

# GRADUATE STUDENT HANDBOOK

## COMPARATIVE AND EXPERIMENTAL MEDICINE

an intercollegiate graduate program at the University of Tennessee, Knoxville

2018–2019 ACADEMIC YEAR

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# TERMS AND ABBREVIATIONS

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**AAPC:** Admissions and Academic Progress Committee for the CEM program

**CC:** Curriculum Committee for the CEM program

**CEM:** Comparative and Experimental Medicine Graduate Program

**CEM program office:** Administers the CEM program. Located in A102 Veterinary Medicine Building.

**CIE:** Center for International Education at the University of Tennessee, Knoxville. Located at 1620 Melrose Avenue, Knoxville, TN 37996-3531, USA.

**Credit hours:** The number of contact hours per week in a given course in a given semester

**Director of Graduate Studies:** Dr. Stephen A. Kania, Professor

**Major professor:** The main advising professor/mentor on the student's faculty committee

**Semester:** The UT-established period for the duration of a course (normally fall, spring, and summer)

**UT:** University of Tennessee

**UTCVM:** University of Tennessee College of Veterinary Medicine

**UTIA:** University of Tennessee Institute of Agriculture

**UT Graduate School:** The University of Tennessee Graduate School. The CEM program operates under the umbrella of the UT Graduate School, located at 111 Student Services Building, Knoxville, TN 37996-0211, USA.

**UT Office of Graduate Admissions:** The admissions department of the UT Graduate School. Located at 201 Student Services Building, Knoxville, TN 37996-0221, USA.

**UT Registrar's Office:** Oversees enrollment services, grades, graduation, transcripts, and student records. Located in 209 Student Services Building, Knoxville, TN 37996-0200, USA.

# WELCOME

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Welcome to the Comparative and Experimental Medicine (CEM) graduate program. We are pleased that you are interested in this exciting and unique multi-disciplinary graduate program at the University of Tennessee, Knoxville. The CEM program offers MS and PhD degrees in preparation for careers in the health sciences. It actively promotes the concept of "One Health, One Medicine" by emphasizing the comparative approach to the study of biomedical science.

The program is open to approved graduate students seeking biomedical training and is especially useful for individuals with, or working toward, professional degrees in the health sciences. The CEM program provides an opportunity to study disease processes common in animals and humans from a multi-disciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing wide-ranging interests in biomedical disciplines and areas of the life sciences and forensic science. The interdisciplinary training environment includes such diverse support as facilities and personnel at the College of Veterinary Medicine, UT Medical Center at Knoxville, life sciences departments, Herbert College of Agriculture, College of Engineering, the Department of Nutrition, and the Department of Public Health.

I hope you will find this handbook useful if you are planning to pursue or are already pursuing a graduate degree in Comparative and Experimental Medicine. It contains basic information about policies and procedures in the graduate program, including curricula and degree completion requirements. We update this document periodically in light of changes instituted by the program or other administrative units.

We invite inquiries from individuals interested in being involved with the program as students, collaborators, faculty, or sponsors.



Stephen A. Kania, MS, PhD  
Professor and Director, Comparative and Experimental Medicine

# INTRODUCTION

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In order to serve the mission and vision of the Graduate School and preserve the integrity of graduate programs at UT, information related to the process of graduate education in each department is to be provided for all graduate students. Based on best practices offered by the Council of Graduate Schools, it is important that detailed articulation of the information specific to the graduate degrees offered in each department/program be disseminated. The CEM Graduate Student Handbook does not deviate from established Graduate School policies noted in the [Graduate Catalog](#) but rather provides the specific ways in which those policies are carried out.

## Purpose of the Handbook

Graduate students are expected to be aware of and satisfy all regulations governing their work and study at UT. Students should be directed to the [Graduate Catalog](#), to [Hilltopics](#), and to the publication on the [Appeals Procedure](#).

## Administration of the Program

Dr. James P. Thompson, Dean of the College of Veterinary Medicine, has executive administrative responsibility for the CEM; Dr. Michael McEntee, Associate Dean for Research and Graduate Studies, provides oversight of the program; and Dr. Stephen Kania, Director of Graduate Studies, is responsible for the program administration.

As Director of Graduate Studies, Dr. Kania holds the following responsibilities:

- Administering the CEM graduate program
- Serving as the contact person with the Graduate School
- Monitoring program admission and policies
- Working with program faculty on recruitment efforts
- Updating department Graduate Handbook yearly
- Tracking assistantships (types, amounts, and responsibilities for each position)
- Following up on CEM program/Graduate School/university awards and fellowships

## Contact Information

### **CEM Program Office:**

A102 Veterinary Teaching Hospital  
2407 River Drive  
Knoxville, TN 37996-4550

**Contact:** Kim Rutherford, Administrative Specialist

**Phone:** (865) 974-0227

**Fax:** (865) 974-4773

**E-Mail:** [kimruth1@utk.edu](mailto:kimruth1@utk.edu)

**Director of Graduate Studies:** Dr. Stephen Kania, Professor

**Phone:** (865) 974-5576

**E-mail:** [skania@utk.edu](mailto:skania@utk.edu)

## Standing Committees

### **Admissions and Academic Progress Committee (AAPC)**

The AAPC develops and applies standards for admitting and retaining well-qualified students who will benefit from graduate education, advance the interests of the degree program, and who will likely make important contributions to biomedical science. The specific responsibilities of the AAPC include:

- Annually review program-specific admissions requirements.
- Review applications and make applicant admission recommendations to the MS, PhD, and DVM-PhD CEM programs.
- Review student annual progress reports and make decisions regarding necessary corrective actions, probation, or dismissal from the program.

### **Curriculum Committee (CC)**

The CC represents the CEM faculty. The purpose of the committee is to develop and maintain a curriculum and standards for performance evaluation that facilitate the training of scientists fully prepared for careers in biomedical science. The specific responsibilities of the CC include:

- Perform an annual evaluation of the curriculum examining individual course content, catalog descriptions, and core course requirements. Identify curricular redundancies and deficiencies.
- Consider requests for new courses and present requests to CEM faculty for approval.
- Identify courses not taught in four or more years, identify reasons for this hiatus, and either vote to remove the course from the catalog or seek CEM faculty input/participation to reengage the course.
- Establish syllabus requirements.
- Recommend examination formats and procedures for comprehensive examinations and thesis and dissertation defenses.

## Guidelines for Students

### Commitment to Program

Students are expected to fully participate in professional activities related to the program.

### Adequate Preparation

With regard to learning in his or her respective courses, the student has the responsibility to seek the information necessary to participate in classroom activity. The student should accept responsibility for adequate preparation for each class meeting, arriving for all classes able and willing to interact through classroom participation, testing, writing, in-class exercises, and other methods provided by the instructor. Basic to these activities is the need for the student to employ appropriate resources, as assigned by the instructor, such as textbooks, other supplies, and outside reading materials.

### Satisfying University Requirements

It is the student's responsibility to be aware of and follow guidelines, schedules, and deadlines provided by the CEM program, the Graduate School, the university, and instructors. All regulations must be satisfied in a timely fashion.

## Guidelines for Faculty

### Atmosphere for Teaching and Learning

It is very important that the faculty member create from the beginning, and preserve, an atmosphere conducive to learning. Both teacher and student should feel that they have come together in the common cause of the pursuit of learning. Faculty members should ensure that their students are progressing through their course of study in a timely fashion.

### Conducting a Course

It is the instructor's responsibility to organize class material as efficiently and effectively as possible at the beginning of each term of instruction. At the beginning of the semester, faculty members will distribute to students a syllabus that makes clear the basis of the final grade with regard to the value placed on each component of the course. The faculty member should set an example for students in being faithful in attendance and punctual in starting and ending classes. Students should be informed of all planned instructor absences as early as possible.

In presenting course content, the faculty member should endeavor at all times to adhere to his or her subject; the classroom should not be used as a theater for expression of personal views that are not germane to the course.

### Guidelines for Major Professor (Primary Mentor)

The major professor, in conjunction with the graduate committee, is primarily responsible for supervising and guiding the student's graduate program. This includes ensuring adequate funding for the student's research, stipend, and/or tuition; compliance with Graduate School and CEM program requirements and deadlines; timely progress through the student's graduate program of study; and successful completion of the student's thesis/dissertation, with publication of the student's work as the first author in peer-reviewed scientific journals before or shortly after graduation. The major advisor will act to best serve the research, education, and career development of the student.

# ADMISSION REQUIREMENTS

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## Admission Classifications

There are several types of admission classifications at UT. More detail on each type is provided on the [Graduate Admissions](#) web page and/or in the [Graduate Catalog](#). Regardless of classification, all applicants must apply through the [Office of Graduate Admissions](#).

- **Degree** – for those pursuing a graduate or professional degree.
- **Non-degree** – for those interested in taking graduate courses but not in a particular degree program.
- **Graduate Certificate** – for those pursuing a graduate certificate.
- **Transient** – for those enrolled in a graduate program at another institution and wishing to use UT classes in their program of study.
- **Postdoctoral** – for those holding a doctoral degree who wish to continue taking graduate courses.
- **Faculty and Staff** – for members of the faculty or staff located in Knoxville.
- **English Proficiency Conditional** – for degree-seeking international graduate students who have not satisfied the English certification requirement.
- **Change of Program** – for currently enrolled graduate students seeking a change of graduate major, concentration, or degree; or moving from non-degree to degree seeking (or vice-versa).
- **Readmission** – for graduate students with an interruption in enrollment who seek readmission.

## Requirements for Admission to the CEM Master of Science Degree Program

Applicants to the MS degree program must have a baccalaureate degree with coursework in chemistry, including organic; mathematics, including calculus; physics; and basic biology. More advanced study in biology, such as biochemistry, mammalian anatomy, histology, cell biology, or other appropriate biomedical courses from an accredited university is recommended.

Applicants who do not have a professional degree from an accredited institution must have a combined score of at least 300 on the quantitative and verbal sections of the Graduate Record Examination (GRE).

## Requirements for Admission to the CEM Doctor of Philosophy Degree Program

Applicants generally will be expected to have

- a professional degree from an accredited institution in one of the medical sciences (e.g., DVM, MD, DDS)  
OR
- a master's degree in one of the biomedical sciences and a GRE score of at least 300 on the quantitative and verbal sections.

An individual having a baccalaureate degree with a strong background in the physical and biological sciences may be admitted to the PhD program upon presenting evidence of exemplary performance on the GRE.

## Selection of a Major Professor

Students who meet the minimum requirements for admission to the CEM program need to identify a major professor who will sponsor them before full admission to the program will be considered. Participating [graduate faculty](#) are listed in this handbook. The major professor advises the student about courses, supervises the student's research, and facilitates communication within the CEM program.

# APPLICATION PROCEDURE

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Applications to the CEM program must be submitted online to the [UT Office of Graduate Admissions](#).

## Materials to Submit

1. APPLICATION\*: [Submit online](#)  
*\*Be sure to select **Comparative and Experimental Medicine** as your major.*
2. TRANSCRIPTS: One unofficial\* transcript from ALL former schools submitted online.  
*\*Official transcripts must be received before the student will be allowed to register for a second term.*
3. GRE SCORES: Submit if you do not have a professional degree (e.g., DVM, MD, DDS) from an accredited institution.
4. Three letters of recommendation from referees. The referees should fill out the online recommendation form produced when that portion of your online application is completed.
5. Pay the non-refundable application fee by credit/debit card or electronic check.

## International Students

- Review the [application information](#) for International Students.
- Include your TOEFL or IELTS score.
- Pay particular attention to all deadlines; **there are no extensions.**

Term	Deadline	File Completion Deadline
Fall	February 1	May 15
Spring	June 15	October 1
Summer	October 15	February 15

## Assistantships and Fellowships

The College of Veterinary Medicine offers a limited number of ongoing graduate research assistantships in the CEM program. This and other methods of support may be arranged with individual investigators. Successful pairing with a mentor does not guarantee funding support. The following assistantships are awarded as funds become available:

### Graduate Research Assistantships

Awarded as funds are available; applications reviewed several times per year. Persons with a professional degree in the health sciences (DVM, MD, DDS) who wish to pursue a PhD program are given priority. Awards are renewable up to 4 years for the PhD and up to 2 years for the MS. Awards typically include a stipend and/or tuition waiver.

**Notification of Award:** Awardees are notified by a letter from the Director of Graduate Studies.

**How to Apply:** Requests must come through the major professor addressed to the Director of Graduate Studies.

### Requirements for Maintaining an Assistantship

- Students holding a one-half time (20 hours per week) assistantship normally should enroll in at least 6 credit hours during the semesters of the assistantship. A one-fourth time (10 hours per week) graduate assistant normally should take at least 9 credit hours during the semesters of the assistantship. A student must be enrolled in at least 9 credit hours to be considered full-time for federal financial aid purposes, even if the student has an assistantship. Summer enrollment must be at least 3 credit hours in order to maintain student health insurance.

For international students, the minimum enrollment may be different. International students should always check with the Center for International Education (CIE) to determine the number of credit hours needed to satisfy the requirements of their specific visa.

- Students must make timely and satisfactory progress as described in the **Degree Requirements** and **Academic Status** sections of this handbook.
- Assistantships are not automatically renewed. Students must submit a progress report each academic year to the Director of Graduate Studies. Funding assistance is dependent on the availability of funds and satisfactory performance of the student's assigned duties. In cases where corrective measures must be taken to remediate deficiencies, the CEM program will follow procedures as outlined in the [Policy for the Administration of Graduate Assistantships](#) in the [Graduate Catalog](#).
- Instances in which a graduate assistant wishes to take a leave of absence will be handled on a case-by-case basis between the student, the student's major professor, the CEM program office, and the Graduate School. No guarantee can be made that a student's position will be available upon his or her return. The [leave of absence](#) form must be filled out and submitted to the Graduate School for approval.

### Workload for an Assistantship

As student employees, graduate assistants are balancing professional development through work experience with progress toward their degree in academic experiences, such as courses, theses, or dissertations. To encourage that balance, graduate assistants may not exceed 20 hours of work per week without specific permission from the Graduate School. Appointments are normally on a one-fourth time (10 hours per week) or one-half time (20 hours per week) basis. However, the normal number of hours for conducting an assignment should be mutually understood by the student and the major professor.

### Graduate School Fellowships

The Graduate School offers and administers various fellowships. These awards are for full-time study at UT and awardees are selected on the basis of high achievement, broad intellectual ability, and potential for significant career contributions. Students do not apply for fellowships; they are nominated by the department. More detailed information can be found on the Graduate School's [fellowships webpage](#).

## On-Campus Employment

The Office of Financial Aid and Scholarships coordinates the [Federal Work Study Program](#) (FWS), which provides part-time off- and on-campus jobs for U.S. citizens or permanent residents who have demonstrated financial need by completing the Free Application for Federal Student Aid (FAFSA). A wide range of jobs is available in academic units, administrative offices, and non-profit agencies. Students must be admitted into a degree program and be enrolled for a minimum of 6 credit hours each semester to receive federal financial aid, including FWS.

## Loans

Students must apply through the [Office of Financial Aid and Scholarships](#) for all loan programs. Loans are limited to U.S. citizens and certain permanent residents. Additional paperwork is required on unsubsidized Federal Direct Stafford Loans, including the Free Application for Federal Student Aid (FAFSA). Students must be admitted into a degree program and be enrolled for a minimum of 6 credit hours each semester to receive federal financial aid, including federal student loans.

## Health Insurance

The university makes available group health insurance expressly for students who do not have a graduate assistantship. The program is designed to supplement the care provided by the campus Student Health Center and provide basic benefits at low group premium rates. Primary emphasis is placed on hospitalization benefits, since in-patient care is not provided on campus. Students not otherwise covered are urged to avail themselves of this or comparable insurance, since paying for hospital care is the student's responsibility.

Enrollment in the insurance plan (or alternative coverage) is **mandatory for international students**. Students may obtain applications online or in person from the [Student Health Center](#).

All graduate assistants on at least a one-fourth time (10 hours per week) appointment are automatically enrolled in the Graduate Assistant Health Insurance Program. These students will have 100% of the premium paid by the university. If students already have insurance coverage through another insurance carrier, this policy functions as additional coverage.

## Travel Support

The UT Graduate Student Senate administers [travel awards](#) for professional activities. These awards are based on both need and merit and help defray expenses for transportation, lodging, and registration fees. To request a travel award, students must submit an [online application](#) to the Graduate Student Senate. Upon completion of the online application, a paper copy will be emailed to the applicant. The paper copy with all required signatures must be submitted to the Dean of Students Office no later than 5:00 pm on the day of the [application deadline](#).

## REGISTRATION AND ADVISING

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The minimum number of credit hours for registration is 1 credit hour (for students who must register for course 600 Dissertation, the minimum is 3 credit hours). Registration allows use of services such as library checkout, laboratories, and recreation facilities not open to the public.

Information concerning registration is available on the [One Stop Student Services](#) web page. Registration is accomplished via the web through the [MyUTK student portal](#) (you will be asked to login using your UT NetID and password).

### Payment of Registration Fees

During priority registration, the VolXpress statements are delivered electronically (e-VolXpress). Students will receive an email at their UT email address indicating their e-VolXpress statement is available for viewing at [MyUTK](#). Payment is due by the deadline noted on the bill. A graduated late fee is assessed to any student who fails to register during priority registration. Additional information can be obtained online at [One Stop Express Student Services](#), or by calling (865) 974-1111, or in person at Hodges Library.

Failure to pay tuition and fees before the deadline, as noted each semester on the VolXpress statement, will result in the student being dropped from all courses. Students may not attend and credit cannot be earned for classes without proper enrollment registration.

### Change in Registration (Adds, Drops, Withdrawals)

The permanent record will show all courses for which the student has registered, except those audited and those from which the student has withdrawn on or before the "Drop Course without W" deadline. Students who fail to attend the first class meeting, without prior arrangement with the program, may be dropped from the course to make space available to other students; **but it is the responsibility of the student to drop the course from their own schedule.** Students have the responsibility to assure that courses have been dropped; otherwise, a grade of F will be received for the course. If the student drops all courses for the semester, that is considered [Withdrawing from the University](#). Students called to active military duty during enrollment should contact [Veteran Student Services](#) for assistance with withdrawal and readmission procedures.

Type of Change for Full Term Classes (fall/spring)	Deadline
Add or Drop a course without a W or change credit/grading	1 <sup>st</sup> thru 10 <sup>th</sup> day of class
Add a course or change credit/grading with instructor/advisor permission	11 <sup>th</sup> thru 42 <sup>nd</sup> day of class
Drop a course with a W	11 <sup>th</sup> thru 84 <sup>th</sup> day of class

For summer semester, that includes full, first, and second terms, and for mini-term, the periods for add, drop, change of credit/grading are determined based on a percentage of the equivalent deadline for a full semester. See the Timetable/Financial Deadline Calendar for Summer Semester available at the Office of the Registrar website under [Calendars](#). Within the change of registration period, a student may change registration on [MyUTK](#). If additional permission is necessary, a student must execute a [Change of Registration](#) at the Graduate School with approval of the instructor and Director of Graduate Studies.

### 500- and 600- Level Course Distinction

Graduate courses offered through the CEM graduate program provide information and training at both fundamental and advanced levels. Offerings at fundamental levels present information and challenges for which the foundations have been set at the undergraduate level. In the CEM, these courses are listed as 500-level courses. CEM courses listed at the 600-level are advanced presentations based on foundations provided at 500- and lower levels. Guidelines and requirements for 500- and 600-level CEM courses are provided. These guidelines and requirements are primarily for the multi-student courses offered in the program; however, aspects of the guides and requirements are also applicable to the variable credit, special, and advanced topics courses offered in the program.

## 500-level

*Course description:* Information presented in these courses is foundational for the disciplines represented in comparative and experimental medicine. Courses at this level may be core courses for both MS and PhD programs and may be required by student committees for both MS and PhD curricula.

These courses are typically **lecture-based** with examinations as the grading mechanism; however, grading may also be based on written papers and oral presentations. **Credit hours** are based on contact hours with students. As examples, a 1-credit-hour course must meet the equivalent of one 50-minute session per week during a semester whereas a 4-credit course must meet the equivalent of 4 sessions per week (2,800 minutes) during a 14-week semester.

*Faculty:* The responsible faculty member must be at least an assistant professor, and all invited lecturers must have at least a master's degree or professional medical degree (DVM, MD, DDS, or equivalent).

## 600-level

*Course Description:* Information presented in these courses is advanced beyond the fundamental information presented in courses at the 500 level. Courses at the 600 level may be presented in traditional or non-traditional formats, including interactive and group or individual learning activities. Depending on the course format, grading may be based on examinations, written papers, oral presentations, or defined participation.

Course credit is determined from a combination of lectures, group learning activities, and interactive and individualized learning activities.

*Faculty:* The responsible faculty member must be at the rank of assistant professor or above and must have previously taught in at least one graduate-level course (500-level graduate course or 800-level veterinary course).

## Special and Advanced Topics and Variable Credit Courses

The CEM offers different courses titled as either special or advanced topics. These courses are individualized to meet specific needs of students. Credit hours are variable, and the courses may be repeated with different subject matter. Approval to offer special and advanced topics courses must be requested prior to the semester in which the course is proposed to be offered. CEM faculty should submit requests to the Director of Graduate Studies using the [Course Request Form](#), accompanied by a course syllabus.

CEM 501 and 515 provide opportunities for specialized experiences in comparative and experimental medicine. These courses should be used to meet the specialized needs of students and for projects appropriate for 500-level credit. Examples include research papers and analytical techniques and instrumentation involving established technologies.

CEM 510 provides opportunities for students to learn advanced research techniques while conducting individual research projects under supervision of faculty. This course should be used to meet the specialized needs of students and for projects appropriate for 500-level credit.

CEM 610 and 618 are advanced or special topics in comparative and experimental medicine, and medical science, respectively. These courses are intended primarily as specialized experiences for doctoral students in the CEM program and address new and developing topics in research and technology that may be applicable to doctoral-level research and/or clinical medicine.

CEM 620 can be a specialized, in-depth experience in various disciplines, such as current and future research methodology, and recent advances in instrumentation in analytical techniques for comparative medicine. This course is intended primarily as a specialized experience for doctoral students in the CEM program and addresses topics that may be applicable to doctoral-level research and/or clinical medicine.

CEM 650 is a variable credit, surgical pathology course intended primarily for pathology residents pursuing graduate degrees. The Director of Graduate Studies must grant approval to offer this course for greater than 2 credit hours. The written request should be submitted to the CEM program office prior to the semester the course is to be offered and must justify the proposed credit hours.

## Proper Use of Courses 502 and 500/600

**Course 502: Use of Facilities** is for students who are not taking coursework and do not wish to register for thesis or dissertation hours. Registering for this course will permit borrowing privileges in the University Libraries or use of computer labs, other labs, and/or other university resources.

**Note: Credit hours taken in course 502 may not be used toward degree requirements.**

**Course 500: Thesis** is for the master's-level student working on a thesis. Six credit hours of course 500 must be taken for the degree, and students must register for course 500 each semester during work on the thesis. At least 3 credit hours of course 500 must be taken during the semester in which the student plans to graduate.

**Course 600: Dissertation** is for the doctoral-level student working on a dissertation. Twenty-four credit hours of course 600 must be taken for the degree, and students must register for course 600 when work toward the dissertation begins. Continuous registration of at least 3 credit hours (including summer semester) in course 600 is required thereafter.

## Full-Time Status

The maximum load for a graduate student is 15 credit hours during fall and spring semesters. While 9 credit hours are considered full time, the typical full academic load varies by discipline. For the summer semester, graduate students may register for a maximum of 12 credit hours in an entire summer semester or for a maximum of 6 credit hours in a five-week summer session. Students may enroll in only one course during a mini-term session.

Students holding a one-half time (20 hours per week) assistantship normally should enroll in at least 6 credit hours during the semesters of the assistantship. A one-fourth time (10 hours per week) graduate assistant normally should take at least 9 credit hours during the semesters of the assistantship. **A student must be enrolled in at least 9 credit hours to be considered full-time for federal financial aid purposes, even if the student has an assistantship.**

Registration for more than 15 credit hours during any semester, or for more than 12 credit hours in the summer semester, is not permissible without prior approval. Students wishing to take course hours beyond the standard credit hours for a single term must submit a [Graduate Course Overload](#) request to the Director of Graduate Studies.

## Selection of an Advising Committee

Students who are notified of having met the minimum requirements for admission to the CEM program should determine a major professor assignment before full admission to the program will be granted. Participating [graduate faculty](#) are listed in this handbook. The major professor advises the student about courses, supervises the student's research, and facilitates communication within the CEM program.

After one semester of graduate-level coursework has been completed, the student should work with the major professor to establish the advising committee. The major professor must approve the student's program each semester; therefore, the student is expected to maintain close consultation with the major professor and other members of the advising committee with regard to progress in the program. See **Degree Requirements** in this handbook for more information about choosing an advising committee.

# DEGREE REQUIREMENTS

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## Master of Science

- 14 credit hours in Core Coursework
- 8 credit hours in Research Emphasis Area
- 2 credit hours of Electives
- 6 credit hours in CEM 500 (Thesis Option) or CEM 501/510/515 (Non-Thesis Option)

**30 credit hours total**

### Core Courses:

- 504 Descriptive and Applied Epidemiology (3 credit hours)
- 541 Cellular and Molecular Basis of Disease (3 credit hours)
- 616 Comparative & Experimental Medicine Seminar (1 credit hour)
- Journal Clubs 500- or 600-level (4 credit hours)
- Statistics 500- or 600-level (3 credit hours)

In addition to core courses, students must complete 8 credit hours of coursework in a research emphasis area, 2 credit hours of electives, and 6 credit hours in either CEM 500 (thesis option) or CEM 501/510/515 (non-thesis option). Research emphasis area may include epidemiology, imaging, immunology, infectious diseases, medicine, molecular and cellular biology, nutrition and metabolism, oncology, parasitology, pathology, pharmacology, surgery, or toxicology. Exceptions to accommodate students with interests not listed above must be approved by the Director of Graduate Studies after application, in writing. The purpose of the research emphasis area is to focus the student's final examination.

400-level courses: A maximum of 6 credit hours at the 400 level (in which graduate credit is offered) may be counted toward candidacy. **In order to receive graduate credit**, students must select "graduate" level upon registration AND must inform the course instructor on or before the first day of class that graduate credit is being sought. Course requirements for graduate credit will be more rigorous and will exceed the expectations for undergraduates. Petitions for retroactive changing of undergraduate to graduate credit will not be accepted.

**Transfer Credits:** A majority of the total credit hours required for a master's degree must be taken at UT. Official transcripts from all institutions previously attended must be sent directly to the Graduate School before any credit will be considered. Courses transferred will not be counted in determining the student's grade-point average. Credits transferred from universities outside the UT system cannot be used to meet thesis requirements or 600-level coursework requirements. Credit for extension courses taken from other institutions is not transferable, nor is credit for any course taken at an unaccredited institution. No graduate credit is accepted for work done by correspondence study. Transferred courses must have been completed within the six-year period prior to receipt of the degree. The courses must be listed on the [Admission to Candidacy](#) form and will be placed on the student's UT transcript only after admission to candidacy.

**Additional requirements:** Master's students are required to present at least once in the annual UTCVM Research Day event. Students who have been in the program for at least two semesters are required to complete a [yearly progress report](#). All students must complete an approved [responsible conduct of research](#) training program.

### Degree Time Limit

Candidates have six calendar years to complete the master's degree, starting at the beginning of the semester of the first course counted toward the degree. Students who change degree programs during this 6-year period may be granted an extension after review and approval by the Dean of the Graduate School. In any event, courses used toward a master's degree must have been taken within six calendar years of graduation.

## Master's Committee

The master's committee is composed of the student's major professor and at least two other faculty members, all at the rank of assistant professor or above. At least one faculty member must be from the College of Veterinary Medicine (which can include the major professor), and at least one faculty member must be from outside the major professor's academic unit. If the student is pursuing a minor, one faculty member should be from the minor department.

**After one semester**, the student should consult with the major professor concerning the formation of the master's committee. By the **end of the second semester**, the master's committee must be chosen. The student must submit a [Masters Committee Appointment Form](#) to the Director of Graduate Studies for approval.

The committee will assist the student in planning a program of study, formulating and completing an appropriate research project, developing a thesis or project proposal, and ensuring the achievement of degree requirements. The committee may require and/or recommend specific courses (in addition to those required by the program).

The student is responsible for coordinating meetings of the master's committee at least twice per year and obtaining and/or preparing required materials for the meetings, such as appropriate Graduate School forms, transcripts, yearly progress reports, and research proposals. Student progress will be monitored by the Director of Graduate Studies. It is incumbent upon students to promptly honor requests for progress reports.

## Admission to Candidacy

Application for Admission to Candidacy is made after the student has completed prerequisite courses and at least 9 credit hours of graduate coursework with an overall GPA of 3.00 or higher. The [candidacy application](#) must be signed by the student's committee and the Director of Graduate Studies. All courses to be used for the degree must be listed, including transfer coursework. The student must submit the application to the Graduate School no later than the last day of classes of the semester preceding the semester in which the student plans to graduate.

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## Thesis Option

### Registration

Students register for course 500 Thesis each semester that work is done on the thesis (continuous registration is not required). A minimum of 6 credit hours of 500 Thesis is required for the thesis option, including a minimum of 3 credit hours in the semester in which the thesis is accepted by the Graduate School. After receiving the master's degree, a student is no longer permitted to register for 500 Thesis.

### Thesis

The thesis represents the culmination of an original research project completed by the student and is submitted in electronic format to the Thesis/Dissertation Consultant in the Graduate School for examination, final approval, and acceptance. It must be prepared according to guidelines provided on the [Theses and Dissertations](#) webpage, including the requirement to use university-approved [plagiarism detection software](#) prior to the thesis defense.

An electronic copy of the thesis must be accompanied by one **original approval form**. The approval form must have the original signatures of the members of the master's committee. The approval form certifies that the committee members have examined the final copy of the thesis and judged it to be satisfactory.

### Final Examination (Defense of Thesis)

Candidates must present a thesis seminar and pass a final oral examination. This examination, which covers both coursework and the thesis, measures the candidate's ability to integrate material in the research emphasis area and related fields. Final draft of the thesis must be distributed to all committee members at least two weeks prior to the date of the final examination.

The student schedules the final examination, which consists of a public seminar followed by an oral defense, by submitting the [Scheduling Defense of Thesis](#) form to the CEM program office. **The Director of Graduate Studies is invited to attend the oral defense.** The examination must be held at least two weeks before the final date for acceptance and approval of thesis by the Graduate School. This is an official university academic activity – pets (with the exception of service animals) and young children are not permitted to attend. Students should not bring refreshments to the defense. Results of the examination are submitted to the Graduate School on the [Report of Final Examination with original signatures](#). In case of failure, the candidate may not apply for re-examination until the following semester. The result of the second examination is final. Information on the appeals process is located in the [Grievances and Appeals section](#) of this handbook.

## Non-Thesis Option

The non-thesis option would normally be elected by students who desire advanced didactic training at the master’s level without performing an extensive research project. This option is useful for students employed within the field of biomedical science or engaged in resident training. Students must meet all requirements for the MS degree in Comparative and Experimental Medicine.

### Final Examination (Oral Defense)

In lieu of a thesis, 6 credit hours in CEM 501, 510, or 515 are required in which the student prepares an analytical research paper that thoroughly identifies and explores a scientific, technical, or social science issue associated with the field. This paper will be presented as a public seminar, followed by an oral comprehensive examination (defense) by the student’s committee. All committee members must be present for the examination. **The Director of Graduate Studies is invited to attend the oral defense.**

The student must submit the [Scheduling of Non-Thesis or Capstone Defense](#) form to the CEM program office *at least two weeks prior to the examination*. Following the oral defense, the [Report of Final Examination with original signatures](#) must be submitted to the Graduate School by the deadline date for that semester. In case of failure, the student may not apply for re-examination until the following semester. The result of the second examination is final.

## Example Timetable for Completion of MS Degree

Semester <sup>*</sup>	Year 1			Year 2		
	Fall	Spring	Summer	Fall	Spring	Summer
Entry into program						
Establish advising committee						
Submit progress report						
Submit Admission to Candidacy form						
Thesis credit hours						
Research Day experience <sup>†</sup>						
Final exam						

<sup>\*</sup>Assumes entry to program during fall semester and graduation during summer semester. Semesters should be adjusted according to when individual students entered program.

<sup>†</sup>Orange arrows indicate option of year in which to complete degree requirement.

## Master of Science – Forensic Odontology Concentration

This three-semester concentration is designed for anthropologists, dentists, registered dental hygienists, biologists, crime scene specialists, detectives, and medico-legal death investigators wishing introduction and formalization to skills in the search, recovery and collaborative identification of compromised human head and neck remains, and recognition of human and non-human bite marks at autopsy. This concentration is founded on the standards and guidelines established by the American Board of Forensic Odontology in the endeavors of human identification, bite mark investigation and analysis, dental age estimation, missing and unidentified persons, and mass fatality incident dental identification team development.

Training involves search, recovery, identification, and processing of fresh, mutilated, and decomposing and skeletal remains as evidence that has been exposed to many post-mortem environments from scattered and clandestine burials to aquatic and thermal contexts. Training will continue to include examination of those remains in the autopsy setting. Twice-monthly laboratory sessions at the Knox County Medical Examiner's Office – East Tennessee Regional Forensic Center will provide case work exposure. Training also involves recovery of relevant head and neck remains at an outdoor decomposition facility and processing for examination and report writing for submission as a defensible court document.

Applicants for the MS with a Forensic Odontology concentration must meet the minimum requirements for admission for the CEM program. For some students, prerequisite or concurrent coursework will likely be necessary to succeed in the course of study.

Students must meet all requirements for the MS degree in Comparative and Experimental Medicine. This includes courses CEM 504, CEM 541, 4 credit hours of 500- or 600-level journal clubs, and 3 credit hours of 500- or 600-level statistics. The CEM 504 course may be substituted with another relevant and appropriate course, as approved by the student's committee and the director of the program. The CEM 616 course is encouraged, but not required, for forensic odontology students. In lieu of a thesis, at least 1 credit hour in CEM 535 Capstone Experience is required in which the student prepares an analytic research paper that thoroughly identifies and explores a scientific, technical, or social science issue associated with the field. This paper will be presented as a seminar, which is followed by an oral comprehensive exam by the student's committee.

<b>Forensic Odontology Course of Study</b>		
<b>Semester</b>	<b>Course</b>	<b>Credit hours</b>
<b>Fall</b>	<i>CEM 504: Descriptive and Applied Epidemiology (optional)</i>	3
	CEM 541: Cellular and Molecular Basis of Disease	3
	CEM 550: Introduction to Forensic Odontology	3
	CEM 554: Dental and Maxillofacial Anatomy/Histology	4 (3 lecture, 1 lab)
	Journal Club (1 or 2)	1 or 2
<b>Spring</b>	CEM 552: Head and Neck Anatomy	4 (1 lecture, 3 lab)
	Statistics (500- or 600-level)	3
	Journal Club (1 or 2)	1 or 2
<b>Summer</b>	CEM 556: Head and Neck Osteology and Trauma	4 (2 lecture, 2 lab)
	CEM 558: Laboratory Methods in Forensic Odontology	4 (1 lecture, 3 lab)
	Journal Club (1 or 2)	1 or 2
	CEM 535: Capstone Experience	1
<b>Minimum 30 credit hours required for the degree</b>		

## Capstone experience

The capstone should capture the spirit of the program in the form of either an original, applied primary research project; a theoretical or secondary research project; or a systematic review. It must be finalized during the last semester of study. Through this experience, the student will demonstrate skills associated with the degree program, such as applied performance and critical analysis. Students must demonstrate their abilities to:

1. Gather material independently, as needed.
2. Think critically about and integrate the theoretical and/or practical knowledge that they have acquired throughout their studies.
3. Reflect on the ethical issues that are implicit in their project and/or their project's design.

What constitutes a sophisticated, integrative experience will vary with each student, since the coursework and subtheme undertaken are individual. Planning for this project should occur during the first semester and with the consultation of the committee, which must approve the project before work begins. In general, students develop ideas for their capstone based on coursework and/or interests. Examples of capstone experiences include an independent project, integrated case study or simulation, internship, practicum, original research project, or literature meta-analysis or systematic review. The capstone requirement must be met by passing the CEM 535 Capstone Experience course with a B grade or better.

### Specifications

Comparative Aspect	Capstone Project	vs.	Master's Thesis
<i>Time Frame</i>	Two or three semesters		Three to six semesters
<i>Length of Written Product</i>	~8 pages		75–150 pages (typically appx. 100 pages)
<i>Nature of Project</i>	Work-product demonstrates expertise in a narrow area. Should say much about a narrow topic.		Considers the topic in greater depth, more completely, and always involves basic or applied primary research.
<i>Oral Presentation/ Defense</i>	Neither the seminar nor the oral comprehensive exam should be a traditional defense of the paper.		Defense by committee and open to public.
<i>Professional Considerations</i>	<ul style="list-style-type: none"> <li>• Simulates settings often found on the job</li> <li>• Highlights an area of practical or theoretical importance to the field</li> </ul>		<ul style="list-style-type: none"> <li>• Helpful for students who intend to enter a PhD program and/or conduct individual research</li> <li>• Generally more rigorous; can be a good resume builder</li> </ul>
<i>Required Course &amp; Credit Hours</i>	1 credit hour in CEM 535 Capstone Experience in one semester		6 credit hours in CEM 500 Thesis over two or more semesters

### Paper

The research paper portion of the capstone experience should have a minimum length of 8 double-spaced pages (excluding figures and references). Choose a topic about which you care deeply. You have the resources of a major research university at your disposal and you are mentored by a faculty committee. Think of the capstone experience as an exciting, pivotal project that might launch the next stage of your academic or professional life.

### Seminar and Oral Comprehensive Examination (Oral Defense)

The seminar and oral defense will take place during the final semester of the program on or before the date set by the Graduate School for non-thesis programs. The student should allow one hour for the seminar, with the oral defense to immediately follow. All committee members must be present for the examination. **The Director of Graduate Studies is invited to attend the oral defense.**

The student must submit the [Scheduling of Non-Thesis or Capstone Defense](#) form to the CEM program office *at least two weeks prior to the examination*. Following the oral defense, the [Report of Final Examination with original signatures](#) must be submitted to the Graduate School by the deadline date for that semester. In case of failure, the student may not apply for re-examination until the following semester. The result of the second examination is final.

# DEGREE REQUIREMENTS

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## Doctor of Philosophy

### Core Courses:

- 504 Descriptive and Applied Epidemiology (3 credit hours)
- 541 Cellular and Molecular Basis of Disease (3 credit hours)
- 616 Comparative & Experimental Medicine Seminar (1 credit hour)
- Journal Clubs 500- or 600-level (6 credit hours)
- Statistics 500- or 600-level (3 credit hours)

### Required coursework

In addition to core courses, students must complete 8 credit hours of coursework in a research emphasis area. The research emphasis area may include epidemiology, imaging, immunology, infectious diseases, parasitology, medicine, molecular and cellular biology, nutrition and metabolism, pathology, pharmacology, toxicology, or surgery. Exceptions to accommodate students with interests not listed above must be approved by application, in writing, to the Director of Graduate Studies. The purpose of the research emphasis area is to focus the student's comprehensive and final examinations.

Students with a master's degree or professional degree (e.g., DVM, MD, DDS) must complete a minimum of 24 credit hours of graduate coursework (exclusive of course 600 Doctoral Research and Dissertation). A minimum of 6 credit hours must be at the 600 level (exclusive of Dissertation), and at least 12 credit hours must be graded A-F. In addition, 24 credit hours of course 600 Doctoral Research and Dissertation are required.

Students without a master's degree or professional degree must complete a minimum of 48 credit hours of graduate coursework and 24 credit hours of course 600 Doctoral Research and Dissertation. A minimum of 6 credit hours must be at the 600 level (exclusive of Dissertation), and at least 30 credit hours must be graded A-F.

400-level courses: A maximum of 6 credit hours at the 400 level (in which graduate credit is offered) may be counted toward candidacy. **In order to receive graduate credit**, students must select "graduate" level upon registration AND inform the course instructor on or before the first day of class that graduate credit is being sought. Requirements for these courses will be more rigorous and will exceed the expectations for undergraduates. Petitions for retroactive changing of undergraduate to graduate credit will not be accepted.

**Transfer credits:** At the doctoral level, courses are not officially transferred, although they may be used to meet degree requirements. If a requirement has been met through coursework in another program, the student, in consultation with the committee, may petition the Director of Graduate Studies for a waiver of this requirement. Courses taken at universities outside of the UT system cannot be used to meet dissertation requirements or 600-level coursework requirements.

**Additional requirements:** PhD students are required to present at least twice in the annual UTCVM Research Day event. Students who have been in the program for at least two semesters are required to complete a [yearly progress report](#). All students must complete an approved [responsible conduct of research](#) training program.

### PhD Residence Requirement

Residence is defined as a minimum of two consecutive semesters of full-time enrollment (9 credit hours) or three consecutive semesters of part-time enrollment (6 credit hours). For the doctoral degree, a minimum of two consecutive semesters of residence is required, except in programs where alternative or additional residence requirements have been approved.

### Degree Time Limit

Comprehensive examinations must be successfully completed within 5 years, and all requirements must be completed within 8 years from the time of a student's initial enrollment in the doctoral degree program.

## PhD Committee

During the **first year** of graduate study, the student works with the major professor to identify a PhD committee. The committee, subject to Graduate Council policies and individual program requirements, must approve all course work applied toward the degree, certify the student's mastery of the major field and any cognate fields, assist the student in conducting research, and recommend the dissertation for approval and acceptance by the Graduate School. The student should meet with his or her committee at least twice a year. At the time of the first meeting, with approval of the committee, the student shall declare a research emphasis area.

The committee must have at least four members. At least two members must be UT tenured or tenure-track faculty, at least one member must be from outside of the student's department/interdisciplinary program (this external member can be from outside of UT), and at least one member must be from the College of Veterinary Medicine (this can include the major professor). If a minor is declared, one member must have expertise in the minor discipline.

To officially establish the committee, the student must submit the [PhD Committee](#) form, with original signatures, **along with the CVs of any external members**, to the Graduate School (111 Student Services Building) for final approval by the Dean of the Graduate School. Changes in committee membership must be submitted for approval using the [Revise PhD Committee](#) form.

## Comprehensive Examination

This examination should be taken when the student has completed, or nearly completed, all prescribed courses and should be completed before the end of the third year of the program (medical residents pursuing a PhD degree have until the end of their fourth year). Its successful completion indicates that, in the judgment of the faculty, the doctoral student can think analytically and creatively, has a comprehensive knowledge of the field and the specialty, knows how to use academic resources, and is deemed capable of completing the dissertation. The comprehensive exam should also be a learning experience in which specific skills are developed, including effective and comprehensive literature review, writing ability, experimental design for hypothesis-driven research, and oral presentation skills. The comprehensive exam must be passed prior to admission to candidacy. In case of failure, the candidate may not take the examination again until the following semester. The result of the second examination is final.

The exam shall consist of two parts: 1) a written research proposal/grant application (in the format outlined below) and 2) an oral exam that assesses the general knowledge of the student in the research emphasis area and serves as a defense of the written proposal. The exam should be carried out according to the following guidelines:

### Part 1 – Written Examination: Submission & Approval of Research Proposal Topic

Each student shall submit to his or her major professor a topic for a written grant proposal and a short statement defining the subject area (no more than 1 page in length). The proposal topic may be conceptually related to the student's intended doctoral research, but need not be identical in terms of experimental design. **Once approved, the student informs the exam coordinator and committee of the topic and the timeline.** The student will have 4 weeks to submit the written proposal to the exam coordinator and committee members.

#### Format and submission of written research proposal

The proposal should adhere to the following guidelines (similar to an NIH R21 or equivalent grant mechanism), including page restrictions.

- Standard Project Timeline: 2 years
- Style: Arial, Helvetica, Palatino Linotype, or Georgia typeface; black font color; at least 11-pt font Margins and at least 0.5" on all sides Paper size 8.5 x 11"; single spaced.
- Page Limits: Project Narrative 4 lines (1 short paragraph), Project Summary/Abstract 30 lines, Specific Aims and Hypothesis 1 page, Research Strategy 6 pages, Bibliography Unlimited, Biographical Sketch 2 pages
- Face Page: Proposal title, investigator, committee members' names, and project start & end dates.

- **Project Narrative:** Describe the relevance of this research to public health or applied field. Use plain language that can be understood by a general, lay audience.
- **Project Summary/Abstract:** Meant to serve as a succinct and accurate description of the proposed work when separated from the application. This section should be informative to other persons working in the same or related fields and understandable to a scientifically or technically literate reader.
- **Specific Aims:** Briefly state the objectives of the research. List the specific goals and any hypotheses to be tested, and summarize expected outcomes and impact of the results.
- **Research Strategy:** Include significance, innovation, and approach sections.

A) **Significance:** Importance of the problem or critical barrier to progress in the field that the proposed project addresses. How the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields. How concepts, methods, technologies, treatments, services, or preventive interventions that drive this field will be changed if the proposed aims are achieved.

B) **Innovation:** How the application challenges and seeks to shift current research or clinical practice paradigms. Describe any novel theoretical concepts, approaches, or methodologies; instrumentation or interventions to be developed or used; and any advantage over existing methodologies, instrumentation, or interventions. Explain any refinements, improvements, or new applications of these approaches.

C) **Approach:** Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims. Include how the data will be collected, analyzed, and interpreted. Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims. If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high-risk aspects of the proposed work. Point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised. If there are multiple specific aims, you may address significance, innovation, and approach for each specific aim individually or for all specific aims collectively.

- **Bibliography:** List references cited in the text using a single, scientific journal format. Where appropriate, each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication.
- **Biographical Sketch:** Student's biographical sketch in this format (limited to 2 pages). Do not include an eRA Commons user name. Following the educational block, complete only sections A and B, as described hereafter. A. **Personal Statement.** Briefly describe why you are well-suited for your role in the project. The relevant factors may include aspects of your training; your previous experimental work on this specific topic or related topics; your technical expertise; your collaborators or scientific environment; and your past performance in this or related fields. B. **Positions and Honors.** List in chronological order previous positions, concluding with your present position. List any honors.
- **Project Budget:** No written budget is expected. In lieu of a written NIH/NSF format modular/R&R budget, the student should be prepared to discuss, during the oral exam (Part 2), the budget needed to carry out the proposed project.

## Part 2 – Oral Examination

**Within 3 weeks after submitting the written examination,** the student should sit for the oral examination with all committee members and the exam coordinator. The oral examination should be scheduled as early as possible, preferably when the student is notified to begin writing. The CEM program office is available to assist the student in securing an exam room once the committee, exam coordinator, and student have agreed upon a date and time for the oral exam. The exam will be closed-door with the student's committee members and exam coordinator. **The Director of Graduate Studies should also be invited.**

The oral exam is intended to establish the student's ability to orally present and defend a research proposal as well as to survey the student's general breadth of knowledge in the research emphasis area. Therefore, students should prepare a summary of their grant proposal and give a brief (~10 minutes) presentation; they should also expect questions that probe their scientific knowledge as it relates to the subject matter of the research proposal. Although students are not expected to prepare a written, formal budget, the student should be prepared to discuss, during the oral exam, the budget needed to carry out the proposed project.

The committee will convene immediately after the oral examination to determine if the student has successfully passed the oral exam. If the committee decides against a grade of pass for the oral exam, a time for re-examination (during the following semester and including a revision of the written proposal) should be scheduled before the end of the current semester. The exam coordinator should ensure that a short summary of the oral exam and a record of its outcome are filed in the CEM Program Office no later than 2 weeks after the examination is completed.

### **Roles & Responsibilities: Major Professor, Committee Members, & Exam Coordinator**

The proposal must be written completely independently by the student. The mentor should guide the student on the overall project idea, but the 4-week preparation and writing process should be independent of the major professor. In preparation for the written exam, students will need mentoring and/or coursework on how to prepare a compelling grant – this assistance should be provided well in advance of the 4-week writing period.

#### Exam coordinator

The Director of Graduate Studies shall appoint a coordinator for the comprehensive examination by soliciting suggestions, from the student's major professor, of at least three CEM faculty members. The coordinator must not be a member of the student's committee and must be eligible to direct doctoral dissertations.

**The coordinator will ensure that all time restrictions and guidelines set forth herein are strictly adhered to by the student and committee members.** The oral examination shall be administered by the PhD committee under the direction of the coordinator. The coordinator may participate in the examination and may vote on the outcome of the examination, if he or she chooses to do so.

#### Assessment of written proposal

Each member of the committee shall evaluate the proposal. The exam coordinator should ensure that a copy of the written proposal is filed in the CEM Program Office, along with copies of the evaluations and a short summary of the oral exam and a record of its outcome, no later than 2 weeks after the examination is completed.

#### Assessment of oral examination

The oral exam is intended to establish the student's ability to orally present and defend a research proposal as well as to survey the student's general breadth of knowledge in the research emphasis area. Therefore, students should expect questions that probe their scientific knowledge as it relates to the subject matter of the research proposal. Although students are not expected to prepare a written, formal budget, the student should be prepared to discuss, during the oral exam, the budget needed to carry out the proposed project.

The committee will convene immediately after the oral examination to determine if the student has successfully passed the oral exam. The student shall pass the examination provided the coordinator has established that:

- a. A consensus exists among the examining committee members in favor of passing (at least a 2/3 majority on the committee, including the vote of the coordinator, if he or she chooses to vote).
- b. An appropriate number of questions dealing with the declared research emphasis area were administered.
- c. The examination was fair and rigorous.

If the committee decides against a grade of pass for the oral exam, a time for re-examination (not before the following semester and including a revision of the written proposal) should be scheduled before the end of the current semester.

### **Admission to Candidacy**

A student may be admitted to candidacy for the doctoral degree after passing the comprehensive examination and maintaining at least a 3.00 GPA in all graduate coursework. Each student is responsible for submitting the [Admission to Candidacy](#) form, which must be signed by the PhD committee and the Director of Graduate Studies. **Admission to candidacy must be applied for and approved by the Graduate School least one full semester prior to the date the degree is to be conferred.**

## Dissertation

The dissertation represents the culmination of an original research project completed by the student. The organization, method of presentation, and subject matter of the dissertation are important in conveying to others the results of such research.

A student should be registered for the number of dissertation credit hours representing the fraction of effort devoted to this phase of the candidate's program. Thus, a student working full-time on the dissertation should register for 9 credit hours (6 credit hours for those on a one-half time assistantship) of course 600 per semester.

The dissertation must be prepared according to the guidelines established by the Graduate School and available on the [Theses and Dissertations](#) webpage. An electronic copy of the dissertation must be accompanied by one **original** [Thesis/Dissertation Approval](#) form. The approval sheet must have the original signatures of the members of the PhD committee. The approval sheet certifies to the Graduate School that the committee members have examined the final copy of the dissertation and have found that its form and content are satisfactory. More detailed information is provided in the **Preparation and Submission of Theses and Dissertations** section of the [Graduate Catalog](#), including the requirement to use university-approved [plagiarism detection software](#) prior to the dissertation defense.

For PhD candidates, the [Survey of Earned Doctorates](#) certificate of completion is also submitted when the Thesis/Dissertation Approval Form and the final copy are submitted.

## Dissertation Continuous Registration

Students who have started taking dissertation credit hours in course 600 Doctoral Research and Dissertation must **continuously register** for course 600 for a minimum of 3 credit hours every semester. This includes summer semester and the semester in which the dissertation is approved and accepted by the Graduate School.

Students who have started taking course 600 and wish to do an internship/practicum relevant to their degree can petition to be exempted from the continuous enrollment requirement for up to three semesters or 12 months (maximum). Instructions for submitting a request are included on the [enrollment exemption request](#) form.

## Final Examination (Defense of Dissertation)

A doctoral candidate must pass an oral defense of the dissertation. The dissertation, in the form approved by the major professor, *MUST be distributed to the committee at least two weeks before the examination*. The examination must be [scheduled](#) through the UT Graduate School at least one week prior to the examination and must be conducted in university facilities. Final examinations not properly scheduled must be repeated.

The examination is announced publicly and is open to all faculty members. The defense of the dissertation will be administered by ALL members of the PhD committee after completion of the dissertation and all course requirements. *This examination must be passed by a simple majority at least two weeks before the date of submission and acceptance of the dissertation by the Graduate School*. Results of the defense must be submitted by the dissertation deadline.

Failure to pass the oral defense of dissertation may constitute dismissal from the program. Requests for second attempts must be sent to the Director of Graduate Studies for review and approval/disapproval. In case of failure, the candidate may not apply for reexamination until the following semester. The result of the second examination is final. Appeal information may be found under "[Grievances and Appeal Procedures](#)" in the handbook.

The final examination should also fulfill the following CEM guidelines:

- A draft of the dissertation, paper or electronic file, shall be placed in the CEM program office one week prior to the final examination and be available to all interested persons at UT.
- A seminar shall be [scheduled](#) and presented by the student. The seminar will be announced through the CEM program office and be open to all interested persons at UT. Seminar announcements should identify this as a dissertation defense.

- This is an official university academic activity; pets (with the exception of service animals) and young children are not permitted to attend.
- Students should not bring refreshments to the defense.
- At the end of the presentation, questions shall be open to the audience and be appropriate to that presentation.
- An oral defense of the dissertation, by the student, will be conducted by the PhD committee immediately following the seminar. **The Director of Graduate Studies is invited to attend the oral defense.**

### Example Timetable for Completion of PhD Degree

	Year 1			Year 2			Year 3			Year 4		
Semester*	Fall	Spr	Sum									
Entry into program	→											
Establish advising committee		→	→									
Submit progress report			→			→			→			
Take comprehensive examination							→	→	→			
Submit Admission to Candidacy form										→	→	
Dissertation credit hours									→	→	→	→
Research Day experience†						→			→			→
Schedule and take final exam												→

\*Assumes entry to program during fall semester and graduation during summer semester. Semesters should be adjusted according to when individual students entered program.

†Medical/clinical residents pursuing a doctoral degree have until the end of their 4th year and should adjust timetable accordingly.

‡Orange arrows indicate option of which *two* years in which to complete degree requirement.

### PhD with Concurrent MS Degree

The CEM program offers the PhD with a concurrent MS degree option for doctoral students who plan to complete the master's degree while maintaining enrollment in the doctoral program. Students will gain experience working with a committee, performing research, and writing that will help prepare them for their PhD work. The degree requirements for the concurrent MS/PhD are integrated within the degree requirements for the PhD, with a common committee (except in special circumstances; i.e., when a student wishes to complete an MS in one research emphasis area [ex: immunology] and a PhD in another [ex: virology]).

The concurrent master's degree is designed primarily for the benefit of those entering the PhD program with a baccalaureate degree only. A combined total of 48 credit hours (plus 24 credit hours of Dissertation) is required for the PhD with concurrent MS, regardless if the student holds a previous master's or professional degree.

Students must submit a [Request for Concurrent Master's Degree](#) form to the Graduate School (111 Student Services Building) two weeks prior to the deadline for submission of the graduation application for the master's degree. No fee will be assessed for submission of this form.

Preferably, the student will decide the **path to degree (see next page)** upon entrance into the PhD program. Students who have already completed a master's degree in a similar program elsewhere will continue to be admitted directly into the PhD-only program.

**Path 1: MS with thesis; PhD with dissertation**

Students will progress through the MS program and complete a thesis and oral defense before attempting the PhD comprehensive examination and completing the dissertation and dissertation oral defense. Six credit hours of 500 Thesis and 24 credit hours of 600 Dissertation are required. Students who have already started taking dissertation credit hours will need to register for both 500 Thesis and 600 Dissertation.

**Path 2: MS with project in lieu of thesis option; PhD with dissertation**

Students will progress through the MS program with 6 credit hours in CEM 501 (Special Topics in Comparative and Experimental Medicine), CEM 510 (Graduate Research Participation), or CEM 515 (Current Topics in Comparative and Experimental Medicine), completed under the supervision of the student's major professor and committee. The individual project will involve a literature survey, development of a pre-doctoral fellowship grant targeted toward a specific funding agency, or other comparable project deemed acceptable by the student's committee. The student will undergo an oral defense of the project before attempting the PhD comprehensive examination and completing the dissertation and dissertation oral defense. **The Director of Graduate Studies is invited to attend the oral defense.**

Concurrent MS students will be expected to follow all of the [requirements](#) for a master's degree as outlined in this handbook. This includes forming a master's committee and submitting a [Masters Committee Appointment Form](#) to the Director of Graduate Studies for approval.

## Dual DVM-PhD

The College of Veterinary Medicine and the Comparative and Experimental Medicine (CEM) graduate program offer a coordinated accelerated dual program leading to the conferral of both the Doctor of Veterinary Medicine and the Doctor of Philosophy degrees. The accelerated dual program allows veterinary students to apply up to 8 credit hours of DVM course work toward a PhD degree in CEM, leading to completion of both degrees in less time than would be required to earn both degrees independently. The accelerated program is designed to prepare highly motivated students for a career in veterinary research.

Students entering the dual degree program must meet minimum admission requirements for both the DVM and the PhD programs. Applicants for the DVM-PhD program must make separate application to, and be competitively and independently accepted by, the College of Veterinary Medicine for the DVM and the CEM program for the PhD. Students who have been accepted by the College of Veterinary Medicine may apply for approval to pursue the dual program any time prior to or after matriculation.

Students enrolled in the dual DVM-PhD program will be officially classified as primarily veterinary students until the DVM coursework is completed, with the following exception: dual program students will typically enroll as primarily PhD students during the two summer semesters following completion of their first and second years in the veterinary curriculum. After the DVM is conferred, the dual student's primary major will be CEM.

A dual program candidate must satisfy the graduation requirements of each program. The CEM program will award up to 32 credit hours toward the PhD for acceptable performance (a grade of at least a "B" in A-F-graded courses) in approved courses offered by the College of Veterinary Medicine. Courses eligible for dual credit will be at the recommendation of the student's CEM major professor in consultation with the student's PhD committee. Students in the dual program who also hold a master's degree may use up to 24 credit hours from their master's program as part of the 32 credit hours awarded toward the PhD, as approved by the student's committee.

A total of 48 course credit hours, independent of dissertation (CEM 600), are required for the PhD degree (16 CEM core course credit hours plus 32 credit hours accepted from the DVM program). The doctoral comprehensive examination must be successfully completed within 2 years of completing all DVM course work.

### Expectations for Good Standing

Students in the CEM program are expected to maintain a 3.00 cumulative grade-point average on all graduate courses graded A–F. For all other courses, a grade of either P or S must be received. In addition, students are expected to make reasonable progress in their thesis/dissertation research after projects have been approved. The CEM program has a formal process for annual evaluation of student progress and performance. The process is designed to optimize the value of individual student programs and to ensure timely progression through degree requirements.

### Yearly Progress Report

Following each spring semester, students who have been in the CEM graduate program for at least two semesters must meet with their major professor to discuss their progress and performance. The major professor is responsible for providing a written evaluation describing the student's accomplishments, strengths, and deficiencies and, if necessary, suggested corrective actions. In the event of an anticipated unsatisfactory evaluation, the major professor consults with the student's advising committee before preparing the evaluation. The major professor provides copies of the evaluation to the members of the student's committee and to the Director of Graduate Studies.

Following the major professor's evaluation and prior to the start of the fall semester, the student must submit a report packet to the CEM program office. The packet includes a detailed reporting form, a current curriculum vitae (CV), and a copy of the major professor's evaluation. The reporting form includes explanations and corrective actions to be taken in response to deficiencies or unsatisfactory progress reported in the major professor's evaluation. The packet will be available to the major professor and to members of the student's advising committee.

If warranted, the Director of Graduate Studies will notify the student, the major professor, and the student's advising committee that a report of unsatisfactory performance is being made to the AAPC. The AAPC will review the report and any additional materials provided by student's committee members and decide if there are grounds for probation or [dismissal](#) from the program. Should a progress report not be filed by the specified deadline, access to financial support may be jeopardized, and students may be restricted from registering for courses.

### UTCVM Research Day Experience

Master's students are required to present at least once in the annual UTCVM Research Day event, prior to defense of the thesis. Doctoral students are required to present at least twice in this event, prior to defense of the dissertation. In exceptional circumstances, the Director of Graduate Studies may waive this requirement.

### Grade-Point Average (GPA)

Graduate students must maintain a cumulative grade-point average (GPA) of at least 3.0 in all graduate courses taken for a letter grade of A to F. Grades of S/NC, P/NP, and I, which have no numerical equivalent, are excluded from this computation.

### Repeating Courses

Graduate students may repeat up to two courses in which they earned a grade of D or F. The decision to repeat a course is made between the student and the major professor. Each course may be repeated only once. Both the original and repeat grades will be included in the calculation of the cumulative GPA. Credit hours will only be counted once towards meeting degree/program requirements.

To re-enroll in a class in order to improve an earned grade, the student must complete a [Permission to Repeat a Graduate Course](#) form and have it signed by their major professor. The form may be scanned and emailed **from the major professor** to the Graduate School, or it may be sent by campus mail or hand delivered.

## Grade of Incomplete

Under extraordinary circumstances and at the discretion of the instructor, the grade of I (Incomplete) may be awarded to students who have satisfactorily completed a substantial portion of the course requirement but cannot complete the course for reasons beyond their control.

- The I grade is not issued in lieu of the grade of F.
- The conditions for removal of the I grade, including the time limit for removal of the I grade, are decided by the course instructor.
- It is the responsibility of the student receiving an I grade to arrange with the course instructor whatever action is needed to remove the I grade at the earliest possible date, and in any event, within one calendar year of the assignment of Incomplete.
- Students do not remove an I grade by re-enrolling in the course.
- The I grade does not carry quality points and is not computed as a grade of F in the grade point average.
- **If the I grade is not removed within one calendar year or upon graduation, it shall be changed to an F and count as a failure in the computation of the grade point average.**
- A student need not be enrolled at the university to remove a grade of Incomplete.

## Academic Probation

If, upon completion of 9 credit hours of graduate course work, a student's GPA falls below 3.00, the student will be placed on academic probation. A student will be allowed to continue graduate study in subsequent semesters if each semester's grade point average is 3.00 or greater. Upon achieving a cumulative GPA of 3.00, the student will be removed from probationary status.

## Dismissal

If a student is on academic probation, the degree status will be terminated by the Dean of the Graduate School if the student's semester GPA falls below 3.00 in a subsequent semester. When the particular circumstances are deemed to justify continuation, and upon recommendation by the Director of Graduate Studies and approval of the Dean of the Graduate School, a student on probation whose semester GPA is below 3.00 may be allowed to continue on a semester-by-semester basis. Other terms of dismissal are failure to pass the [comprehensive](#) or final examination (requests for second attempts must be sent to the Director of Graduate Studies and reviewed by the AAPC for approval/disapproval), failure to meet CEM program time limit requirements, violations of [academic honesty](#), [research misconduct](#), or [unsatisfactory progress](#). Unsatisfactory progress includes two consecutive grade reports of "No Progress" (NP) in 500 Thesis or 600 Dissertation. Dismissal of a graduate student from the CEM program is accomplished by written notice to the student, with a copy to the Graduate School. In those cases where the department's requirements for continuation are more stringent than university requirements for graduate programs, the Dean of the Graduate School will evaluate the student's record to determine whether the student is eligible to apply for a change of status and register in another area of study. Registration for courses in the CEM program by students dismissed from the program will not be permitted, except by written authorization from the Director of Graduate Studies.

## Conflict Resolution

If a conflict develops between a student and the student's major professor, both parties should work to correct the interfering issues. Conflicts may include issues of disruptive conduct and insubordination. If the conflict cannot be resolved, the professor or student should request mediation through the Director of Graduate Studies. If all efforts fail and the professor decides to stop serving as the student's major professor, that professor documents in writing all the problems and the attempts to make corrections to the student, the student's committee members, and the Director of Graduate Studies. Conversely, students may similarly request changes. Under either scenario, to remain in the program, the student must provide to the Director of Graduate Studies a written explanation and request to formally visit with other program faculty (as in laboratory rotations) or to associate formally with another faculty member (who must provide written agreement). The Director of Graduate Studies will notify the student, the major professor, and the student's advising committee of their decision. The CEM program is not responsible for replacing any stipend and tuition support provided by the first faculty mentor, and it is possible that stipend and tuition support for the student may be lost.

# ACADEMIC HONESTY

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## Expectations

Plagiarism or academic cheating of any description (during closed-book examinations, thesis preparation, manuscript preparation, and research) is considered a serious breach in academic honesty, as is falsification of data.

## Violations

Violations of academic honesty by a student should be reported in writing to the Director of Graduate Studies. The student will be notified, in writing, of the charge(s) by the committee within 7 days of the latter receiving the charge. The Director of Graduate Studies will investigate the circumstances of the alleged offense by meeting with both the accuser and the accused and either impose a penalty or dismiss the charges within 30 working days of student notification of the charge (unless an extension requested by the student is approved).

## Penalties

Appropriate penalties for violation of academic honesty are probation, suspension, or dismissal. The exact penalty will depend on the circumstances under which the violation was committed.

## Appeal

After a hearing by a CEM appeals panel, a student dissatisfied with the decision rendered may [appeal](#) the decision to the Appeals Committee of the [Graduate Council](#) in the manner detailed in [Hilltopics](#).

# CONFLICTS OF INTEREST

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- Students are discouraged from providing food and refreshments for participating faculty during comprehensive examinations and thesis/dissertation defenses. The student being examined is not expected or required to do this, and the action may place examining faculty in an uncomfortable situation. Following a successful examination or thesis/dissertation defense, it is then acceptable for participating faculty to be invited to a celebration.
- Students are not required to provide food and refreshments at regular committee meetings, and providing anything beyond inexpensive snacks and coffee or soft drinks is strongly discouraged.
- Students should not give gifts to faculty in the CEM program, including their own major professor, before they have completed all requirements for their degree. Although gift giving is common in other cultures, this practice can be misinterpreted as creating or contributing to a conflict of interest, and is therefore strongly discouraged.

# LEGAL REQUIREMENTS FOR RESEARCH

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Institutions of higher education have maintained a centuries-old tradition of integrity and objectivity. The University of Tennessee is pleased with the overall support given by its faculty, staff, volunteers, and students in upholding this tradition and wants to ensure that the highest level of integrity in all academic activities is continued. Therefore, any individual who has reason to believe that he or she has knowledge of an act of research misconduct, including fabrication of results, plagiarism, and/or misrepresentation of findings, should communicate this information to a supervisor or appropriate administrator. If an allegation of misconduct is substantiated, the chief administrative officer of the campus shall initiate the applicable disciplinary procedures, and sanctions, if appropriate, will be imposed under those procedures.

## Responsible Conduct of Research and Compliance Training

All researchers at UT are expected to comply with the university's research policies, regulations, and guidelines. [Information](#) and required forms are available at the Office of Research. Regulations must be followed for all research, especially that involving animal care, biosafety, human subjects, and radiation.

It is recommended that all students in the CEM program complete training in the responsible conduct of research during their first year of study, and all students must complete this training within their first 2 years. Training may be acquired by completing any one of the following three options:

1. Satisfactory completion of an approved online training module.
  - a. [CITI - Collaborative Institutional Training Initiative](#) (*recommended*)
2. Graduate course
  - a. CEM 525: Research Ethics for the Life Sciences (*recommended*)
  - b. Others, as they become available and are approved by the CC
3. Student-Mentor training plan

Additional opportunities for responsible conduct of research training may be available through the [UTIA](#) and [UT Knoxville](#) research offices, as well as through periodic training sessions from other campus groups.

Upon satisfactory completion of responsible conduct of research training, students should record the training as part of their yearly progress report. This should document instruction in the topics addressed in the core training provided under the approved options listed above (1a or 2a).

# GRIEVANCES AND APPEALS PROCEDURES

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Appeals may involve the interpretation of and adherence to university, college, and department policies and procedures as they apply to graduate education and the issuance of grades based on specific allowable reasons as stipulated in the *Graduate Council Appeal Procedure*. Appeal procedures in regard to allegations of misconduct or academic dishonesty are presented in [Hilltopics](#) under "Disciplinary Regulations and Procedures."

An initial appeal at the lowest level must be filed no later than 30 days after the incident that occasions the appeal.

Graduate students and faculty should first try to resolve the matter through informal discussions. If a satisfactory resolution is not met, the individual should file a grievance in writing to the Director of Graduate Studies. If applicable, any person accused in the grievance must be notified, in writing, by the Director of Graduate Studies within 7 days of receiving the written allegation. The student must present details of the grievance in person and provide documentation of the issue. The Director of Graduate Studies shall work with the student to appoint a three-member panel composed of faculty who are not involved in the dispute. The panel shall render a decision within 30 working days of receiving the grievance, unless an extension requested by any of the parties involved is approved. If any party is not satisfied by the decision of the panel, further [appeals](#) may be made to the university's Graduate Council Appeals Committee.

Students with grievances related to race, sex, color, religion, national origin, age, disability or veteran status should file a formal complaint with the Office of Equity and Diversity, 1840 Melrose Avenue.

For all other problems students may encounter related to their graduate studies that they feel cannot be addressed by or to their mentor and committee, students are strongly encouraged to seek guidance from Director of Graduate Studies.

Undergraduate students who wish to appeal a grade in a graduate course should follow the procedures outlined in the [Undergraduate Catalog](#). No appeal may be filed later than 90 days after the final grade has been issued.

# CEM COURSE LISTINGS

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CEM students are not restricted to registration only within the CEM course listings and are expected to enroll in courses outside the program.

Codes for course offerings:

*E* – offered every semester

*F* – offered in fall semester only

*Sp* – offered in spring semester only

*Sum* – offered in summer semester only

*A* – offered in alternate years

*Even* – offered in even-numbered years (e.g., 2018)

*Odd* – offered in odd-numbered years (e.g., 2019)

**411 – Undergraduate Research Participation (1-3).** Experience in active biomedical research projects under supervision of faculty. Students in pre-medicine, biology, and related majors may conduct research projects within designated areas. *Satisfactory/No Credit grading only. May be repeated with consent. Maximum 9 credit hours. Contact coordinator prior to registering. E*

**500 – Thesis (1–15).** *P/NP only. E*

**501 – Special Topics in Comparative and Experimental Medicine (1–6).** Specialized experience in comparative and experimental medicine. *May be repeated. Maximum 12 credit hours. Consent of instructor. E*

**502 – Registration for Use of Facilities (1–15).** Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. *Satisfactory/No Credit grading only. May be repeated. May not be used toward degree requirements. E*

**504 – Descriptive and Applied Epidemiology (3).** Principles of epidemiology as well as historic and modern applications to human and animal diseases. Host-agent relationships, measurement of disease frequency, disease monitoring and control in human and animal populations, field investigations, animal health economics and production. *F*

**506 – One Health (3).** Will address the link between human, animal, and environmental health. Each online module focuses on some aspect of “One Health” and may include topics such as emergency preparedness, zoonotic diseases, antibiotic resistance and food safety, responsible pet ownership and the human-animal bond, and the effects of climate on disease prevalence. Methods of intervention and problem solving such as research design, program evaluation, community education, and policy analysis are also incorporated. This is an online course. *Sum*

**507 – Epidemiology of Vector-Borne, Bacterial, and Viral Zoonotic Diseases (3).** Emphasis is placed on understanding the host, agent, and environmental factors that determine the distribution of selected diseases of importance to both human and animal populations. Selected topics include vector-borne zoonoses, rabies, brucellosis, and psittacosis. This is an online course. *Recommended Background: Public health, veterinary medicine, nursing courses, or students in these programs. Comment(s): Graduate or professional veterinary students at UTK and personnel employed by the Tennessee Department of Health and enrolled in the Applied Epidemiology Certificate Program. Consent of instructor. Sum, Odd*

**508 – Epidemiology of Parasitic, Foodborne, and Bacterial Zoonotic Diseases (3).** Emphasis is placed on understanding the host, agent, and environmental factors that determine the distribution of diseases of importance to both human and animal populations. Selected topics include anthrax and leptospirosis, in addition to parasitic and foodborne zoonoses. This is an online course. *Consent of instructor. Sum, Even*

**510 – Graduate Research Participation (1-3).** Advanced research techniques while conducting individual biomedical research projects under supervision of faculty. *May be repeated. Maximum 12 credit hours. Consent of instructor. E*

**515 – Current Topics in Comparative and Experimental Medicine (1–6).** Specialized experience in comparative and experimental medicine. *May be repeated. Maximum 12 credit hours. Consent of instructor. E*

**525 – Research Ethics for the Life Sciences (1).** Cross-listed: (Plant Sciences 525). How good research conduct and knowing the rules of science can enable success in life science research. Bioethics is not a focus. *F*

- 530 – Wildlife Diseases (2).** Cross-listed: (Wildlife and Fisheries Science 530). Necropsy of birds and mammals. Recognition of various diseases and methods of preparing pathological materials in field and lab. Investigative procedures concerning wildlife diseases. *F, Even*
- 531 – Wildlife Medicine: Conservation and Policy (2-3).** Cross-listed: (Veterinary Medicine 875). Both online and in-person study abroad components. The online portion of the course will explore policy and economics of wildlife medicine as well as address human health concerns in developing nations. A clinical component abroad will allow students to learn to handle and treat medical and surgical conditions in wild animals. Students must satisfactorily complete online modules and associated assignments, participate in didactic and clinical activities while abroad, and write a reflective paper upon completion of the course. *Contact Hour Distribution: 1 hour online, 1–2 hours off campus. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 credit hours. Comment(s): Veterinary Medicine students may count the course only once (either 2 or 3 credit hours) toward degree requirements. Registration Permission: Consent of instructor. Sp*
- 535 – Capstone Experience (1-3).** Capstone experience completed under the supervision of the student's major professor and master's committee. Individual project involving a literature survey, development of a white paper, or other suitable project. *Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated once. Registration Restriction: Master of Science - Forensic Odontology concentration. Registration Permission: Consent of instructor. E*
- 541 – Cellular and Molecular Basis of Disease (3).** Disease at the molecular level. Changes in molecular events in cells that lead to disease and occur as a result of disease. Correlation with clinical and pathological states. Systems covered: neurological, structural, respiratory, circulatory, metabolic, endocrine, reproductive, and immunological. *Prerequisite: Biochemistry and Cellular and Molecular Biology 419, or equivalent. F*
- 544 – Cancer Cell Biology (3).** Comprehensive discussion of the major mechanisms of cancer initiation, promotion, and progression. Emphasizes experimental approaches, signaling pathways, technology, and animal models that are employed to study cancer. Students are expected to learn about common laboratory techniques in cancer research, apoptosis/cell cycle, and the following as they relate to cancer: alternative splicing, signaling pathways, inflammation, chemo/dietary prevention, animal models, pathobiology, PET/CT imaging, genetics, lipids, radio-oncology, metastasis/angiogenesis, and obesity. *Recommended background: Advanced biology, including cell biology, molecular biology, biochemistry, microbiology, or genetics. F, Odd*
- 550 – Introduction to Forensic Odontology (3).** Development of the discipline within a medico-legal context. From crime scene to positive identification to courtroom, dental remains as evidence are studied from a historic to current approach using taphonomic, radiographic, histologic, pathologic, and anthropologic perspectives. *Consent of instructor. F*
- 552 – Head and Neck Anatomy (4).** Detailed gross dissection of the human head and neck with traditional musculo-skeletal and neuro-vascular emphasis. *1 hour lecture and 3 hours lab per week. Consent of instructor. Sp*
- 554 – Dental and Maxillofacial Anatomy/Histology (4).** Human dento-facial embryology, odontogenesis, mineralized tissue histology and dental morphology. *3 hours lecture and 1 hour lab per week. Consent of instructor. F*
- 556 – Head and Neck Osteology and Trauma (4).** Detailed neuro- and viscerocranial osteology, including embryology, post-natal facial growth and development, aging and degenerative pathology, and perimortem trauma. *2 hours lecture and 2 hours lab per week. Prerequisite: CEM 552. Consent of instructor. Sum*
- 558 – Laboratory Methods in Forensic Odontology (4)** Instruction in oral autopsy procedures, preparation of crime scene or autopsy-related evidence, preparation of gross specimens and analysis, charting of dentitions, photography and radiography of dentitions, report writing for legal medicine, and dissection and light microscopy of tissues for reports and courtroom testimony. *1 hour lecture and 3 hours lab per week. Consent of instructor. Sum*
- 600 – Doctoral Research and Dissertation (3–15).** *P/NP only, E*
- 601 – Advanced Epidemiology (3).** Epidemiological study design, data analysis, and model building. Emphasis placed on using, understanding, and making inferences based on least squares, logistic, Poisson, survival, and mixed models. STATA will be used as the basic computing language for all analyses. *Recommended Background: Graduate-level epidemiology or statistics course. Consent of instructor. Sp, Odd*
- 602 – GIS and Geographical Epidemiology (3).** Principles and applications of Geographical Information Systems (GIS) and geographical epidemiology in human and animal health research and practice. Exposure to a wide range of spatial analysis techniques useful in the investigation of human and animal disease problems as well as vector dynamics. The knowledge gained is useful in guiding disease prevention and control strategies. *Recommended Background: Graduate-level epidemiology or statistics course. Consent of instructor. Sp, Even*

- 607 – Diagnosis and Pathogenesis of Virus Diseases of Domestic Animals (3).** Advanced study of virus diseases important to domestic animals: virus biology, pathogenesis, pathology, and diagnosis technical training in virus diseases diagnosis. *2 hours and 1 lab. Consent of instructor. Sum, Even*
- 610 – Advanced Topics in Comparative and Experimental Medicine (1–3).** Specialized, in-depth experience in various disciplines. Current and future research methodology, recent advances in instrumentation in analytical techniques for comparative medicine. *May be repeated. Maximum 12 credit hours. E*
- 611 – Journal Club in Emerging Infectious Diseases (1).** Readings and discussions based on current literature. *May be repeated. Maximum 12 credit hours. F, Sp*
- 612 – Journal Club in Biomedical and Diagnostic Sciences (1).** Readings and discussions based on current literature. *May be repeated. Maximum 12 credit hours. E*
- 613 – Journal Club in Large Animal Clinical Sciences (1).** Readings and discussions based on current literature. *May be repeated. Maximum 12 credit hours. E*
- 614 – Journal Club in Small Animal Clinical Sciences (1).** Readings and discussions based on current literature. *May be repeated. Maximum 12 credit hours. Must have DVM or equivalent degree. E*
- 615 – Journal Club in Comparative and Experimental Medicine (1).** Readings and discussions based on current literature. *May be repeated. Maximum 12 credit hours. E*
- 616 – Comparative and Experimental Medicine Seminar (1).** Research seminars pertinent to disciplines within the program. *Satisfactory/No Credit grading only. May be repeated. Maximum 12 credit hours. Maximum 3 credit hours may be applied toward degree requirements. F, Sp*
- 617 – Medical Biology Seminar (1).** Invited speakers. Topics posted in advance. *Satisfactory/No Credit grading only. May be repeated. Maximum 12 credit hours. Maximum 3 credit hours may be applied toward degree requirements. F, Sp*
- 618 – Advanced Topics in Medical Science (1-3).** New developments in biological research applicable to clinical medicine. *May be repeated. Maximum 12 credit hours. Primarily for doctoral candidates in Comparative and Experimental Medicine. Consent of instructor. E*
- 620 – Current Topics in Comparative and Experimental Medicine (1–3).** Specialized, in-depth experience in various disciplines, such as current and future research methodology, and recent advances in instrumentation in analytical techniques for comparative medicine. *May be repeated. Maximum 12 credit hours. E*
- 650 – Surgical Pathology (1-2).** Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. *May be repeated. Maximum 3 credit hours. Consent of Instructor. E*
- 652 – Disorders of the Endocrine System (2).** Cross-listed: (Animal Science 652). Pathological and physiological aspects of diseases; endocrine glands of various animal species. *Recommended Background: 3 credit hours of physiology. Sp, Even*

## College of Veterinary Medicine

### Biomedical and Diagnostic Sciences

**Bemis, David – PhD**

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Research Emphasis: Diagnostic bacteriology/ mycology, bacterial pathogenesis, Bordetella

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**Cox, Sherry – MS, PhD**

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Research Emphasis: Pharmacology

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**Donnell, Robert – DVM, PhD**

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Research Emphasis: Pathogenesis of amyloid formation, deposition and clearance via use of transgenic models, development of antibodies and clinical evaluation of novel approaches

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**Fecteau, Kellie – MS, PhD**

Research Emphasis: Clinical endocrinology

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**Flatland, Bente – DVM, MS**

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Research Emphasis: Clinical pathology quality management, method validation/comparison, point-of-care testing, coagulation, hematology, chemistry of stains and staining, diagnostic cytology

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**Fry, Michael – DVM, MS**

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**Gerhold, Richard – DVM, MS, PhD**

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**Giori, Luca – DVM, PhD**

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Research Emphasis: All aspects of laboratory medicine, with a specific interest in diagnostic of adrenal endocrinopathies

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**Kania, Stephen – MS, PhD**

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**Kennedy, Melissa – DVM, PhD**

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Research Emphasis: Coronavirus, infections in felidae, viral diseases of non-domestic species

[http://works.bepress.com/melissa\\_kennedy/](http://works.bepress.com/melissa_kennedy/)

**Martin-Jimenez, Tomas – DVM, PhD**

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**McEntee, Michael – DVM**

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**Miller, Debra – DVM, PhD**

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Research Emphasis: Amphibian diseases; Leatherback sea turtle and marine and Arctic mammal pathology

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**Newkirk, Kim – DVM, PhD**

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**Odoi, Agricola – BVM, MSc, PhD, FAHA**

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Research Emphasis: Applications of GIS & spatial epidemiology in health research & practice; zoonotic infections of public health significance; determinants of population health

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**Okafor, Chika – DVM, MS, PhD**

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**Reed, Robert – DVM, PhD**

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**Rouse, Barry – DVM, MSc, PhD**

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Research Emphasis: Comparative cellular and molecular immunology; viral infection diseases

<https://vetmed.tennessee.edu/FacultyStaff/SitePages/CVMProfile.aspx?NetID=btr>

**Schaefer, Deanna – DVM, MS, MT(ASCP)**

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**Souza, Marcy – DVM, MPH**

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**Thompson, Sharon – DVM, MPH**

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**Wang, Hwa-Chain Robert – BVM, PhD**

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Research Emphasis: Anti-cancer molecular oncology

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## Large Animal Clinical Sciences

**Adair, Henry S. – DVM, MS**

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Research Emphasis: Equine laminitis; laser Doppler flowmetry; microvascular blood flow and laser surgery

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**Anderson, David – DVM, MS**

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Research Emphasis: Bovine pain and welfare; ruminant surgery; animal models for human research

<https://orcid.org/0000-0003-0745-7591>

**Caldwell, Marc – DVM, PhD**

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Research Emphasis: Infectious diseases of food animals with particular focus on bacterial pathogenesis and host-pathogen interactions

<https://orcid.org/0000-0002-1451-9749>

**Dhar, Madhu – MS, PhD**

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Research Emphasis: Animal models of human disease with special relevance to obesity and diabetes

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**Lear, Andrea – DVM, PhD**

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Research Emphasis: Reproductive and placental immunology, infectious disease, neonatology

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**Mulon, Pierre-Yves – DVM, DES, DACVS-LA**

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Research Emphasis: Biomechanics, bone healing, regenerative medicine, bone implant interface, osseointegration

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**Seddighi, M. Reza – DVM, PhD**

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Research Emphasis: Pharmacokinetics and dynamics of analgesics and anesthetics

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**Whitlock, Brian – DVM, MS, PhD**

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Research Emphasis: Reproductive physiology and endocrinology; interaction of metabolic and reproductive systems

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## Small Animal Clinical Sciences

**Cekanova, Maria – PhD, MS, RNDr**

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Research Emphasis: Metabolism, tumorigenesis, adult mesenchymal stem cells, imaging technology

<https://orcid.org/0000-0002-9651-1619>

**Jones, Michael – DVM**

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Research Emphasis: Avian medicine

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**Millis, Darryl – DVM, MS**

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Research Emphasis: Effects of growth factors on bone healing; canine gait analysis

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**Morandi, Federica – DVM, MS**

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Research Emphasis: CT; nuclear Medicine; PET

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**Murphy, Maryanne – DVM, PhD, DACVN**

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Research Emphasis: Obesity prevention and management

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**Weigel, Joseph – DVM, MS**

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Research Emphasis: Orthopedics

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**Whittemore, Jacqui – DVM, PhD**

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Research Emphasis: Vaccine-associated immune disorders; pancreatic and liver disorders; non-invasive interventional techniques

<https://orcid.org/0000-0003-2624-2262>

**Witzel, Angela – DVM, PhD**

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Research Emphasis: Veterinary nutrition

<https://orcid.org/0000-0002-7424-3502>

## UT Graduate School of Medicine

### **Gerard, David – PhD**

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Research Emphasis: Bone activity in response to implanted materials and bone response to growth factors

[http://gsm.utmck.edu/oral\\_surg/faculty/gerard.cfm](http://gsm.utmck.edu/oral_surg/faculty/gerard.cfm)

### **Goldman, Mitchell – MD**

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Research Emphasis: Vascular/transplant surgery

<http://gsm.utmck.edu/surgery/faculty/goldman.cfm>

### **Grandas, Oscar – MD**

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Research Emphasis: Pancreas transplantation

<http://gsm.utmck.edu/surgery/faculty/grandas.cfm>

### **Karlstad, Michael D. – PhD**

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Research Emphasis: Regulation of pulmonary inflammation and protein metabolism by protein and lipid mediators in critical illness and trauma

<http://gsm.utmck.edu/surgery/faculty/karlstad.cfm>

### **Kennel, Stephen – PhD**

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Research Emphasis: Human immunology & cancer

<http://gsm.utmck.edu/internalmed/faculty/kennel.cfm>

## Public Health, Nutrition, Entomology & Plant Pathology

### **Brown, Kathleen C. – PhD, MPH**

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Research Emphasis: Health issues and how they affect the overall quality of life and health of the community

<http://publichealth.utk.edu/people/brown/>

### **Chen, Jiangan (Jay) – MM, PhD**

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Research Emphasis: Impacts of environmental toxicants on development and reproductive function

<http://publichealth.utk.edu/people/chen/>

### **Kintziger, Kristina W. – PhD, MPH**

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Research Emphasis: Understanding the vulnerabilities and current & future disease burden associated with climate-sensitive hazards; understanding the relationship between morbidity/mortality and social determinants of health

<http://publichealth.utk.edu/people/kintziger/>

### **Marks, Murray K – PhD**

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Research Emphasis: Mineralized tissue biology and histology; dental enamel histopathology; skeletal trauma histology; fetal dental development, human identification/forensic anthropology

<http://gsm.utmck.edu/dentistry/faculty/marks.cfm>

### **Mountain, Deidra - PhD**

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Research Emphasis: Vascular/transplant surgery

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### **Terry, Paul – PhD, MPH**

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Research Emphasis: Epidemiology

<http://gsm.utmck.edu/internalmed/faculty/terry.cfm>

### **Wall, Jonathan S. – PhD**

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Research Emphasis: Amyloid and other abnormal protein assemblies

<http://gsm.utmck.edu/internalmed/faculty/wall.cfm>

### **Raynor, Hollie – PhD, MS**

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Research Emphasis: Lifestyle interventions for obesity treatment in children and adults; examining environmental dietary factors which influence food consumption

<http://nutrition.utk.edu/peopletwo/hollie-raynor/>

### **Trout Fryxell, Rebecca – MS, PhD**

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Research Emphasis: Surveying vector populations and assessing pathogen prevalence; ascertaining specific biologies and life histories of vectors by population, species, and/or community; investigating population specific vector ecology and genetics; and developing and evaluating novel methods for vector management and disease suppression

<https://orcid.org/0000-0003-2133-0220>

# APPENDICES

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## Forms

- CEM Forms
  - [vetmed.tennessee.edu/research/Pages/gp\\_current\\_students.aspx](http://vetmed.tennessee.edu/research/Pages/gp_current_students.aspx)
- Graduate School Forms
  - [gradschool.utk.edu/forms-central/](http://gradschool.utk.edu/forms-central/)

## Funding

- Costs and Funding Opportunities
  - [tiny.utk.edu/grad-funding](http://tiny.utk.edu/grad-funding)
- Financial Aid and Scholarships
  - [onestop.utk.edu/financial-aid](http://onestop.utk.edu/financial-aid)
- Travel Awards – Graduate Student Senate
  - [gss.utk.edu/travel-awards](http://gss.utk.edu/travel-awards)

## International Students

- Center for International Education
  - [cie.utk.edu](http://cie.utk.edu)
- International House
  - [ihouse.utk.edu](http://ihouse.utk.edu)

## Professional Development & Training

- Best Practices in Teaching
  - [tiny.utk.edu/bpit](http://tiny.utk.edu/bpit)
- Center for Career Development
  - [career.utk.edu](http://career.utk.edu)
- Center for Integration of Research and Teaching (UT CIRTL)
  - [teaching.utk.edu/utcirtl](http://teaching.utk.edu/utcirtl)
- Experience Learning
  - [experiencelearning.utk.edu](http://experiencelearning.utk.edu)
- Libraries Information for Graduate Students
  - [libguides.utk.edu/graduate](http://libguides.utk.edu/graduate)
- Office of Graduate Training and Mentorship (OGTM)
  - [gradschool.utk.edu/training-and-mentorship](http://gradschool.utk.edu/training-and-mentorship)
- Teaching & Learning Innovation
  - [teaching.utk.edu](http://teaching.utk.edu)

## Student Resources

- Academic Appeals
  - [tiny.utk.edu/rights-obligations](http://tiny.utk.edu/rights-obligations)
- Admissions, Graduate
  - [gradschool.utk.edu/admissions](http://gradschool.utk.edu/admissions)
- Comparative and Experimental Medicine
  - [vetmed.tennessee.edu/research/Pages/Graduate\\_Program.aspx](http://vetmed.tennessee.edu/research/Pages/Graduate_Program.aspx)
- Counseling Center
  - [counselingcenter.utk.edu](http://counselingcenter.utk.edu)
- Equity and Diversity, Office of
  - [oed.utk.edu](http://oed.utk.edu)
- Graduate Catalog
  - [tiny.utk.edu/grad-catalog](http://tiny.utk.edu/grad-catalog)
- Graduate School
  - [gradschool.utk.edu](http://gradschool.utk.edu)
- Graduate Student Senate
  - [gss.utk.edu](http://gss.utk.edu)
- Graduation Deadlines
  - [tiny.utk.edu/grad-deadlines](http://tiny.utk.edu/grad-deadlines)
- Housing
  - [housing.utk.edu](http://housing.utk.edu)
- Multicultural Student Life
  - [multicultural.utk.edu](http://multicultural.utk.edu)
- OIT - Office of Information Technology
  - [oit.utk.edu](http://oit.utk.edu)
- Research Integrity
  - [research.utk.edu/compliance](http://research.utk.edu/compliance)
- Sexual Misconduct, Relationship Violence, and Stalking
  - [sexualassault.utk.edu](http://sexualassault.utk.edu)
- Student Conduct and Community Standards
  - [studentconduct.utk.edu](http://studentconduct.utk.edu)
- Thesis/Dissertation Consultant
  - [gradschool.utk.edu/thesesdissertations](http://gradschool.utk.edu/thesesdissertations)