from local departments of health, CDC, FDA, USDA, Department of Defense, to private corporations, food animal and food production units, and research laboratories. These organizations are concerned with issues such as public health, food safety, wildlife, food and animal production, comparative medicine, zoonoses, biosecurity, bioterrorism, and related issues. Many of these agencies face mass retirements of senior staff in the next decade, which should result in an increased demand for competent, well-trained practitioners of various public health disciplines.

Learning Environment in the Department of Veterinary Integrative Biosciences

Texas A&M is one of the world's major research universities, and VIBS operates in that tradition. Our flexible programs are easily tailored to each student's aptitudes, skills, needs, and career aspirations. We provide graduate students with the opportunity to obtain a comprehensive education in biomedical sciences, veterinary anatomy, epidemiology or public health and to focus their training on state-of-the-art scientific research. Young scientists who pursue detailed and focused research, while at the same time having the base to realize the broader, whole-animal significance, will be the most productive in advancing the use of their findings toward benefits to all mankind.

We strive to create a collegial atmosphere among professionals, which includes graduate students. Students are encouraged and expected to interact freely with fellow students and faculty, including faculty who are not on a given student's official committee or in this department. In addition to the help provided by the official graduate committee, all faculty are available for counseling and technical assistance. Students are encouraged to participate in the graduate student organizations of the College of Veterinary Medicine and of the University at large.

While the graduate student's main goal should be to obtain a quality graduate education and the departmental goal is to provide the student with opportunities to do so, we must not forget to take the time to learn from each other. Student suggestions and ideas for improvement are always welcome. Graduate students are considered an important part of the departmental team and are encouraged to voice creative ideas for the improvement of departmental teaching and research programs.

Departmental Philosophy on Graduate Education

The Department strives to educate students to become competitive and capable of enjoying a rewarding career in biomedical research, whether in government, academia, or the private sector. Toward this end, the programs are devised to train students to design experiments or research projects properly, evaluate data critically, analyze and interpret research results objectively, and to become proficient in oral and written communication. While the emphasis is on research, students are given enough coursework and teaching experience in macroscopic anatomy, histology, embryology, neuroscience, cell biology, epidemiology or public health to make them employable in the academic positions that require teaching of these subjects.

Issues for Which the Department Is Not Obligated to the Graduate Student

Almost all of the costs necessary to provide materials used on a day-to-day basis in VIBS such as telephone service, fax machine service, copy machine service, pens, pencils, paper, folders, paper clips, tape, writing pads, slides, overhead transparent sheets, are provided on an annual basis through the state allocation. As a result, the Department cannot provide everything students must have or use as they progress toward completion of their graduate training. The student should provide office supplies and equipment required for their coursework and for preparation of his/her thesis or dissertation.

Obligations of Students to the Department

While a graduate student in the College of Veterinary Medicine, you may be employed by the Texas A&M University System. Accordingly, students are expected to uphold the ethical standards applied to all system employees. Additionally, as a member of the scientific research community, you are expected to maintain ethical standards of research and scholarship.**

Students in the Department of Veterinary Integrative Biosciences are expected to comply with the following:

1. Students should perform their official duties in an honest and forthright manner. The student should not hold financial interests, engage in (a) financial transaction(s) to further private interests, or engage in outside activities that are in conflict with the official performance of their job at TAMU.

2. Students should refrain from and disclose waste, fraud, abuse, and corruption in accordance with System Policy 21.04, Control of Fraud and Fraudulent Actions.

3. Students should protect and conserve public property and shall not use it for other than authorized activities.

4. "Academic research and scholarship must be conducted under the highest standards of honesty and integrity and all data, procedures, and findings will be properly and thoroughly documented. The credibility and long-term reputation of the faculty, staff, and each institution depend on the encouragement, enforcement, and reward of superior ethical standards. Achieving high ethical standards should transcend considerations of finance, personal gain, and short-term individual and institutional recognition." (System Regulations 15.99.03 "Ethics in Research and Scholarship")

5. All recorded data (notebooks, pictures, data disks, captured images, etc.) are the property of Texas A&M and/or the granting agency under which students complete research.

6. Students should use the utmost care and highest ethical standards when completing research involving animal subjects. Minimal numbers of animals should be used and ethical practices and guidelines from the Guide for the Care and Use of Laboratory Animals must be followed (published by the Institute of Laboratory Animal Resources, Commission on Life Sciences, National Research Council, National Academy Press, Washington, D.C.). A summary of the policies outlined in the guide are as follows:
    - "Design procedures on the basis of relevance to human or animal health, advancement of knowledge, or the good of society.
    - Use appropriate species, quality, and number of animals.
    - Avoid or minimize discomfort, distress, and pain in concert with sound science.
    - Use appropriate sedation, analgesia, or anesthesia.
    - Establish experimental endpoints.
    - Provide appropriate animal husbandry directed and performed by qualified persons.
    - Conduct experimentation on living animals only by or under the close supervision of qualified and experienced persons."

7. Information on use of human subjects in research can be found at the Vice President for Research website: http://vpr.tamu.edu/irb.html. "All research projects involving human subjects, conducted by Texas A&M University employees or students or using members of the A&M community as subjects must be approved by the university's Institutional Review Board (IRB)." The referenced webpage contains forms, information, regulations, and links to the Belmont Report, 1979.
8. Information on the use of client-owned animals in research is approved through the Clinical Research Review Committee (CRCC) for Client-Owned Animal Research. http://www.cvm.tamu.edu/resgrad/forms/ Is the site where the CRCC forms will be (currently under revision). For more information contact the office of research and graduate students at the CVM. For university owned animals http://vpr.tamu.edu/bgres.html or the above web site also has the forms.

9. Further responsibilities are described at the System Administrative and General Offices website at sago.tamu.edu/policy

**Portions of this section are adapted from "System Policy 07.01 Ethics Policy, TAMUS Employees" and "System Regulations 15.99.03 Ethics in Research and Scholarship"

Section C
Definitions

Graduate Advisory Committee - a committee of members of the Graduate Faculty who guide and direct the student's entire graduate program.

Major Professor - a member of the Graduate Faculty and Graduate Advisory Committee who has immediate supervision of the student's research and thesis or dissertation. The major professor is normally the chair-person of the student's Advisory Committee.

Graduate Advisor - counsels incoming students to plan a course of study for the first semester, if necessary, before they have established a Graduate Advisory Committee. The Graduate Advisor is a member of the Graduate Faculty and the faculty of the Department of Veterinary Integrative Biosciences appointed by the Department Head. This person is the departmental liaison between the graduate student and the administration of the Department, the College and the University. The Graduate Advisor keeps track of and interprets the rules and regulations and serves as a constant counselor to all graduate students.

Graduate Instruction Committee - a standing committee of representatives, one from each of the departments in the College of Veterinary Medicine. This committee discusses matters regarding graduate instruction and makes recommendations to the College Executive Committee (which consists of the Dean, Department Heads, Associate and Assistant Deans, Hospital Director and Development Officer) and to the Graduate Council. The Departmental Graduate Advisor is a member of this committee.

Graduate Council - a standing committee of the University Faculty Senate that advises the Director of the Office of Graduate Studies. This committee consists largely of the chair-persons of the Graduate Instruction Committee from each college.

Graduate Faculty - that group of faculty that has been authorized by the Graduate Instruction Committee and the Graduate Council to direct graduate student research. All members of the student's advisory committee must be officially recognized members of the University's Graduate Faculty.

Graduate Record Exam (GRE) - admissions test administered by the Educational Testing Service that is required for application to the Office of Graduate Studies. Scores made on the GRE more than five calendar years before application for admission to the Office of Graduate Studies will not normally apply for satisfying admission requirements.

Graduate Programs Committee - a standing departmental committee consisting of six faculty members, appointed by the department head, that advises the department on graduate policies and programs. This committee monitors all parts of the graduate program to assure fairness and quality of the VAPH program. The chairperson of this committee serves on the College Graduate Instruction Committee.

Graduate Council Representative - a member of the TAMU graduate faculty appointed by the office of graduate studies to serve as a member of a graduate student's advisory committee. This appointed member of the committee accepts the dual responsibility of seeing that the student is treated fairly by the committee, while at the same time seeing that the student performs up to the expected standards of graduate excellence at TAMU. Some graduate college representatives choose to become intensely involved with the research while others do not, but they are an active part of the team. The GCR, according to the TAMU Graduate Catalog, "is to be provided a copy of the degree plan, the dissertation or record of study proposal and the dissertation or record of study in a timely manner and must participate in every committee meeting or examination."

Graduate Student Personnel File Supervisor - The department maintains an individual file on each VIBS graduate student. It is the department's job to see that all of the proper records and documents related to a student's individual programs are properly completed in a **timely manner**. Students should

get to know **Dana Parks** and check with them **prior to** submission of any documents (degree plan, petitions, proposals, etc.). They can help students meet all deadlines and prevent returned paperwork.

Office of Graduate Studies – The Office of Graduate Studies is located at 302 Jack K. Williams Administration Building. According to the TAMU Graduate Catalog, "The Office of Graduate Studies (OGS) maintains the official record for each graduate student, and in this role serves as the primary administrative body and overarching source of information for graduate education. OGS assists and facilitates progression towards completion of a graduate degree through maintenance of all official documents. Clearance for graduation, including final review of theses and dissertations when required, is performed by OGS.

The Office of Graduate Studies website is at http://ogs.tamu.edu/

Section D
Programs

The Department of Veterinary Integrative Biosciences offers programs of study and research leading to the MS and PhD degrees in Biomedical Sciences and MS degrees in Epidemiology or Veterinary Public Health. Interdisciplinary programs are also currently available through the Department for degrees in Genetics, Toxicology, and Food Science & Technology. These broadly-based programs encompass studies at both the cellular and molecular levels as well as the organismal and population levels. The academic curriculum is designed to prepare students for independent research and academic careers in their chosen areas of specialization. Students receive core instruction in the basic anatomical disciplines, public health, or epidemiology. The anatomical disciplines include macroscopic anatomy, histology, embryology, neuroanatomy, cellular and molecular biology, or developmental biology. Public health includes descriptive and analytical public health, biostatistics, and toxicology. Epidemiology includes studies of the design, conduct, and evaluation of both descriptive and analytic research studies in both veterinary and human populations. Issues specific to the study of infectious and non-infectious diseases are addressed.

Students specialize in one of five areas of emphasis of the research faculty in the Department:

Genomics, which emphasizes applications of structural and functional genomic tools to understanding diseases and biologically relevant traits in domestic companion and livestock species, and their exotic relatives.

Neuroscience, which emphasizes the function and morphology of the nervous system at tissue, cellular, and molecular levels.

Reproductive/Developmental Biology, which emphasizes the functional anatomy of reproduction and development at tissue, cellular, and molecular levels.

Food Safety and Technology, which develops and implements technological and regulatory practices that protect and improve aspects of human food and/or animal feed which influence health.

Environmental Toxicology and Public Health:

Toxicology, which studies molecular and kinetic mechanisms involved in the toxic actions/ interactions of environmentally important toxins and the health effects of such chemicals in all vectors.

Veterinary Public Health, which studies the control, diagnosis, and prevention of diseases, with emphasis on those transmitted between humans and animals, specifically including rabies, brucellosis, Lyme disease, and trichinosis.

Epidemiology, which relies on a constantly evolving theory and methodology (as well as practice) in order to better describe the distribution and determinants of disease (or health status) in populations of humans and animals.

Section E
Admission

Students will be considered for admission if they meet the standards set forth by the Texas A&M University, which complies with Texas House Bill 1641. We seek candidates with superior credentials that include GPA, GRE/GMAT verbal score and GRE/GMAT quantitative score. Graduate students currently in our program have a past coursework grade point average (GPA) of 3.40. A TOEFL score (not more than two years old) is required of those who are from a country in which the official language is not English. These students must pass the ELPE exam in order to teach. In general, students who apply should also have (1) in-depth course exposure in the biological sciences; (2) past hands-on research experience, either at the undergraduate honors level or the BS or MS levels; (3) strong letters of recommendation; (4) demonstrated evidence of good communication skills; and (5) provided a written plan for their tentative future career goals in teaching and/or research.

Applicants who meet the above criteria must consult with the departmental Graduate Advisor, who in concert with the Department Head, will determine if there is a likelihood that a Graduate Faculty member can be found within the Department who can act as the Major Professor. A major consideration is whether or not the programs we offer are compatible with the anticipated future goals of the student. The Graduate Advisor and Department Head will also evaluate any special situations in the applicant's past experience and academic credentials that will influence the admission process.

Admission first requires submission of an application for graduate studies to the Texas A&M University Office of Admissions. Forms are available online (http://admissions.tamu.edu/graduate/).

Following receipt of the application by the Texas A&M University Office of Admissions, the application is then reviewed by the Departmental Graduate Programs Committee and, often, an interview is requested. The Departmental Graduate Programs Committee recommends acceptance or rejection to the Department Head. Final offer of admission is the prerogative of the Department Head.

Section F
Advisory Committee

Composition

The Advisory Committee for a student shall be selected by mutual agreement of the student and the chosen Major Professor, subject to the approval of the Department Head. For the MS degree, the Committee will consist of a chairperson and at least two other members, one of whom must be from another department. The Committee for a student pursuing a PhD degree will consist of a chairperson and at least three other members, one of whom must be from an outside department, plus a Graduate Council representative, who is appointed by the Office of Graduate Studies. These are minimum numbers; the committees can be larger if desired.

Faculty members who are eligible to serve as major professors must have the following qualifications:

1. A research program sufficiently active to permit the student to complete a thesis or dissertation research project in a timely manner.

2. Access to adequate equipment and supplies to support the student's research project.

Responsibilities of the Major Professor

The major professor has the following responsibilities to the student:

1. To provide for the supplies, equipment, and other resources necessary to successfully complete a graduate program.

2. To explain to the student the requirements for successful completion of a degree program.

3. To explain the specific requirements needed for satisfactory completion of the planned research.

4. To supervise and assist the student in conducting research. This responsibility includes molding and monitoring the development of a student to assure that the student acquires competence in the theory and methodology of the research specialty.

5. To approve in a timely fashion the proper university required documents (degree plan, proposal, dissertation or thesis, request for graduation, etc,) completed by the student.

6. To assure that an eligible student who is on university or departmental financial support makes application for extramural research support by the end of the first year.

7. To help the student achieve the goals listed under “Goal and Objectives of Graduate Faculty/Students” within this document.

8. To proactively help the student obtain placement in a high-quality program (post-doctorate, faculty, or industry) after graduation.

9. To provide a forum for development of oral communication skills, such s regular lab meetings at which students present and discuss their data.

Section G

Financial Support

Graduate student stipends are available from the Office of Graduate Studies, the Department, interdisciplinary training grants and individual research grants in the Department. These awards are competitive, based on grade point average, GRE scores, past academic and research experience, and commitment to science.

Office of Graduate Studies

Merit Fellowships and Minority Merit Fellowships - restricted to students enrolled for the first time as graduate students at Texas A&M University. These funds are effective September 1 through August 31 for 24, 36, or 48 months. Completed applications (including GRE scores) must be received at Texas A&M University by March 1 preceding the Fall Semester of intended enrollment. Students must have been admitted to an authorized degree program by this date.

Department

Graduate Assistant, Teaching (GAT) or Non-Teaching (GANT) - restricted to students enrolled for the first time as graduate students at Texas A&M University. Effective September 1 through May 31 or August 31. Nominations are requested in the month of February preceding the Fall Semester of intended enrollment. Nominees should have completed applications (including GRE scores) by March 1. Further information about Graduate Assistantships can be found at http://studentlife.tamu.edu/agss/assistantships.htm.

In addition, Veterinary Clinical Associateships (VCAs) are offered to qualified graduate students holding the DVM/VMD degree. Contact the Department Head for information. **Along with the GAT AND VCA awards comes an obligation to teach**. **GANT awardees are not required to teach, but will be asked to help assist with a course outside of the classroom (preparation, grading, record keeping, etc.).** (See section on Teaching.)

Fellowships are also available for the various interdisciplinary programs on campus (Food Science and Nutrition, Genetics, Toxicology, etc.). Consult the directors of these programs for current details.

Individual Research Grants

Researchers within the Department receive substantial funding from the National Institutes of Health, the U.S. Department of Agriculture, the Environmental Protection Agency, Department of Defense, private foundations, and private industry. Funds from these grants and contracts support many of the graduate students in the Department. For information, contact the Department Head or Graduate Advisor.

Competitive Graduate Student Fellowships

Eligible PhD candidates who receive stipends directly from the Department (as opposed to funds from grants or University fellowships) are expected to document a good-faith effort to secure an alternative extramural source of funding by the end of the first year. Such students should work with their major professor to obtain grants that include budgeting for graduate student support. Students should also apply to the student support programs of NIH, NSF, foundations, and other such sources.

Section H
Requirements for MS and PhD Degrees in Biomedical Sciences

Curriculum

The Department of Veterinary Integrative Biosciences awards both the MS, non-thesis MS and PhD degrees in Biomedical Sciences. The department recognizes that each graduate student is unique and therefore there is a considerable degree of flexibility with regard to the course selection for each student's degree plan. Some of the participating faculty belong to interdepartmental programs, such as Toxicology, Food Science and Technology, Nutrition, Reproductive Biology, Neuroscience, or Genetics. Graduate students who choose one of the interdepartmental programs ***will follow the degree requirements of that respective degree*** except that all VIBS students are expected to present at the VIBS student symposium (see Oral Presentations). Joint DVM-PhD programs can be arranged in special cases through the Associate Dean for Research and Graduate Studies. The list of new courses available is constantly being updated so students should check the latest catalogue and consult with their mentor. All degree requirements are as stated in the Graduate Catalog, except as shown below:

Course Requirements for Biomedical Sciences Degree Plans

	Minimum Credit Hours	
	MS	**PhD**
General Core Courses (or equivalent; for VIBS students with neuroscience, reproductive, or other biological science focus)		
BICH 601	3	3
BICH 602	3	3
STAT 601 or 651	4 or 3	4 or 3
STAT 602 or 652		3
VIBS 602 Histology	4	4
VIBS 689 Special Topics in Scientific Ethics	3	3
VIBS 650 Education in a Veterinary Medical & Biomedical Environment	1	1
VIBS 681 Seminar (see "Oral Presentation")	1	2
VIBS 685 (see [+]"Lab Rotation")	...	3[+]
SUBTOTALS	**24-30**	**38-44**
VIBS 691 (research) and other elective courses and seminars	2-6	51-55
TOTALS	**32**	**96**
Reproductive Biology Core		
ANSC 630	4	4
ANSC 631		4
VTPP 653 or ZOOL 649	3	3
Reproductive Biology Electives		
VTPP 654	3	3
VTPP 659	3	3
VIBS 601	4	4
VTMI 649	3	3
VIBS 617	1-4	1-4
Specialty-Group Core Courses* **		
Anatomy core (see below)	…	4
Cell Biology or Neuroscience or Reproductive Biology (See below)	6	12

The General Core Courses can be waived if an MS in a field of biomedical science is already completed, or if the student's committee deems that equivalent competency already exists.

Anatomy Core Courses			**Credit Hours**
BIOL	602	Transmission Electron Microscopy	5
VIBS	603	Neuroanatomy	4
VIBS	612	Embryology	4
VIBS	689	(Special Topics in Mammalian Developmental Biology)	4

* Waivers allowed for equivalent courses taken previously.
** Optional for DVMs
*** Students who choose an interdepartmental program in Genetics, Toxicology, or Food Science and Nutrition will take Specialty Group Core Courses required by the respective degree and as determined by the student's committee.

Suggested Specialty Core Courses**

			Credit Hours
Cell Biology			
BICH	689	Molecular Biology I	1-4
BIOL	602	Transmission Electron Microscopy	5
BIOL	611	Molecular Biology of Differentiation and Development	3
	OR 674	Cellular and Molecular Aspects of Development	3
MMIM	602	Immunoregulation	3
VIBS	602	Histology	4
VIBS	617	Cell Biology	1-4
VIBS	640	Neurobiology	1-5
VTMI	649	Immunology	3
VTMI	650	Experimental Immunology	4
VTMI	662	Advanced Immunologic Concepts	1-5
Neuroscience			
Neurosciences Core Courses			
BIOL	689	Principals of Neuroscience I	3
BIOL	689	Principals of Neuroscience II	3
Neurosciences Electives			
ANSC	610	Applied Animal Ethology	3
ARCH	677	Neuroscience and Architecture	3
BIOL	601	Biological Clocks	3
BIOL	611	Molecular Biology of Differentiation and Development	3
BIOL	615	Signal Transduction in Behavior and Development	3
BIOL	644	Neural Development	3
BIOL	634	Comparative Neurobiology	3?
KIN	625	Disabling conditions	3
KIN	689	Neurophysiology of movement	TBA
MANA	607	Methods of Behavioral Brain Research	1
MANA	608	Methods in Neurohistology	2
MANA	609	Neurochemistry	2
MPHM	603	Neuropsychopharmacology	4
PSYC	606	Learning	3
PSYC	607	Experimental Psychology	3
PSYC	609	Physiological Psychology	3
PSYC	630	Health	3
PSYC	641	Principles of Neuropsychology	3
PSYC	649	Seminar in Behavioral Neuroscience	3

PSYC	671	Experimental Design for Behavioral Scientists	3	
PSYC	689	Neuroanatomy	TBA	
VIBS	603	Neuroanatomy	4	
VIBS	604	Neuroendocrine Anatomy	4	
VIBS	606	Neuroanatomical Systems: Neurodegenerative diseases	3	
VIBS	612	Mammalian Embryology	4	
VIBS	640	Neurobiology	1-5	
VIBS	689	Developmental Toxicology	TBA	
VIBS	689	Cellular Neurophysiology	4	
VPAT	650	Neuropathology of Animals	1-4	
VTMI	664	Strategies for manipulating the mouse genome	3	
WFSC	620	Vertebrate Ethology	4	
WFSC	622	Behavioral Ecology	3	
ZOOL	434	Regulatory and Behavioral Neuroscience	3	
ZOOL	435	Laboratory for Regulatory and Behavioral Neuroscience		1
ZOOL	634	Comparative Neurobiology	3	

SECTION I

Requirements for MS Degree in Veterinary Public Health

General Core Courses (or equivalent)		Minimum Credit Hours
VIBS	608 Epidemiology methods I*	4
STAT	651 Statistics in research I	3
VIBS	650 Graduate education	1
VIBS	681 Seminar (see "Oral Presentation")	1
VIBS	694 Internship (non-thesis option only)	Var (8 max)
VIBS	691 Research (thesis option only)	Var (8 max)

*May be replaced with VIBS 607 Applied Epidemiology with approval of the student's advisory committee
Minimum 36 hours are required per university regulations for MS non-thesis degrees
Minimum 32 hours are required per university regulations for MS thesis degrees

Students pursuing the MS in Veterinary Public Health can choose 1 of the 3 available themes

Veterinary Public Health Themes

1. Epidemiology
2. Food Safety and Security
3. Public Health and Policy

1. Epidemiology Theme

Theme-Specific Core Required Courses (or equivalent)**		Minimum Credit Hours
VIBS	610 Epidemiology methods II (Module 1)	3
STAT	652 Statistics in research II	3

Theme-Specific Required Courses (2 minimum)**		Minimum Credit Hours
VIBS	689 Risk analysis, disease detection and surveillance	3
VIBS	689 Spatial methods in epidemiology	3
VIBS	689 Infectious disease epidemiology	3
VIBS	615 Food hygiene	4
VIBS	633 Animal diseases in comparative medicine	3

2. Food Safety and Security Theme

Theme-Specific Core Required Courses (or equivalent)**		Minimum Credit Hours
CVEN	610 Environmental risk assessment	3

Theme-Specific Required Courses (5 minimum)**		Minimum Credit Hours
VIBS	615 Food hygiene	4
VIBS	618 Food toxicology I	3
VIBS	619 Food toxicology II	3
VIBS	670 Basic environmental toxicology	3
FSTC	657 HAACP	3
FSTC	606 Microbiology of foods	3
AGEC	689 Biosecurity	3
VTMI	689 Foreign animal diseases	3
VTMI	619 Molecular methods in microbiology	3

3. Public Health and Policy Theme

Theme-Specific Core Required Courses (or equivalent)**		**Minimum Credit Hours**
CVEN	610 Environmental risk assessment	3

Theme-Specific Required Courses (5 minimum)**		**Minimum Credit Hours**
VIBS	689 Risk analysis, disease detection and surveillance	3
AGEC	689 Biosecurity	3
VTMI	689 Foreign animal diseases	3
VTMI	619 Molecular methods in microbiology	3
FRSC	651 GIS for resource managers	3
BUSH	601 Leadership and public administration	3
BUSH	611 Public policy formation	3

**Or equivalent courses as determined by the student's advisory committee

Selection of elective courses for each theme should be determined by individual advisory committees to obtain the appropriate required hours. Some of the courses listed are not taught every semester and students should consult with their advisory committee to identify appropriate addition/substitution courses as necessary.

Students not possessing an undergraduate or advanced degree in the life sciences, veterinary medicine, or medicine are strongly recommended to take a graduate-level course in physiology, and appropriate to their area of interest, a course in microbiology or pathology.

Technical Writing

Depending on the assessment of the student's writing skills by his/her advisory committee, completion of a technical writing course may be required.

Section J
Requirements for MS Degree in Epidemiology

Curriculum

The Department is authorized to award MS degrees in epidemiology. **A non-thesis option is not available**. Some of the participating faculty belong to interdepartmental programs, such as Toxicology, Food Science and Technology, Nutrition, Reproductive Biology, Neuroscience, or Genetics. Graduate students who choose one of the interdepartmental programs will follow the degree requirements of that respective degree except that all VIBS students are expected to present at the VIBS student symposium (see Oral Presentations). All degree requirements are as stated in the Graduate Catalog, except as shown below:

Course Requirements for MS Degree in Epidemiology

General Core Courses (or equivalent)*		**Minimum Credit Hours**
VIBS	608 Epidemiologic methods I	4
VIBS	610 Epidemiologic methods II (Module 1)	3
VIBS	650 Graduate education	1
VIBS	681 Seminar (see "Oral Presentation")	1
STAT	651 Statistics in research I	3
STAT	652 Statistics in research II	3
VIBS	691 Research	Var (8 max)

*VIBS 607 Applied epidemiology or equivalent is recommended for students without a prior course in epidemiology

Additional Required Courses (2 minimum)**		**Minimum Credit Hours**
VIBS	610 Epidemiologic methods II (Module II)	1
STAT	607 Sampling	3
STAT	653 Statistics in research III	3
STAT	636 Methods in multivariate analysis	3
STAT	659 Applied categorical data analysis	3
PHEB	609 Categorical data analysis	3
PHEB	689 Survey sampling	3

Suggested Elective Courses**		**Minimum Credit Hours**
VIBS	689 Risk analysis, disease detection and surveillance	3
VIBS	689 Spatial epidemiology	3
VIBS	689 Infectious disease modeling	3
FRSC	651 Geographic information systems	3
FRSC	652 Advanced topics in geographic information systems	3
HLTH	607 Health research methods	3
RLEM	653 Landscape analysis and modeling	3
SOCI	623 Measurement of sociological parameters	3
SOCI	624 Qualitative methodology	3
STAT	637 Statistical methods in ecology	3
WFSC	624 Dynamics of populations	4

**Or equivalent courses as determined by the student's advisory committee

Selection of appropriate courses should be determined by individual advisory committees to obtain the minimum 32 hours required per university regulations for MS thesis degrees. Some of the courses listed

are not taught every semester and students should consult with their advisory committee to identify appropriate addition/substitution courses as necessary.

Students not possessing an undergraduate or advanced degree in the life sciences, veterinary medicine, or medicine are strongly recommended to take a graduate-level course in physiology, and appropriate to their area of interest, a course in microbiology or pathology.

Technical Writing

Depending on the assessment of the student's writing skills by his/her advisory committee, completion of a technical writing course may be required.

Section K
Requirements for the Epidemiology Track within the PhD Degree in Biomedical Sciences

General Core Courses (or equivalent)*		Minimum Credit Hours
VIBS	608 Epidemiologic methods I	4
VIBS	610 Epidemiologic methods II (Modules 1&2)	4
VIBS	650 Graduate education	1
VIBS	681 Seminar (see "Oral Presentation")	1
STAT	651 Statistics in research I	3
STAT	652 Statistics in research II	3

*VIBS 607 Applied epidemiology or equivalent is recommended for students without a prior course in epidemiology

Additional Required Courses (3 minimum)**		Minimum Credit Hours
STAT	653 Statistics in research III	3
STAT	606 Design of experiments	3
STAT	607 Sampling	3
STAT	659 Applied categorical data analysis	3
PHEB	609 Categorical data analysis	3
PHEB	689 Survey sampling	3

Suggested Elective Courses**		Minimum Credit Hours
VIBS	689 Risk analysis, disease detection and surveillance	3
VIBS	689 Spatial epidemiology	3
VIBS	689 Infectious disease modeling	3
FRSC	651 Geographic information systems	3
FRSC	652 Advanced topics in geographic information systems	3
HLTH	607 Health research methods	3
RLEM	653 Landscape analysis and modeling	3
SOCI	623 Measurement of sociological parameters	3
SOCI	624 Qualitative methodology	3
STAT	637 Statistical methods in ecology	3
WFSC	624 Dynamics of populations	4
STAT	636 Methods in multivariate analysis	3

**Or equivalent courses as determined by the student's advisory committee

Selection of appropriate courses should be determined by individual advisory committees to obtain the minimum hours required per university regulations for PhD degrees. Some of the courses listed are not taught every semester and students should consult with their advisory committee to identify appropriate addition/substitution courses as necessary.

Students not possessing an undergraduate or advanced degree in the life sciences, veterinary medicine, or medicine are strongly recommended to take a graduate-level course in physiology, and appropriate to their area of interest, a course in microbiology or pathology.

Technical Writing

Depending on the assessment of the student's writing skills by his/her advisory committee, completion of a technical writing course may be required.

**Students wishing to take MANA courses must receive approval of their committee members and obtain a form in the graduate office of the medical school to be filled out for registration. The process for obtaining credit for these courses is currently in review and students should check with their major professor as to any procedural changes that might arise.

***Students may find other TAMU Health Science Center Courses listed at http://medicine.tamhsc.edu From there, click on the appropriate school from the website menu.

NOTE: The application process for obtaining credit for courses taken in the TAMUS-HSC is being revised.

Section L
Requirements for MS Degree in Science and Technology Journalism

Curriculum

The Department administers the MS degree program in science and technology journalism. Students choose between a non-thesis (internship) track and a thesis track. The non-thesis track (total: 36 hours) includes 15-27 hours of journalism-related classes, 6-18 hours of science electives, and a 3-hour internship (VIBS 684, Professional Internship). The thesis track (total: 32 hours) includes 18 hours of journalism-related classes, 6 hours of science electives, and 8 hours of thesis research (VIBS 691, Research). The program is individualized to suit each student's background and goals.

Core Courses

All students take the following 3 courses:

VIBS 657	Issues in Science and Technology Journalism
VIBS 658	Research Methods in Science and Technology Journalism
VIBS 660	Reporting Science and Technology

Other Journalism-Related Courses

Students can take other journalism-related courses in the VIBS department and elsewhere in the university. Examples of courses that qualify include VIBS 663 (Biomedical Reporting), a VIBS 685 (Directed Studies) course in science editing, relevant courses in the communication department and the English department, and courses in the history and philosophy of science. Students should choose their journalism-related courses in consultation with their advisors.

Science Electives

Science courses from any department in the university can be taken. Students should consult their advisors about selecting such courses. All students in the program are strongly encouraged to take VIBS 607 (Applied Epidemiology). Those students who have not taken a statistics course are encouraged to do so.

Prerequisite Work

Students without sufficient background in journalism or science are required to complete additional undergraduate courses as preparation for their studies. Such prerequisite work is specified at the time of admission.

Section M
Course Load

Course credit hours for which a student must register each semester vary depending on the type of financial support received by the student (see "In Residence Registration" and "Financial Assistance" in the Graduate Catalog). International students are also subject to specific requirements (see "Course Load Requirements for International [Non-Immigrant] Students" in the Graduate Catalog).

Minimum acceptable requirements for Graduate Assistant, Teaching (GAT), Graduate Assistant, Non-Teaching (GANT), Graduate Assistant, Research (GAR) (All 50% time employment) and Veterinary Clinical Associate (VCA) (75% time employment) are the following:

Fall & Spring Semester - 9 Credit Hrs
Summer Sessions -
For one 5-wk Summer Session: 3 Credit Hrs
For one 10-wk Summer Session: 6 Credit Hrs

Note: When students finish formal course hours, they register for 691-Research credit hours to satisfy the minimum requirements given above.

Note: Students must register for each semester until degree work is completed. See Graduate Catalog, "Registration and Academic Requirements," for details.

Section N

Laboratory Rotation

(See VIBS 685 in Course Requirements for Biomedical Sciences Degree)

All incoming VIBS PhD candidates who have not identified a major professor at the time of entry into the program are expected to spend several weeks of tutorial training in at least three different laboratories, ideally during the first and/or second semester. If a student does not complete the rotations in the first semester, the student may take a grade of "incomplete" and finish the remaining rotation(s) in the next semester. Only with special permission from the Department Head will a student be allowed to postpone beginning the rotation beyond the first semester enrolled in the graduate program.

The purpose of these rotations is to allow the student to observe the operations of the lab and to receive a quick overview of the research discipline of the lab. The student will be assigned key papers regarding the ongoing research and the techniques used in the lab. The amount of "hands on" experience will be left up to the supervisor of the lab being visited. One of the rotations may be with the faculty member who may later become the student's major professor. These rotations should also assist the student to select a graduate committee in a more informed manner.

If a major professor is already identified at the beginning of the student's enrollment, then the student may, with the approval of his/her major professor, plan three credits of 685 as a full semester rotation in one laboratory outside the major professor's lab. This rotation should provide a means in which to learn a technique and to generate data from a part of the experimental protocol of the student's graduate proposal. This rotation should be planned later in the student's graduate program (after the committee is identified, the research proposal is approved, and the experimental protocols are underway). This rotation should allow the student to work closely with several committee members, and to learn techniques outside of the major professor's lab. In addition, the student will serve as a bridge to help foster interdisciplinary research collaboration between faculty in and outside of VIBS.

Section O
Oral Presentations

The Department provides several forums for the development of oral communication skills by graduate students. Such skills are vital to success in most professional endeavors, including those in academic, government, or private sectors. The Office of Graduate Studies requires that students pursuing a Master's degree pass an oral and/or written examination covering their thesis and all work taken on the degree program (see "Final Examination" in the Graduate Catalog). Those pursuing a PhD must pass both written and oral preliminary examinations covering the subject matter of all fields in the program, and an oral final examination that covers the dissertation and related topics (see "Examinations," "Admission to Candidacy," "Dissertation," "Application for Degree," and "Final Examination" in the Graduate Catalog). In preparation for these examinations and for demands that will be made on their oral communication abilities later in their careers, students **are required** to attend and present in multiple formats as follows:

Seminar and Student Symposium.

Seminar allows students to meet and hear leading scientists in their field. Seminars featuring nationally recognized speakers allow students to see and hear proper and exciting presentations of good science.

The following rules govern seminar: **(Please note number 3)**

1) In order to complement graduate level learning, scientific advancement, and scientific contact, all graduate students should attend seminars on a weekly basis every semester they are in residence.

2) All students are expected to attend the **STUDENT SYMPOSIUM** each time it meets.

3) All students must register during their residence for one (1) hour of seminar during their Master's (MS) program or two (2) credit hours during their doctoral (PhD) program. When registered for seminar students will attend an average of one seminar of their choosing each week. It is recommended that students also present at the departmental symposium the semester in which they are registered for seminar.

Symposium affords students the opportunity to learn and practice their verbal, organizational, and public speaking skills, and to apply the art of timed presentations.

Rationale:

(1) Symposium allows the students to prepare, present, and defend a scientific presentation in front of their peers.

(2) Students have to communicate their research data in the future and most will either teach or train people - both of which require presentations of data and information from textbooks, journals, papers, etc.

The following rules govern Student Symposium Presentations:

(1) Regardless of other presentations VIBS students may give, VIBS graduate students must present at least twice (PhD) or once (MS) at the **STUDENT SYMPOSIUM** over their time in residence. Students early in their graduate program may present a review of major research papers in their research area, students in the middle part of their program may choose to present their research proposal or preliminary data, while students late in their program should present their research data.

(2) Students should seek guidance of their major professor and graduate committees in preparing and previewing student presentations prior to delivery. The student is encouraged to meet with the professor afterwards to review the presentation. All **SYMPOSIA** are videotaped so that students can review the tape to help them address and improve their presentation skills. Feedback about the student's performance at the Student Symposium will be provided in written form by at least three faculty members designated by the seminar coordinator or major professor. Constructive criticism

will be offered on scientific soundness, presentation style, visual aids, appearance, voice, mannerisms, and other pertinent areas. Assistance is available on campus for graduate students who have excessive difficulty with oral presentations.

Scientific Meetings. Students are encouraged to attend and to present their work at regional, national or international meetings before graduation. Travel funds for use by doctoral students to present dissertation work may be applied for from the Mini-Grant Program that the Office of Graduate Studies sponsors http://ogs.tamu.edu/. Details are available through the departmental office, the Graduate Student Advisor, at and the College of Veterinary Medicine Graduate Student Association at www.cvm.tamu.edu/gas. In addition, many of the Intercollegiate Faculties have grants available for graduate students.

Section P
Written Communications

A major goal of the graduate program in the Department of Veterinary Integrative Biosciences is to develop scientists capable of writing proposals and of publishing research results effectively. Where needed, they will be required to enroll in a technical writing course.

Thesis and Dissertation Proposals. The student must submit a proposal at an early stage of his/her training that outlines intended research. In no case should this be later than the end of the first year for MS students or the end of the second year of the program for PhD students. The student and the major professor, in consultation with the members of the Advisory Committee, jointly carry out selection of the project. For students pursing the MS, the Advisory Committee and the Department Head must approve the proposal. For students pursuing the PhD, the Advisory Committee, Graduate Council Representative, and the Department Head (and chair of the intercollegiate faculty, if appropriate) must approve the proposal.

Other Proposals. Experience in writing grant proposals is essential training for graduate students pursuing the Doctor of Philosophy degree. Major professors should encourage students to participate in active research programs as junior team members, helping in experimental design and development of research programs. ***REMINDER:*** **Eligible PhD students who obtain stipends from the Department are expected to actively seek extramural funding, which is also another opportunity to gain experience in proposal writing.** For example, students may submit proposals for funding to the Graduate Student Mini-Grant Program, to the National Science Foundation (NSF) predoctoral award program, the National Institutes of Health (NIH), or to other programs. A folder with proposal examples is available through Dr. Jane Welsh, Graduate Student Advisor.

Theses and Dissertations. The Office of Graduate Studies requires the preparation of a thesis by students seeking a Master's degree (thesis option) or a dissertation by those seeking a Doctor of Philosophy degree. The Department does offer a Master's degree, non-thesis option both in Veterinary Public Health and Biomedical Sciences. The thesis or dissertation is an original work by the student that reviews progress in the field of the student's research, describes his/her original experimental methods and results, and discusses the significance of these results in relation to the existing body of knowledge. The format should be consistent with that used in a scholarly journal in the student's field of study. In addition the work must contain a comprehensive review of the literature and a thorough comparison of the results with what is already published. Specific instructions regarding the preparation of the thesis or dissertation may be obtained from the Office of Graduate Studies.

A requirement for the PhD degree in this Department is that the dissertation, or some appropriate portion of it, be prepared for submission to a peer-reviewed scientific journal for publication. ***It is suggested that this submission be completed prior to submission of the dissertation for the Department Head's signature.***

Section Q

Graduate Student Teaching Requirements

1. Texas A&M is committed to quality instruction at all levels. The Department of Veterinary Integrative Biosciences is committed to providing the opportunity for all graduate students to gain insight into education pedagogy. All graduate students (MS or PhD) who teach are required to attend and participate in the TATEP program on teaching methods presented, in the fall, by the Center for Teaching Excellence. Teaching stipends **cannot** be awarded until these requirements are met. (Please note that students who are spring teaching assistants, and did not attend the program in the fall, will be required to attend the next fall scheduled session.)

2. VIBS students who receive graduate assistant teaching (GAT) or graduate assistant non-teaching (GANT) stipends from the Department must assist in the instructional program of the Department each semester they are paid by the Department. Teaching is an important part of the University mission, and graduate students are an important part of teaching. **Please be aware that if a graduate student receives a departmental stipend (GAT, GANT) he/she accepts an obligation to teach/assist with teaching each semester he/she receives the stipend (see 3 and 4 below).** When the student obtains his/her own support, an extramural fellowship, or support from their major professor, they are released from a teaching obligation, provided items 3 and/or 4 below are met. Students are welcome to continue a classroom assignment if they desire.

3. All graduate students seeking the MS or PhD degree, regardless of source of support, must assist in teaching, to the satisfaction of the supervising professor, during the matriculation of this program.

4. Teaching assistance will ordinarily consist of laboratory instruction in one of the courses for which the graduate student is deemed qualified by the course instructor. With the approval of the Department Head, students paid from non-departmental funds may satisfy their teaching requirement in any courses in which members of the VIBS faculty are participating instructors.

5. Teaching assignments are to be made by the Department Head or his/her designee with input from the student's major professor.

6. Graduate student teaching performance is to be evaluated and critiqued by the instructor who is supervising the course. Unsatisfactory performance by GATs or GANTs will lead to termination of their financial support. Some students may be required to repeat the teaching assistant requirement in the same or another course.

7. All graduate students are expected to have basic command of the English language. Students who fail to meet certain standards of English competency will be required to take remedial English courses. An international student who has not passed the ELPE cannot be a GAT but may be considered for a GANT position. For university requirements on English proficiency, please see Section V/Admission of the handbook of the Graduate Handbook (English Language Proficiency Requirements, English Language Proficiency Examination, and English Proficiency Counseling).

Section R
University Residence Requirement

In order to receive a graduate degree from TAMU, the University requires that students be on campus and attend class as follows:

MS candidates:	1 semester, full-time
PhD candidates:	
with BS	4 semesters, full-time (2 must be consecutive)
with MS or DVM	2 semesters, full-time

The full-time course load per semester is a minimum of 9 hours. This load may be satisfied by registration for "research hours," i.e., VIBS 691, or any combination of formal, numbered courses and 691 credits.

Residence requirements for the PhD degree must be met before admission to candidacy (see “The Degree of Doctor of Philosophy: Residence" in the Graduate Catalog). For establishing residence requirements, the two combined 5-1/2-week summer terms are equal to one semester.

Section S
Milestones and Timetable for the Degree Process

Activity Required of Student	Recommended Time of Completion (months after enrolling)	
	MS	PhD**
Meet with Department's Graduate Advisor	... before enrollment...	
Identify the Major Professor*	3	6
Create and meet with Advisory Committee	5	8
Submit Degree Plan	6	9
Meet with Advisory Committee to develop plans for thesis/dissertation	8	12
Submit thesis/dissertation proposal	10	15
Complete all course work and take oral preliminary examination		20
Review research progress and problems with Advisory Committee	16	26
Submit thesis/dissertation and take final oral/written examinations	24 - X	36 - X
Exit Interview		

*Some students will identify a major professor prior to entrance into the graduate program. (This is particularly true for epidemiology students.) Students who do not have a major professor prior to entrance into the graduate program will be assigned a temporary advisor by the Department Head or by the Departmental Graduate Advisor. Within one year, the student should identify a major professor.

**Schedule assumes that student enters with equivalent MS or DVM background. For those without these prior degrees, a detailed outline, including submission deadlines, is given on pages 111-121 in the graduate catalog.

A guiding principle for all candidates is that the degree plan should be submitted before more than half of the courses to be taken are completed and that the research proposal should be submitted at least six months before submitting the thesis and twelve months before submitting the dissertation.

Section T
Relationships to Professional Veterinary Curriculum

A student enrolled in a graduate program in the Department of Veterinary Integrative Biosciences may not apply to the veterinary curriculum at Texas A&M University unless the student has completed his/her degree. Special exceptions may be arranged with the Department Head. When the College develops a formal DVM/PhD joint program, the policies will be adjusted accordingly for those VIBS students who are approved to participate.

Graduate students who leave the graduate program to enroll in the veterinary curriculum will not receive academic credit for any professional courses they may have taken with veterinary students (VIBS 601, 602, or 603).

This policy may be waived for students who concurrently pursue DVM and PhD degrees.

Section U
Useful Websites

Office of Graduate Studies: http://ogs.tamu.edu/

Medical Sciences Library: http://library.tamu.edu/

College of Veterinary Medicine: www.cvm.tamu.edu/

CVM Graduate Studies: www.cvm.tamu.edu/resgrad/

Graduate Student Association: www.cvm.tamu.edu/gsa
Click on "Travel Awards" to find information on funding for attending meetings

Center for Teaching Excellence: www.cte.tamu.edu

Funding information:
***Lalor Foundation**: http://www.lalorfound.org/
Office of Graduate Studies: http://ogs.tamu.edu/

Virology: www.cvm.tamu.edu/virology/

Neuroscience: www.bio.tamu.edu/neuro/

Genetics: http://gene.tamu.edu/

Toxicology: http://toxicology.tamu.edu/

*The goal of the Foundation is to promote intensive research in the areas indicated and to assist and encourage able recent postdoctoral investigators in academic positions to follow research careers in reproductive physiology.

Section V
Graduate Faculty

Abbott, Louise C. - developmental neurobiology of the mammalian nervous system; neuroanatomy; neurochemistry; neurologic disorders including ataxia and epilepsy; programmed cell death (apoptosis) in the developing and adult nervous system; developmental neurotoxicology with specific interest in the effects of heavy metals on the developing CNS. [a,c]

Arosh, Joe A., Prostaglandin Biosynthesis, Catabolism, Transport and Signaling, Molecular Endocrinology and Cell Signaling, Reproductive Biology: Uterine and

Ovarian Physiology, Endocrine Oncology: Breast, Endometrial and Ovarian Cancer [b]

Banu, Sakhila K- endocrine toxicology, endocrine oncology, heavy metal endocrine disruptors on female reproductive tract development and function, pregnancy outcomes and fetal development, vitamin C and nutrioxidants' intervention in heavy metal-induced toxicity prostaglandin biosynthesis, signaling and transport on mammary gland cancer development

Bratton, Gerald R. - gross anatomy, neuroanatomy, nutritional influences on lead intoxication, metal effects on reproductive function, localization of central nervous system neurons and their peripheral distribution. [a,b,c]

Budke, Christine M. - epidemiology- zoonotic diseases, international veterinary medicine and public health, transmission dynamics of parasitic diseases, burden of disease indicators.

Burghardt, Robert C. – reproductive biology, toxicology, cell signaling and signal transduction; development/application of non-invasive imaging tools using biosensors for defining the function of living cells and tissues and the action of biological response modifiers on cellular homeostasis. [a,b,f,4,5,14,15]

Cai, James J.- molecular population genomic, sevolutionary interpretation of genotype-phenotype mapscientific computing, algorithms, and software tools genetic disorders and complex traits, interaction network, alternative splicing, and the evolution of gene expression

Chowdhary, Bhanu P. – genome analysis in livestock, comparative genomics, molecular cytogenetics, analysis of genetic diseases. [d,1]

Cummings, Kevin- analytic epidemiology, molecular epidemiology, statistical methods, epidemiology of *Salmonella* and other foodborne pathogens, public health, in particular food safety and zoonotic diseases, antimicrobial resistance, hospital biosecurity

Cothran, E. Gus Heredity basis of equine congenital defects. Interrelationships of inbreeding, genetic polymorphism, and reproductive performance in horses. Population genetics of feral horses. Genetic conservation of rare breeds. Evolution of horses under domestication. Comparative genomics.

Dees, W. Les - neuroendocrinology, reproductive physiology, puberty and sexual maturation, neurotoxicology. [a,b,c]

Gastel, Barbara scientific writing science editing medical journalism international scientific communication.

Hoffman, Anton - gross anatomy, clinical and applied anatomy (neurological and surgical), medical illustration, radiographic anatomy and applied imaging.

Ivanek-Miojevic, Renata- analytical epidemiology mathematical modeling, spatial epidemiology, risk assessment, microarray analysis, epidemiology, ecology and evolution of infectious, foodborne and zoonotic pathogens, including antimicrobial resistance, food safety

Johnson, Greg A. - reproductive physiology of pregnancy focusing on uterine and fetal-placental development in relation to pregnancy recognition, implantation, and placentation. [2]

Johnson, Larry - toxicology, histology, spermatogenesis, gamete physiology, gene expression of Sertoli cells, aging of the testis, seasonal reproductive changes, and infertility in males. [a,b,1]

Ko, Gladys - Neuroscience, Toxicology, Circadian neurobiology and synaptic plasticity, Circadian regulation of ion channels (voltage-dependent calcium channels and cyclic-nucleotide gated channels) and neurotransmitter release from chick retina cone photoreceptors. Circadian regulation of synaptic plasticity and the cellular mechanisms of melatonin effects in mammalian hippocampus, Signal transduction, electrophysiology, biochemistry, pharmacology, morphology and molecular biology. [a&c]

Li, Jianrong Neurobiology Glia biology Mechanisms underlying the effects of neuroimmune molecules in the mammalian central nervous system on oligodendrocyte development, myelination, demyelination and/or remyelination. Interactions among oligodendrocytes, microglia, neurons and astrocytes under physiological and pathophysiological condition. Novel role of vitamin K in the central nervous system

Li, Qinglei - Female reproductive tract development, regulation of ovarian/uterine function, TGF beta signaling pathway, gonadal tumor development

Murphy, William - Feline gene mapping Mammalian comparative genomics Genetics of male hybrid sterility Molecular evolution and phylogenetics Y chromosome evolution

Pine, Michelle D. – Neurotoxicology, pesticides and neurodevelopment—mechanism of pesticide interference with calcium signaling. Nanoscience—collaborative projects with C. Sayes. utilizing nanochemistry to decrease the mammalian toxicity of pesticides

Phillips, Timothy D. - food safety, molecular toxicology, elucidation of fundamental chemical mechanisms of toxic action/interaction of food-borne carcinogens, mutagens, and developmental toxicants, and development of methods to detect and detoxify food-borne and environmental toxins. [a,8,14]

Porter, Weston - Identification and characterization of factors involved in normal mammary gland development and breast cancer; carcinogenesis, environment-development interactions. [a,b,14]

Raudsepp, Terje - general and molecular cytogenetics, chromosome evolution, general and biomedical genomics in domestic animals, physical gene mapping in animals/birds, comparative genomics, mammalian genome evolution, structure and organization of equine sex chromosomes (the X and Y chromosomes), sex and reproduction related genes in horses [d]

Russell, Leon H. - epidemiology, medical mycology, zoonotic diseases (rabies), food toxicology. [a,7,8,12,14]

Samollow, Paul B. Comparative genomics and genome evolution. Genetics / genomics of marsupials; with emphasis on the gray, short-tailed opossum (*Monodelphis domestica*). Patterns and characteristics of meiotic recombination in marsupials. Genetic architecture of marsupial immune system components. Evolutionary genetics and genetic structure of natural populations. Genetics of variation in human thyroid-hormone phenotypes.

Skow, Loren C. developmental biology, comparative molecular genetics of mammals with emphasis on molecular analysis of genetic diseases, development of animal models of human genetic disorders. [d,1]

Tiffany-Castiglioni, Evelyn - neurobiology, cellular mechanisms of neurotoxicity, astroglial response to disease and trauma, lead neurotoxicity. [a,c,14]

Venkatraj, Jijayanagaram -human molecular genetics and diagnostics; breast cancer genetics, molecular basis of breast cancer progression, pathology and intervention

Welsh, C. Jane - cell biology, neuroimmunology, psychoneuroimmunology, viral infections of the central nervous system, animal models of multiple sclerosis, autoimmune diseases, effects of stress of viral pathogenesis. [c,d,e,11]

[a] Interdisciplinary Faculty of Toxicology
[b] Interdisciplinary Faculty of Reproductive Biology
[c] Faculty of Neuroscience
[d] Genetics Faculty
[e] Emerging Faculty of Virology
[f] Faculty of Biotechnology

Information about the department's graduate program should be obtained from the VIBS Graduate Advisor:

Dr. C. Jane Welsh,
Department of Veterinary Integrative Biosciences,
College of Veterinary Medicine,
Texas A&M University,
College Station,
Texas 77843-4458
Email jwelsh@cvm.tamu.edu,
Phone (979) 862-4974,
FAX (979) 847 8981

1. Joint Appointment, Department of Animal Science
2. Joint Appointment, Department of Veterinary Physiology
3. Departmental Graduate Advisor
4. Director, Image Analysis Laboratory
5. Joint Appointment, Department of Medical Physiology
6. Member, Nutrition Faculty
7. Diplomate, American College of Veterinary Preventive Medicine
8. Member, Food Science and Technology Faculty
9. Joint Appointment, Department of Soil and Crop Sciences
10. Joint Appointment, Texas Veterinary Medical Diagnostic Laboratory
11. Joint Appointment, Department of Veterinary Pathobiology
12. Joint Appointment, Department of Medical Microbiology and Immunology
13. Joint Appointment, Department of Small Animal Medicine and Surgery
14. Member, Center for Food Safety
15. Member, Center for Animal Biotechnology and Genomics, Institute of Biosciences and Technology
16. Lab Animal Science
17. Joint Appointment Department of Environmental and Occupational Health, School of Rural Public Health
18. Joint Appointment Department of Math
19. Joint Appointment School of Rural Public Health
20. Joint Appointment Texas Tech University Health Sciences Center