Course Bulletin

001188	Pathology Mentor
Subject:	Catalog Nbr:
VET	1188

133789	Animals and Society I
Subject:	Catalog Nbr:
APP	501
Animals in Society uses lectures, discussions and assignments to survey contemporary issues regarding animals and how those issues play out in public policy and community practices toward animals. This is done through a series of modules that examine the historical, social, ethical, political, legal, legislative and economic aspects of society's relationship to recognized categories of animals. The first module of Animals & Society I comprises an introduction to ethics, law, science, social marketing, and policy-making; this year, the second module focuses on wildlife and wildlife policy.	

133807	Animals and Society II
Subject:	Catalog Nbr:
APP	502
Animals in Society II is centered around modules on farm animals, companion animals and the use of animals in research. Additional context is provided in the form of class sessions on humane education and the role of animals in literature and art.	

133997	Public Policy Analysis
Subject:	Catalog Nbr:
APP	509
This course focuses on the theories, analytical approaches and techniques of public policy analysis and provides students with an opportunity to critically examine theoretical frameworks in the context of animal policy. The course will explore policy process, elements of policy design, and the relationship between social movements and political institutions. Through in-depth research in animal policy areas of interest to them, students will gain skills in policy analysis and familiarity with research resources, including laws, regulations, legislation, lobbying reports, and campaign finance records. For the course, students will write a policy analysis case study and policy memos among other assignments.	

134234	Elective
Subject:	Catalog Nbr:
VET	521

134248	Elective

Course Bulletin

Subject:	Catalog Nbr:
VET	522

134328	Intro to Lab Anml Med

Subject:	Catalog Nbr:
LAM	551

This course is an introduction to the use of animals in biomedical research and the role of the laboratory animal veterinarian. In the first half of the course, presentations from experts in the field cover regulatory control of research animal use, the role of the Institutional Animal Care and Use Committee (IACUC), animal models in biomedical research, and ethical use of animals. A laboratory animal anatomy module includes a dissection lab devoted to anatomy of chickens and frogs. The second half of the course covers the biology and care of research animals and design of research animal facilities. The class tours several rodent housing and mixed species research facilities in the area.

Students are expected to attend all classes, labs, and tours. They are required to write one analysis paper on research animal ethical cases and to work in groups to create a design for a multi-species research animal facility. Two written assignments are required. Cross listed with PhD course: BMS 657

134376	Surgery and Anesthesiology In Research Facilities & Journal Club

Subject:	Catalog Nbr:
LAM	556

This course provides students with additional training in anesthesia and surgery methods relevant to the laboratory animal setting. The first portion of the course focuses on principles of anesthesia in laboratory animals and common procedures in rodents. Practical laboratories provide an opportunity for the students to gain hands-on experience in appropriate restraint and handling techniques as well as practice common procedures such as injections, oral administration of compounds, catheter placement and blood collection in rodents. Pain assessment, analgesic management, determination of humane endpoints and methods of euthanasia are also covered. Principles of aseptic surgery in research facilities and post-operative care are emphasized. Students also have an opportunity to practice routine dentistry in Cummings School teaching dogs. This course includes two journal club sessions led by laboratory animal veterinarians or residents in training programs. Journal clubs introduce contemporary topics in the literature and foster critical reading of new research reports.

134393	Specialized Research Environments & Journal Club

Subject:	Catalog Nbr:
LAM	557

This course provides advanced instruction in topics relating to specialized environments which are of particular concern to the laboratory animal veterinarian. The course primarily consists of didactic presentations and discussions led by specialists in the field on a broad variety of topics including zoonotic diseases, occupational health and safety programs, and biocontainment facility design and disaster planning.

Course Bulletin

Other subjects include: transgenic technology, behavioral studies and imaging technologies such as ultrasound, magnetic resonance imaging (MRI) and computed tomography (CT). The course consists of didactic lectures, case studies, and facility tours which are designed to integrate the material discussed in lectures. This course includes two journal club sessions led by laboratory animal veterinarians or residents in training programs. Journal clubs introduce contemporary topics in the literature and foster critical reading of new research reports.

134409	**Applied Learning Experience: Animal Facility Experience**
Subject:	Catalog Nbr:
LAM	558
The summer Animal Facility Experience consists of 8 weeks of in-depth training experiences at industry or academic laboratory animal facilities during the first or second summer after matriculation into the program. The focus of this experience should be on clinical laboratory animal medicine, husbandry, regulatory compliance, or facility management. With advance approval of the program director, equivalent full-time work experience acquired before matriculation may substitute for LAM 558 or 559, but not both. Work undertaken to satisfy undergraduate course requirements will typically not qualify for exemption.	

134470	**Research: Planning and Techniques (mentor)**
Subject:	Catalog Nbr:
CBS	561
Students spend the majority of their training time working in the laboratory, conducting research studies relevant to their research project. Data is analyzed and interpreted in light of the test hypotheses. One objective of the research is to have students present their findings at scientific meetings and prepare their studies for publication	

134488	**Fundamentals of Animal Research-Biostatistics**
Subject:	Catalog Nbr:
CBS	570
This is an elementary course in statistics, designed to give an overview of the basics of statistical analyses, including probability theory, distributions, and hypothesis testing. It is a core course in the graduate curriculum, and as such the prerequisites are those for entry into the graduate program. Topics to be covered include probability and sampling theory, frequency distributions, and hypothesis testing. Some hands-on exercises using statistical software are also offered, but it is anticipated that more advanced applications will require additional instruction. It is the instructor's objective to familiarize students with central concepts and to save in depth discussion of methodologies for advanced courses, however when it is practical, students are encouraged to suggest topics for discussion and review.	

134520	**Fundamentals of Animal Research II: Research Ethics**
Subject:	Catalog Nbr:
CBS	571

Course Bulletin

The aim of the course is to discuss acceptable, unacceptable and controversial aspects of research ethics and responsibilities of a researcher. Students enrolled in the course participate in the discussions of topics using a case-based approach. The course topics include: (1) Experimental techniques and the treatment of data, (2) Conflict of interest, (3) Publication policies and openness in research, (4) Allocation of credits and authorship practices, (5) Error and negligence in science, (6) Misconduct in science, and (7) Responding to violations of ethical standards. The course meets weekly for 2 hours during November-December.

134537	**Journal Club/Seminars**
Subject: CBS	Catalog Nbr: 572
The emphasis is on critical analysis, identifying the reasons that the research is significant, and understanding how the findings extend current knowledge. Students take this course both semesters of the MS program and give presentations each semester. In addition, students are required to attend department seminar series. These seminars take place throughout the year and are part of the training experience, providing an opportunity to develop communication skills and present ideas.	

134568	**Lab Meetings**
Subject: CBS	Catalog Nbr: 573
All students will attend and participate in weekly laboratory meetings scheduled by their mentor or research groups. Students are expected to present plans or results of projects to laboratory members at these meetings.	

134584	**Readings In Special Topics**
Subject: CBS	Catalog Nbr: 574
This course focuses on important topics within the field of research study. Each student meets weekly with their mentor to discuss relevant research papers in their area of study.	

134599	**Research**
Subject: CBS	Catalog Nbr: 575
Students spend the majority of their training time working in the laboratory, conducting research studies relevant to their research project. Data is analyzed and interpreted in light of the test hypotheses. One objective of the research is to have students present their findings at scientific meetings and prepare their studies for publication.	

134612	**Thesis Preparation**
Subject:	Catalog Nbr:

Course Bulletin

CBS	576

Students in the DVM/MS-CBS program must complete a thesis and write their thesis during June and July and defend it orally by August 15. Students in the DVM/MS-CBS program must complete a thesis. The thesis must contain a title page that includes the project title, the student's name, the names of the mentor, and members of the advisory committee, a statement that the thesis is submitted in partial fulfillment of the requirement for a Master of Science in Comparative Biomedical Sciences, and the month and year of submission. The thesis itself must consist of an abstract of the project (one page), a general introduction to the research problem within the field of study (current and pertinent references should be included in this section), and a body of the thesis that consists of specific experiments, methods, results, a general discussion that relates the experimental finding to existing literature and the state of the field, references, and acknowledgement. Submitted or published work can be included as a component of the body of the thesis.

The thesis should be submitted in final form to the thesis examination committee a minimum of 2 weeks prior to the thesis defense. The Thesis Examination Committee consists of the student's SAC plus one outside examiner (Tufts program faculty or faculty from another academic institution). The name of the outside examiner is submitted to the program director for approval at least one month prior to the scheduled thesis defense. The thesis defense should occur in July or early August in time to permit any final revisions. The Thesis Examination Committee can approve the thesis as is, approve it with revisions, or reject the thesis. It must then be approved by the Advanced Education Committee (AEC). Two copies of the final version of the approved thesis are submitted to the program director by August 15.

134641	**Thesis Preparation (mentor)**
Subject:	Catalog Nbr:
CBS	579

The resident trainees will have an extended period in which to complete and defend their theses. Specifically, during the first year of training, the residents will complete all required course work as required in this MS program except that the research credits and participation will be reduced to a single credit commensurate with the trainee's efforts. At the end of the first year, residents will participate in a research planning and techniques seminar (1 credit) offered by the mentor and related faculty. Research will be conducted for a total of 8 months during the first and second year of residency to fulfill the thesis research requirements, VET 560 and VET 561. The candidate is expected to devote two months during year 1 defining their research project and acquiring relevant laboratory techniques needed for the proposed research. During year 2 the candidate would conduct full-time research from January through June.

134656	**Ecology & Conservation Biology**
Subject:	Catalog Nbr:
MCM	580

The concept that the health of the environment influences the health of humans and animals means that all practitioners of conservation medicine must understand fundamental principles of ecology and conservation biology. This course will ensure all students possess foundational knowledge, including: an understanding of ecosystems, community, population ecology, demography, population genetics, population viability and conservation of biodiversity.

Course Bulletin

134669	Health, Disease and Environment
Subject:	Catalog Nbr:
MCM	581

In this course, students will acquire a basic understanding of disease mechanisms, host defenses against disease, the role of vectors in spreading and maintaining disease, and basic principles of disease ecology. This class will also review the diseases of major concern for conservation medicine and ecosystem health. Emphasis will be placed on the integration of animal, human, and environmental health, and the environmental, economic, and anthropogenic factors promoting the emergence or persistence of infectious diseases and other major health threats.

134683	Research Skills I - Systematic Review and Analysis
Subject:	Catalog Nbr:
MCM	582

Research Skills I will guide students through the process of conducting and writing a thorough and rigorous critical literature review of an interdisciplinary conservation medicine topic of interest to them. Students will learn how to access, organize, analyze, interpret, critique, and communicate data and findings from existing sources of published research. The course's second half will focus on using literature reviews to inform research question and hypothesis development, study designs, and data collection methods. While this course will be unable to explore the multitude of available research methodologies in-depth, it is intended to provide you with an understanding of the breadth of methods available. Since you are expected to be identifying and reading research papers relevant to your selected interdisciplinary conservation medicine problem each week, required course readings will be limited. You may be called upon in class to provide informal updates on your literature search and review in discussions and group activities. Assignments are intended to aid you in beginning to conceptualize and research your case study topic. Each week will include up to six hours of contact time involving didactic presentations, critiques of published research, in-class group activities, individual assignments, and presentations.

134695	Field and Laboratory Techniques
Subject:	Catalog Nbr:
MCM	583

Conservation medicine requires empirical health assessments of individuals and populations. Through this course students will become familiar with commonly used field and laboratory methods. This hands-on course covers methods for estimating the size of populations, sample collection and handling, field capture, restraint and anesthesia (including animal welfare considerations). In addition, student will participate in practical session on laboratory diagnostics and commonly used laboratory research techniques (including PCR, ELISA, microarrays and applications of molecular genetics).

134710	Journal Club
Subject:	Catalog Nbr:

Course Bulletin

MCM	584
Journal club will familiarize students with topical scientific papers relevant to conservation medicine, help students become conversant in the language of different contributing disciplines and enhance the skills of analytical reading and critique. Papers will be coordinated with course material. Students take Journal Club in both the Fall and Spring semesters.	

134723	**Case Study**
Subject:	Catalog Nbr:
MCM	585
The case study will provide a capstone exercise that builds on a student's knowledge and skills to produce a comprehensive conservation medicine analysis of a current health problem and recommend strategies to address identified challenges. Each student will identify an issue and will be charged with leading a collaborative team involving other students and appropriate faculty. Cases will undergo a peer-review evaluation through our network of conservation medicine partners. At the end of the year, case studies will be compiled and submitted for publication. Students register for the Case Study during the fall and spring semesters, and are expected to complete their Case Study during the summer	

134736	**Human Dimensions of Conservation Medicine**
Subject:	Catalog Nbr:
MCM	586
Human political, economic, and cultural considerations help create the conditions that govern animal, human, and environmental health, and establish the context in which conservation medicine solutions are implemented. This course will examine the roles of economics, local, national and international governmental regulations, treaties and policies. It will also explore the influences that communities and local culture have on agriculture, trade, conservation, environment, land use, and public health.	

134750	**Engineered Solutions**
Subject:	Catalog Nbr:
MCM	587
Innovation and applied technology will play an increasingly significant role in developing sustainable solutions for many conservation medicine issues. Conservation professionals need to understand the options and potential of engineered solutions in both natural and built environments. In this course students will work within the context of systems engineering as a basis for problem solving. Applied topics will include: ecological engineering, hydrology, remote sensing (satellite, biological and chemical), engineered natural systems and environmental impact assessment methodologies.	

134762	**Research Skills II - Surveillance Methods and Techniques**
Subject:	Catalog Nbr:
MCM	588
This course will familiarize students with methods for collecting data on health events, disease incidence and	

Course Bulletin

prevalence, including participatory methodologies. Students will be introduced to modeling of disease dynamics and processes and disease mapping using GIS technologies. Students will also acquire familiarity with the use of telemetry for monitoring wildlife populations, and the analysis of wildlife data using GPS and GIS and emerging web-based technologies such as Google Earth.

134777	**Project Management And Communication**
Subject:	Catalog Nbr:
MCM	589
This course will cover important communication skills that will enhance collaboration and dissemination of information to stakeholders (scientific community, public and government agencies) as well as the practical skills needed to initiate, fund, and manage research projects. Style and strategies for publication in scientific and lay journals, delivery of legislative briefings, and use of other media will be explored. Project development topics will include team building, seeking funders, grant writing, project development and management, and program and policy evaluation. Sessions on collaborative writing, data visualization, team management and leadership will be included.	

134789	**Journal Club/Seminar**
Subject:	Catalog Nbr:
LAM	592
Students, along with faculty members, participate in a monthly journal club for discussion of current literature in the field. The emphasis is on critical analysis, identifying significance of the research, and understanding how the findings extend current knowledge.	

134829	**Research**
Subject:	Catalog Nbr:
BMS	603
Guided research on a topic suitable for a doctoral dissertation.	

134842	**Research**
Subject:	Catalog Nbr:
BMS	604
Guided research on a topic suitable for a doctoral dissertation.	

134869	**Research**
Subject:	Catalog Nbr:
BMS	605
Guided research on a topic suitable for a doctoral dissertation.	

Course Bulletin

134897	Journal Club and Seminar Series
Subject:	Catalog Nbr:
BMS	607
Students, post-doctoral fellows, scientific staff, and faculty members participate in a weekly Journal Club and regular seminars. The emphasis in Journal Club is on critical analysis of the data and how the research extends current knowledge. Seminars include both campus Work-in-Progress presentations and research presentations given by scientists from the campus or invited from outside. Students take this course throughout their PhD program and are required to regularly attend both Journal Club and seminars. In addition students lead Journal Club twice per year and present one Work-in-Progress seminar per year beginning in the second year.	

134912	Research
Subject:	Catalog Nbr:
BMS	608
Guided research on a topic suitable for a doctoral Dissertation.	

134940	Research
Subject:	Catalog Nbr:
VET	616

134982	Parasite Biology
Subject:	Catalog Nbr:
BMS	652
Parasites are extraordinarily pervasive. This graduate course explores globally important parasites including hookworms, tapeworms, blood flukes, and those that cause malaria, sleeping sickness, and Chagas' disease. Students examine the morphology, development, and distribution of these pathogens and consider the mechanisms they use to infect their hosts and survive within. Topics include the mechanisms of infection and immunity, intracellular survival strategies, vector biology, drug resistance, vaccines, and the economics and public health impact of parasitic disease. Each class centers on interactive discussions and an examination of the primary scientific literature. Course offered every other year.	

134998	Biostatistics
Subject:	Catalog Nbr:
BMS	653
Biostatistics is the application of statistical principals to the design, analysis and interpretation of biological studies. This course provides an overview of statistics likely to be encountered in the study of animals, animal health and animal welfare. In this course we will explore topics related to experimental design, sampling, descriptive statistics, hypothesis testing and statistical inference. Topics will include pseudoreplication vs. true	

Course Bulletin

	replication, blocking, model selection, contingency table analysis, survival analysis, t-tests, analysis of variance, correlation, linear regression, as well as nonparametric statistical methods. Throughout the course we will emphasize the application and interpretation of statistics within a biological context, with a specific effort to use data and examples that focus on topics relative to the other coursework. Students will gain a working understanding of statistical analyses through use of the software SPSS to work through problem sets and assignments. Cross-listed with APP 516: Statistics

135016	**Responsible Conduct of Research**
Subject: BMS	Catalog Nbr: 654
	The Responsible Conduct of Research (RCR) course at Tufts University is designed to meet the NIH and NSF requirements. The purpose of the class is to help guide the Tufts University research community in understanding the multi-faceted aspects of research and to reinforce the importance of conducting research in an honest and objective way. This course is taught through the Office of the Vice Provost for Research (OVPR) in consultation with program faculty.

135033	**Epidemiology of Zoonotic Infections**
Subject: BMS	Catalog Nbr: 655
	This course seeks to provide health professionals with the basis for evaluating risks and formulating prevention and intervention strategies for outbreaks or endemic transmission of zoonotic infections. Each session is structured with a “vertical” component comprising general principles, and a “horizontal” component comprising a case study of a specific agent that illustrates the general principles. Course offered every other year

135049	**Advanced Molecular Biology**
Subject: BMS	Catalog Nbr: 656
	This course introduces students to molecular biology of both prokaryotes and eukaryotes including (1) DNA replication, repair, and recombination; (2) Bacterial genetics; (3) Chromosome structure and function; (4) Protein biosynthesis and transportation; and (5) Phages and viruses. Course offered every other year.

135081	**Introduction to Lab Animal Medicine**
Subject: BMS	Catalog Nbr: 657
	This course is an introduction to the use of animals in biomedical research and the role of the laboratory animal veterinarian. In the first half of the course, presentations from experts in the field cover regulatory control of research animal use, the role of the Institutional Animal Care and Use Committee (IACUC), animal models in biomedical research, and ethical use of animals. A laboratory animal anatomy module includes

Course Bulletin

	three dissection labs devoted to anatomy of rodents, lagomorphs, hamsters, ferrets, and gerbils. The second half of the course is focused on care of research animals and design of research animal facilities. The class will tour a barrier rodent housing facility, a rodent facility using robotic technology, and a primate facility. Students are expected to attend all classes, labs, and tours. They will be required to write one analysis paper on research animal ethical cases and to work in groups to create a design for a multi-species research animal facility. The class holds a mock IACUC meeting. Same basic course as MS-LAM course 551

135123	**Principles of Biodefense**
Subject:	Catalog Nbr:
BMS	659
	The recent increase in terrorist attacks in many parts of the world has focused attention on the possibility that pathogens and toxins may be used as weapons targeting humans or economically important animals and plants. The issues surrounding bioterrorism and its critical complement, biodefense, are complex and require an understanding of sociopolitical factors as well as those of biology. This course seeks to provide the basis for (1) evaluating the risks associated with bioterrorism and (2) developing strategies for defending against as well as responding to the illegitimate use of biological agents. Each of the sessions are structured into a didactic introductory, “horizontal” hour designed to explore general concepts, with the second hour dedicated to a “vertical” participatory discussion: specific case studies or literature review of the biology and other issues related to specific agents that illustrate important aspects of the horizontal topics. The grade for the course is determined by class participation and a term paper. Course offered every other year

135181	**Molecular & Cellular Biology-Umass Bbs-821**
Subject:	Catalog Nbr:
VET	698

138644	**Transfer Credit**
Subject:	Catalog Nbr:
TRAN	9999

138660	**Toxicological Pathology**
Subject:	Catalog Nbr:
BMS	609
	Focuses on toxicant/drug-induced pathophysiology and histopathological responses of the cardiovascular, pulmonary, gastrointestinal, renal, neurological, musculoskeletal, immune, endocrine and reproductive systems in animals. The course integrates into each organ system studied a review of standard techniques used in toxicity studies including principles of Good Laboratory Practices (GLP), the use of animal necropsy, histology/pathology, various tissue molecular biological techniques, methods in evaluating or testing lesions, genetics of rodent strains, and transgenic mice. Special emphasis is placed on mechanisms of action, defining

Course Bulletin

	histopathologic changes of significance compared to common background/incidental lesions, and the use of nomenclature, data bases and statistical analysis in overall interpretation of histopathology studies. (Course offered every other year.

138661	Externship			
Subject:	Catalog Nbr:			
MCM	590			
2023 SPRG	Primary	Alison Robbins	alison.robbins@tufts.edu	
2023 SPRG	Primary	Christopher Whittier	chris.whittier@tufts.edu	
Students will have the opportunity to immerse themselves in conservation medicine work in a wide variety of settings for four weeks during the program year. The preceptorship will provide students with insight into how conservation medicine issues are addressed and how interdisciplinary approaches can be applied in a real world setting. Students will be able to select from field experiences, clinical experiences, analytical experiences, laboratory-focused experiences, and project management or policy experiences. The preceptorship will be completed either during the winter break or summer semester, depending upon the opportunity.				

138669	Preventive Medicine in Research Animal Facilities & Journal Club
Subject:	Catalog Nbr:
LAM	553
This course complements the second year of the veterinary curriculum which is mainly concerned with the pathophysiology of disease. The course begins with a series of classes in the application of medical statistics to animal research. The class supplements the introductory exposure to statistics and epidemiology in the professional DVM program with specific emphasis on the design and interpretation of research studies using animals. The second half of the courses focuses on viral, bacterial and parasitic pathogens of concern in rodents used in research. The course provides instruction in the diagnosis, treatment, control and prevention of disease in the laboratory animal facility. The development and implementation of health surveillance and preventative health programs in a laboratory animal setting is discussed. This course consists of didactic lectures and tutorial sessions with assigned readings, case studies and interactive discussions. This course includes two journal club sessions led by laboratory animal veterinarians or residents in training programs. Journal clubs introduce contemporary topics in the literature and foster critical reading of new research reports.	

138673	Toxicological Pathology
Subject:	Catalog Nbr:
VET	609

139123	Parasite Biology
Subject:	Catalog Nbr:

Course Bulletin

MCM	1001

139212	Journal Club/Seminar
Subject:	Catalog Nbr:
VET	592
Students, along with faculty members, participate in a monthly journal club for discussion of current literature in the field. The emphasis is on critical analysis, identifying significance of the research, and understanding how the findings extend current knowledge.	

139232	Animal Law
Subject:	Catalog Nbr:
APP	1001
Until recently, animals were treated as nothing more than property in courts of law. In this course, students explore how the changing status of animals is (or might be) reflected in case law, as well as the implications of specific state and federal laws (such as animal cruelty laws, the Animal Welfare Act, and the Endangered Species Act) for the legal status of animals.	

139235	Applied Learning Experience: Animal Facility
Subject:	Catalog Nbr:
VET	550

139236	Laboratory Animal Medicine and Pathology & Journal Club
Subject:	Catalog Nbr:
LAM	555
This course complements the third year of the veterinary curriculum which integrates the pathophysiological aspects of disease with a comprehensive discussion of the presenting clinical signs, diagnostic criteria, and the treatment of these entities. The lectures provided in this course are designed to provide students with a sound basis in clinical laboratory animal medicine with emphasis on diagnosis, prognosis, and management. Experimental surgery laboratories allow students to gain practical experience in swine and rabbit surgical methods by performing common procedures such as jugular vein cannulation. This course includes one journal club session led by laboratory animal veterinarians or residents in training programs. Journal clubs introduce contemporary topics in the literature and foster critical reading of new research reports.	

139237	Applied Learning Experience-Research Facility
Subject:	Catalog Nbr:
VET	554

Course Bulletin

139244	Research
Subject:	Catalog Nbr:
BMS	616
Guided research on a topic suitable for a doctoral Dissertation.	

139245	Applied Learning Experience: Research Experience
Subject:	Catalog Nbr:
LAM	559
The summer Research Experience consists of an 8-week research experience involving animals. The focus of this experience should be significant participation in a research project using laboratory animals, including exposure to experimental design, collection of data, and interpretation of results. With advance approval of the program director, equivalent full-time work experience acquired before matriculation may substitute for LAM 558 or 559, but not both. Work undertaken to satisfy undergraduate course requirements will typically not qualify for exemption.	

139249	JAX-Mammalian Genetics
Subject:	Catalog Nbr:
BMS	1001
In collaboration with Jackson Laboratories, TCSVM is offering a live video presentation of a series of topics on Mammalian Genetics. Faculty as well as graduate students have the opportunity to refresh/learn mammalian genetics.	

139261	UMass-Principles of Light & Electron Microscopy
Subject:	Catalog Nbr:
BMS	1003

139264	Understanding Human Psychopathology
Subject:	Catalog Nbr:
VET	514

139265	Disruption of Cellular Architecture and Human disease
Subject:	Catalog Nbr:
CRUM	788

Course Bulletin

139481	Shelter Visitations
Subject: APP	Catalog Nbr: 1002
This elective is designed for students with a special interest in shelter medicine. The sessions will be divided as follows: Session 1: (2 hours) meet with Dr. McCobb to discuss semester goals and prepare list of locations to visit. The selected locations can be determined by the student's interests and by ease of travel. In addition, we will review a list of goals/questions to be answered by the student at each visit site. Visits: students will visit 4 animal shelters in the New England area. For each shelter they will prepare a five page report summarizing the goals and questions that we discussed. Students should also write a conclusion report (of at least pages) summarizing comparisons between the different places that they visited. Wrap up Session: (2 hours) the student will meet with Dr. McCobb again to discuss the shelter visits and what was learned.	

139482	Farm Animal Welfare
Subject: APP	Catalog Nbr: 1003

139483	Wildlife Rehabilitation
Subject: APP	Catalog Nbr: 1004

139601	GIS for Natural Resources and Conservation Application
Subject: MCM	Catalog Nbr: 1002

139857	Humanitarian Studies In The Field
Subject: MCM	Catalog Nbr: 1003
This course will offer a practical and in-depth analysis of the complex issues and skills needed to engage in humanitarian work in field settings. Through presentations offered by the faculty of the Humanitarian Studies Initiative and guest speakers who are experts in their topic areas, students will gain familiarity with the primary frameworks in the humanitarian field (human rights, livelihoods, Sphere standards, international humanitarian law) and will focus on practical issues that arise in the field, such as rapid public health assessments, field cluster sampling techniques, application of minimum standards for food security, and operational approaches to relations with the military in humanitarian settings.	

Course Bulletin

139893	Molecular and Cellular Immunology
Subject:	Catalog Nbr:
BMS	1004
This course is offered through the University of Massachusetts Medical School.	

139894	Advanced Epidemiology and Research Methods
Subject:	Catalog Nbr:
BMS	1005
This course is offered through the University of Massachusetts Medical School.	

139895	Cell and Molecular Genetics
Subject:	Catalog Nbr:
BMS	1006
This course is offered through the University of Massachusetts Medical School.	

139904	Introduction to Clinical Epidemiology
Subject:	Catalog Nbr:
BMS	1007
This course taken through the University of Massachusetts Medical School.	

139964	Understanding Human Psychopathology
Subject:	Catalog Nbr:
APP	1006

139965	Wildlife in Captivity
Subject:	Catalog Nbr:
APP	1007
This lecture/discussion class examines the ethical, welfare, health, conservation, and policy issues surrounding the keeping of wildlife in captivity. Particular attention is paid to wildlife in zoos and aquariums, but wild animals in sanctuaries, backyards, research facilities, circuses, and other forms of entertainment also receive attention. The course features outside speakers, faculty- and student-run discussions, and weekend field trips to zoos and other facilities.	

139972	Introduction to Animal Welfare Science
Subject:	Catalog Nbr:

Course Bulletin

APP	1008

This course will explore a range of subjects related to animal welfare. The goal is for the student to understand various perspectives and definitions of animal welfare, methods for scientific study and evaluation of animal welfare, the effect of policy and markets on shaping of practices, and current welfare issues in areas such as animal agriculture, sport, science, and education. The course will review the history of animal welfare and the evolution of legislation and policy in the US and elsewhere. To follow, we will consider various aspects of assessing welfare, including stress, physical health, mental states, and quality of life. Issues such as selective breeding, environmental conditions, transportation, humane killing, and animals as business opportunities will be discussed with a cross-species approach. Finally, the students will be introduced to methods of conducting welfare assessments. The format of the course will include a blend of readings, lectures, practical experience, discussion, and student projects. Students are encouraged to participate in the Animal Welfare Judging and Assessment Contest hosted by AVMA after completing this course (if possible with the student's schedule.)

140030	**Global Information Systems-Independent Study**
Subject:	Catalog Nbr:
MCM	1004

140065	**JAX Medical and Experimental Mammalian Genetics**
Subject:	Catalog Nbr:
BMS	1008

140216	**International Environmental Law**
Subject:	Catalog Nbr:
MCM	1005

This course addresses the nature, content, and structure of international environmental law. The course commences with an introduction to international environmental problems, together with basic principles of international law and environmental regulation. Specific topics include global warming, stratospheric ozone depletion, and exports of hazardous substances. Other topics may include marine pollution, transboundary pollution, trade and environment, and development and environment. The course evaluates the role of international and non-governmental organizations; the interrelationship between international legal process and domestic law; and the negotiation, conclusion, and implementation of international environmental

Course Bulletin

agreements. Students take this course at The Fletcher School.

140250	**Immunology Seminar**
Subject:	Catalog Nbr:
BMS	1009

140255	**Infection and Immune Response**
Subject:	Catalog Nbr:
BMS	1010

140256	**Advanced Molecular Biology Seminar**
Subject:	Catalog Nbr:
BMS	1011

140381	**Graduate Biochemistry**
Subject:	Catalog Nbr:
BMS	1012
This course provides a graduate-level discussion of the structure and function of biologically important molecules. Problems of protein and nucleic acid biochemistry are emphasized. This course is offered through Sackler School.	

140382	**Biostatistics II**
Subject:	Catalog Nbr:
BMS	1013
This course surveys regression techniques for outcomes common in public health data, including continuous, binary, count and survival data. Emphasis is on developing a conceptual understanding of the application of these techniques to solving problems and to cogently summarize the results, rather than numerical details. This course offered through the Clinical and Translational Science department at Sackler School.	

140385	**Membranes and Trafficking**
Subject:	Catalog Nbr:
BMS	1014
This course provides a thorough survey of major topics in cell biology, including membrane structure and	

Course Bulletin

function; transport systems, ion channels, and membrane excitability; protein trafficking, and organelle biogenesis. This course is offered through the Integrated Studies Program at Sackler School.

140386	**Pet Loss Hotline**
Subject:	Catalog Nbr:
APP	1009
Students may receive elective credit for participating in a variety of community-service oriented activities, including animal shelter visitation, community cat clinics, support for the Tufts at Tech Community Veterinary Clinic, Tufts Paws for People, and the Tufts Pet Loss Hotline. Academic exercises matched to the service activities help illuminate the policy and practice context of the students' work.	

140387	**Pet Loss Hotline**
Subject:	Catalog Nbr:
APP	1009
Students may receive elective credit for participating in a variety of community-service oriented activities, including animal shelter visitation, community cat clinics, support for the Tufts at Tech Community Veterinary Clinic, Tufts Paws for People, and the Tufts Pet Loss Hotline. Academic exercises matched to the service activities help illuminate the policy and practice context of the students' work.	

140445	**Journal Club/Seminar**
Subject:	Catalog Nbr:
LAM	592
Students, along with faculty members, participate in a monthly journal club for discussion of current literature in the field. The emphasis is on critical analysis, identifying significance of the research, and understanding how the findings extend current knowledge.	

140474	**Community Medicine Clinical Experience**
Subject:	Catalog Nbr:
APP	1010
This elective is for a student with a strong interest in Community Medicine. The interested student will develop an independent project in the area of providing medical care to underserved pet owners. The project may involve time in the clinic or could be independent study about the needs of underserved families, researching community demographics and helping to build community partnerships. Strong Spanish language skills are preferred.	

140487	**Generalized Linear Models**
Subject:	Catalog Nbr:
BMS	1015
This course is offered at UMass Medical School, Graduate School of Biomedical Sciences.	

Course Bulletin

140490	Exploring Human Dimensions of Animal Behavior
Subject:	Catalog Nbr:
APP	1011

How do our attitudes and perceptions of animals and their behavior influence our beliefs about, interactions with, and management of animals? How do our beliefs, values, and behavior impact animals, their behavior, welfare, and long-term survival? This course explores the human dimensions of animal behavior, examining human attitudes and behavior and their effect on animals. Students will develop ethograms, write one paper, and conduct a small research study in a group as well as participate in class discussions.

140529	MCM Independent Study
Subject:	Catalog Nbr:
MCM	1006

MCM independent study – in this independent study students may work on a project that allows further in depth analysis of a topic of their choice or related to an ongoing course they are enrolled in. The study may be in the form of direct experience including, but not limited to observing group meetings or conferences with submission of a written analysis, or academic work including writing a research paper on a topic . The work may not substantially overlap with the student's year-long case study project. Students are expected to prepare an outline of the proposed work and have it approved by the MCM program director and faculty before beginning the work. The work will be graded as outlined by the faculty mentor for the independent study.

140571	Epidemiology of Zoonotic Infections
Subject:	Catalog Nbr:
MCM	1007

This course seeks to provide health professionals with the basis for evaluating risks and formulating prevention and intervention strategies for outbreaks or endemic transmission of zoonotic infections. Each session is structured with a "vertical" component comprising general principles, and a "horizontal" component comprising a case study of a specific agent that illustrates the general principles. Course offered every other year and is cross listed with BMS 655.

140827	Dimensions of Human and Animal Infectious Diseases I
Subject:	Catalog Nbr:
IDGH	540

Infectious Diseases of Humans and Animals I covers important infectious disease in humans and animals. Part I includes five topically-related Units: 1) Introduction; 2) Respiratory Tract Unit; 3) Gastrointestinal Tract Unit; 4) Urogenital Tract Unit; and 5) Disease Ecology Unit. For each body systems-focused unit, normal anatomy and physiology are first reviewed. Additional lectures focus on cellular and molecular targets of infection, host immune and inflammatory responses, and disease-related lesions. The Disease Ecology Unit focuses on species and population interactions and environmental aspects that influence the patterns of disease. Reading

Course Bulletin

from texts, published research papers, homework, student presentations and projects round out the material.

140829	Applied Immunology and Vaccinology
Subject: IDGH	Catalog Nbr: 541
This course will teach the principles of immunology and comparative immunology and then apply them to understand immune responses against intracellular and extracellular infectious agents, immunotherapies, immunodiagnostics, and immune reactions and disorders. In addition, the course will examine (a) how the immune system can be manipulated in order to benefit the animal, (b) how knowledge of the immune response against an infectious agent is applied to designing and developing effective vaccines, and (c) what are the challenges for developing and other aspects of vaccine development. Problem-based sessions are incorporated for discussing and understanding of basic and applied aspects of immunology, and enhancing group collaboration and communication.	

140830	Research Training with Lab Rotation
Subject: IDGH	Catalog Nbr: 542
Students will spend time in each laboratory in the DIDGH to have a deeper understanding of various infectious disease research projects and approaches used to answer research problems specific to each project. Interaction with faculty and scientist, and type of pathogen and problems studied and techniques used in each laboratory will help students identify a laboratory for their summer research work.	

140831	Microbiology and Immunology Techniques
Subject: IDGH	Catalog Nbr: 543
This course will provide students with a hands-on opportunity to learn both the theoretical basis and practical application of a variety of immunological and microbiological techniques commonly used in infectious disease research. Specifically, students will learn how to utilize antibodies to determine concentration of a target molecule in a biological sample, identify pathogens and their antigens, characterize lymphocyte subset responses, neutralize pathogens/toxins and purify pathogens and their virulence factors. Students will also learn to isolate, cultivate and identify bacteria, fungi, viruses and protozoa. In addition, students will learn sterile technique, including preparation of glassware and reagents, how to handle biomedical waste both within the laboratory and under field conditions and how to address a biological spill.	

140832	Fundamentals of Biostatistics
Subject: IDGH	Catalog Nbr: 544
Introductory statistics will be learned using an active approach, emphasizing practical applications of statistical concepts. Students will gain experience in analyzing data sets and presenting data. In addition, students will become familiar with using specialized programs for more advanced statistics, such as SPSS.	

Course Bulletin

Laptop computers are required. Students are assessed by different methods including homework assignments, exams and online quizzes.

140833	Research Ethics
Subject: IDGH	Catalog Nbr: 545
2023 FALL	Primary Abhineet Sheoran abhineet.sheoran@tufts.edu

This course will introduce ethics, science and society and address key issues affecting the responsible conduct of scientific research, including (1) animal use (ethical treatment of laboratory animals, laboratory animal care training, and IACUC); (2) human subjects (informed consent, IRB, training requirements and resources, clinical research and trials, regulations governing clinical investigation, cultural issues, and research/trials in developing countries); (3) laboratory safety and compliance (basic safety, biohazards, recombinant DNA, hazardous chemicals, transfer of etiologic agents, radioactivity); (4) dealing with scientific misconduct (where to report, whom to turn to for support and advice); (5) scientific communication i.e. presentations and publications (seminars and publications, citing the work of others, plagiarism, authorship, order of authors); (6) results of research and note keeping (verification, repetition, data ownership and legal ramifications); (7) conflict of interest and conflict of commitment; intellectual property (protection and rights). This course will also utilize case studies and ethics training through various online web portals to enforce deeper understanding of ethical issues in scientific research.

140834	Journal Club
Subject: IDGH	Catalog Nbr: 546

Students will present scientific papers relevant to infectious disease. All students will be required to thoroughly study the article before the Journal Club. Papers will cover diverse aspects of infectious diseases and be chosen via consultation with students' individual faculty mentors and the Course Director. The presentations will be powerpoint-based (40-50 min), which will be followed by extensive group discussion (20-30 min). The sessions will help students to enhance the skills of analytical reading and critique. The presentations will focus on critical analysis of the results/data, evaluation of the scientific merit of the paper, stimulating class-discussion of the paper and related literature, and developing presentation skills. Students will take Journal Club in both the Fall and Spring semesters. The journal club will be open to everyone and advertised campus-wide. Visiting and resident faculty will be strongly encouraged to attend as well as veterinary students, other graduate students and members of the Tufts community.

140835	Dimensions of Human and Animal Infectious Diseases II
Subject: IDGH	Catalog Nbr: 547

The course provides a system-based overview of infectious agents of the nervous system, skin, and blood (including the reticuloendothelial system). This course also provides basic understanding of biosafety, food safety and regulatory compliance. It is subdivided in 6 modules. Four modules are focused on pathogens and the various diseases they cause. Two additional modules focus on biosafety and food safety, respectively. The introductory lecture for each infectious disease module describes the anatomical and physiological features of

Course Bulletin

relevant organs. Model bacterial, viral, fungal and parasitic pathogens that cause disease domestically and/or globally are covered in depth. The etiology, pathogenesis, immunology, epidemiology, diagnosis, prevention and control of selected pathogens are discussed. Reading of relevant scientific literature complements the lectures.

The food safety module introduces students to local, state and federal regulatory agencies, regulations, and surveillance systems relevant to food safety. Transmission and risk assessment of foodborne pathogens are discussed. Students will also learn about new food safety challenges related to trade, climate change and antimicrobial resistance.

The biosafety module provides basic understanding of biosafety and regulatory compliance. The course covers biosafety level 2 (BSL-2), BSL-3 and BSL-4 laboratory environments. Topics of interest include risk assessment and hazard identification of infectious agents through case studies, biosafety design criteria for facility design, regulations/guidelines, regulatory compliance and biosafety audits.

140836	**Microbial Molecular Biology**
Subject:	Catalog Nbr:
IDGH	548

The first part of the course will cover basic topics of molecular biology relevant to the understanding of viral, bacterial and protozoal microorganisms. Following an overview of the structure and function of nucleic acids, prokaryotic and eukaryotic gene expression and regulation will be discussed. The second part of the course will be devoted to applied topics in molecular biology, including genetically modified organisms, genotyping methods, medical molecular biology, high-throughput sequencing and its application to genomics and the analysis of complex bacterial populations. An introduction into computational methods for analyzing complex sequence data and their application to studying host associated microbial populations and their impact on health and disease will complete the course.

140837	**Animal Models of Infectious Diseases**
Subject:	Catalog Nbr:
IDGH	549

Students will learn the rigors of animal model work in research, which requires taking care of animals on weekends and holidays. They will use mouse model to (a) study Cryptosporidium parvum infection in immunocompetent and immunodeficient hosts, and (b) investigate immunoprophylactic potential of Shiga toxin 2 (Stx2)-specific human monoclonal antibody (HuMAb) 5C12 against a challenge with Stx2. Students will learn to perform mouse handling, oral inoculations, intraperitoneal injections, sample collections (mostly blood and fecal collections), and humane euthanasia of mice and disposal of carcass. They will learn to work in Animal Biosafety Level 2 environment, monitor animals as per animal protocol approved by the IACUC (Institutional Animal Care and Use Committee) and observe and record clinical signs of the disease, analyze samples with immunological and molecular assays, interpret data/results, prepare graphs/tables and write a manuscript-style report. Students will also learn basics of good laboratory practice.

140839	**Food Safety**

Course Bulletin

Subject:	Catalog Nbr:
IDGH	561

Students will become familiar with the more common food-borne illnesses and the risks of transmission from meat, poultry, dairy, eggs, and other foods. They will learn the principles of the Hazard Analysis and Critical Control Points system (HACCP) and the common diagnostic techniques used to monitor food safety, including detecting microorganisms and chemicals. Students will also learn the use of antimicrobial in food producing animals and development of antibiotic resistance, and understand the roles of a variety of state, federal, and global regulatory agencies which recommend and implement food protection practices.

140840	**Applications of Biotechnology**
Subject:	Catalog Nbr:
IDGH	562

Biotechnology is “the application of biological organisms, systems, or processes by various industries to learning about the science of life and the improvement of the value of materials and organisms such as pharmaceuticals, crops, and livestock” (ACS). Classes will explore different biotechnology applications, particularly those technologies of relevance to infectious disease. Students will learn how the technologies were developed, how they are being applied to global health issues, and how they are likely to evolve in the future. As part of the course, students will be asked to select biotechnologies they feel will be important to their personal career objectives, investigate these in depth and present their findings and views to the class followed by general discussion.

140841	**Molecular Biology Techniques**
Subject:	Catalog Nbr:
IDGH	563

The goal of this course is to provide students with hands-on experience in molecular biology procedures. Having first established good laboratory technique (to encompass safety and regulatory issues), students will have the opportunity to learn a variety of molecular methods including DNA isolation, digestion and cloning, bacterial transformation, evaluation of recombinant clones and plasmid isolation. Students will engage in primer design, gel electrophoresis, PCR (including quantitative real time PCR), DNA barcoding and sequence annotation. Basic bioinformatic skills will be explored. Recombinant protein expression systems will be compared (eukaryotic versus prokaryotic) and various recombinant protein expression and purification techniques (e.g. column chromatography and affinity methods) will be tested. Science writing skills that focus upon clarity, precision and comprehension of experimental results and conclusions will be emphasized. Students will gain a firm understanding of how the molecular biology techniques employed in this class are used to diagnose, identify and study infectious diseases.

140842	**Ecology of Disease Transmission**
Subject:	Catalog Nbr:
IDGH	564

This course will teach how host behavior, ecology and habitat patterns impact pathogen invasion dynamics or the spatio-temporal patterns of infectious diseases. Students will acquire a basic understanding of the

Course Bulletin

principles of disease ecology and disease emergence including the major drivers of emergence, the relationships with biodiversity, and the effects of climate change. Key diseases of concern for conservation medicine and ecosystem health will be reviewed as examples. Emphasis will be placed on the integration of animal, human, and environmental health, and the environmental, economic, and anthropogenic factors promoting the emergence or persistence of infectious diseases and other major health threats.

140843	**Global Health and Threat of Emerging Pandemics**
Subject: IDGH	Catalog Nbr: 565
This course will focus on infectious diseases that threaten global health and insecurity, their relation to poverty and development and how economic level, inequity, and policies of nations determines the health of its citizens. Using the lens of infectious diseases covered in previous courses, we will underscore the historical milestones, actors, assumptions, context and theories driving selected infectious diseases and their global health priorities in policy, programs and research. A recurring theme throughout the course is that there are common global drivers of infectious disease emergence and re -emergence influencing the health of populations in high, middle and low-income countries, that cross-cutting issues of inequality and systems transcend settings. The course will also examine the outcomes resulting from the ways in which new global health policies change patterns of health practice and Infectious disease intervention globally. That students will come out with an understanding of major challenges and solutions to infectious diseases of global health significance, programs and policies and be able address global health issues from an inter-disciplinary perspective, examine strategies and solutions for combating emergence and re-emergence of pandemics and promoting Global Health threats. This course is a reminder that no one person, agency or organization holds absolute knowledge on how best to address Infectious disease and Global Health challenges and that it has to be a multidisciplinary effort.	

140846	**Principles of Laboratory Management and Biosafety**
Subject: IDGH	Catalog Nbr: 568
The course will provide in-depth understanding of biosafety and regulatory compliance, and laboratory management. The course will cover biosafety considerations of the BSL-2 and BSL-3 laboratories, risk assessment and hazard identification of infectious agents, biosafety design criteria for facility design, regulations/guidelines and regulatory compliance with federal/state and local laws, biosafety audit of work practices and procedures, management principles and managing a laboratory, and many other aspects of biosafety and laboratory management.	

140847	**Research Assignment**
Subject: IDGH	Catalog Nbr: 569
Students will develop and write research proposals, with a focus on addressing specific, human and/or animal, local or global, serious infectious diseases, including emerging infections. Each student will investigate and understand in depth a particular research problem. The proposal will include long and short term goals, hypothesis, specific aims, comprehensive literature survey on the subject, approach to solutions,	

Course Bulletin

	methodology, biostatistics, expected outcome. Students will get opportunity to work and think independently, read scientific literature, develop oral/written communication, identify techniques to answer a research problem, and appreciate research process. The project will be presented orally to the class and written up and submitted as a significant part of the final course evaluation. Mentors will be assigned to each student to provide guidance as needed.

140848	**Introduction to Human-Animal Interactions**
Subject:	Catalog Nbr:
APP	531
	This interdisciplinary course explores human-animal relationships as a context for promoting health and well-being for humans, animals, and communities. The course focuses on integrative research and application in human-animal interaction, and will cover a range of topics such as the role of animals in promoting positive human development, animal-assisted therapy, animals in the family setting, and animals in educational and programmatic contexts. Additional context is provided in the form of class sessions on humane education and the role of animals in literature and art.

140849	**Research Methods I**
Subject:	Catalog Nbr:
APP	518
	This discussion course will focus on critical reading of the quantitative and qualitative research literature on human-animal relationships. Students will read and present assigned papers, lead and participate in discussions, conduct literature searches, prepare a literature review, and write a research proposal in an area of interest.

140850	**Statistics I**
Subject:	Catalog Nbr:
APP	516
	Biostatistics is the application of statistical principals to the design, analysis and interpretation of biological studies. This course provides an overview of statistics likely to be encountered in the study of animals, animal health and animal welfare. In this course we will explore topics related to experimental design, sampling, descriptive statistics, hypothesis testing and statistical inference. Topics will include pseudoreplication vs. true replication, blocking, model selection, contingency table analysis, survival analysis, t-tests, analysis of variance, correlation, linear regression, as well as nonparametric statistical methods. Throughout the course we will emphasize the application and interpretation of statistics within a biological context, with a specific effort to use data and examples that focus on topics relative to the other coursework. Students will gain a working understanding of statistical analyses through use of the software SPSS to work through problem sets and assignments.

140851	**Communicating Policy Positions**
Subject:	Catalog Nbr:

Course Bulletin

APP	524
The course requires students to draft and revise documents targeted at diverse audiences, including letters to the editor, blogs, op-eds, fact sheets, legislative testimony, and formal comments on draft regulations and other proposals for government actions, and to develop skills in making presentations to the public, legislators, legislative hearings, and other forums.	

140852	**Research Methods II**
Subject:	Catalog Nbr:
APP	519
This course provides more in-depth exploration of survey design, content analysis, and qualitative techniques such as interviews, ethnography, and focus groups. All students will produce a research proposal, which for research track students will lead directly to their capstone research project.	

140853	**Mentored Externship**
Subject:	Catalog Nbr:
APP	532
Students in the applied track complete their program by working at a government agency, legislative office, non-profit organization, or other entity that influences, makes, or implements animal policy or advances human-animal relationships. The students will analyze and synthesize their experiences in a substantial research paper and an oral report to classmates and Center faculty.	

140854	**Independent Research I**
Subject:	Catalog Nbr:
APP	526
For their capstone activity, students in the research track work independently with individual mentors to complete their research projects, with the expected outcome being an article that is potentially publishable in a peer-reviewed journal, or other scholarly product the dissemination of which will advance and inform animal policy or practice.	

140855	**Independent Research II**
Subject:	Catalog Nbr:
APP	527
For their capstone activity, students in the research track work independently with individual mentors to complete their research projects, with the expected outcome being an article that is potentially publishable in a peer-reviewed journal, or other scholarly product the dissemination of which will advance and inform animal policy or practice.	

140856	**Statistics II: Intermediate**
Subject:	Catalog Nbr:

Course Bulletin

APP	517
Intended for advanced research track students and tailored to their interests, this course will focus on experimental design and analysis of survey data, exploring the use of analysis of variance (ANOVA) and regression models, factor analysis, and other advanced techniques using SPSS or an equivalent statistical package.	

140912	**Introduction to Policy**
Subject:	Catalog Nbr:
APP	1012
This lecture-discussion class is a quick introduction to the mechanisms of government with an emphasis on animal and environmental policy. Also examined are how history, culture, ethics, and the media influence the making and implementation of animal and environmental policy.	

140997	**Participatory&Community Approaches Epi Rsch, Disease Surveillance and Hlth Service**
Subject:	Catalog Nbr:
MCM	1008
2023 SPRG	Primary Jeffrey Mariner Jeffrey.Mariner@tufts.edu
This course is designed to be a practical introduction to epidemiological and service delivery methodologies that stress participation and community ownership. The course will combine a minimal amount of introductory lecture with in-class participatory learning exercises and discussion. The course will first look at the underlying concepts of participation and community-based development. Thereafter, the sessions will focus on specific methods and students will be asked to complete a group project using these skills. The group projects will consist of participatory assessments conducted within the University community on a health related theme. The course will close with sessions on community-based health care and the policy and institutional frameworks required for sustainable community-based programs. At the end of the course, students should be adequately prepared to conduct a mentored summer research project in participatory epidemiology.	

141109	**GIS for Conservation Medicine**
Subject:	Catalog Nbr:
MCM	1009
This course will introduce students to the fundamental concepts of the Geographic Information Systems (GIS) as it relates to the one health paradigm and veterinary health. This course is designed for novice GIS students with specific focus on mapping and spatial analysis for human, animal, and environmental health applications. Tutorials include vulnerability analyses of animal habitats, monitoring disease outbreaks for public health, calculating deforestation and land cover change, suitability analysis for Ebola treatment centers in Liberia, site analysis for alternative energy sources, and many more. Technical topics to be covered include GIS data discovery; GPS field data collection; data structure and management; principles of cartographic visualization and design; and basic spatial tools, analysis and modeling. Classes will consist of both a lecture segment and an in-class activity/demonstration. Students will complete weekly tutorials or project assignments and conclude the semester with a final mapping/analysis project of their choosing. This course is open to all	

Course Bulletin

students and faculty from the Veterinary School.

141125	Immunohistochemistry & Microscopy
Subject:	Catalog Nbr:
BMS	1016
Course taken at Woods Hole Institute.	

141126	Introduction to Neuroscience
Subject:	Catalog Nbr:
BMS	1017
Course offered through UMass Medical School.	

141127	Bases of Brain Disease
Subject:	Catalog Nbr:
BMS	1018
Course offered through UMass Medical School.	

141128	Genetic Basis of Behavior
Subject:	Catalog Nbr:
BMS	1019
Course offered through UMass Medical School.	

141129	Current Topics in Aging
Subject:	Catalog Nbr:
BMS	1020
Course offered through UMass Medical School	

141198	Principles of Biostatistics
Subject:	Catalog Nbr:
BMS	1021
This course is offered through PHPD at Tufts Medical School, and provides an introduction to the basic principles and applications of statistics as they are applied to problems in clinical and public health settings. Topics include the description and presentation of data, random variables and distributions, descriptive statistics, introduction to probability, estimation, elements of hypothesis testing, and one- and two-sample tests, ANOVA (including repeated-measures), non-parametric tests, and an introduction to linear and logistic regression. Lectures, problem sets, and computer output are used to develop these and additional concepts. Graduate standing.	

Course Bulletin

141533	Paws for People
Subject: APP	Catalog Nbr: 1013

Due to COVID-19 restrictions on in person therapy animal visitation, the Paws for People elective will take place remotely until further notice. In person events may resume at some point during the 2021-2022 year. There is a 1.0 and 2.0 credit option.

1) Pet Partners Training

Class taught by Pet Partners instructors on becoming a registered visitor; what the animal handler needs to know, following this class students will be eligible to apply to Pet Partners for registration as a trained visitor. There is no fee for students to take this Pet Partners Course. This includes a student manual and all associated materials. Due to COVID restrictions, this course must be taken as an on-line option through Pet Partners (petpartners.org) until the in-person training resumes.

2) Evaluations and Visitations (For 2.0 credit option only)

A) Students will view a webinar conducted by Deb Gibbs, Paws for People program evaluator, on how to prepare for an evaluation

B) Students will view videos of Pet Partners evaluations and complete a reflection assignment.

C) Students will view videos of various types of animal-assisted interventions and complete a reflection assignment.

3) Assignment

The student will be required to complete an assignment related to animal assisted interventions. A number of projects are available as options (eg, grant proposal, research projects, etc). These must be discussed with and pre-approved by the faculty advisor to determine which the best fit is for the individual student.

141551	Applied Animal Behavior
Subject: APP	Catalog Nbr: 1014

This course will focus on applied behavior topics of common companion, farm, and zoo animals. We will discuss animal body language and typical behavior and compare that to people's perceptions of that behavior. Assessment of behavior and common problem behaviors will be reviewed along with effective management and modification techniques of those problems. Force-free handling and positive reinforcement training will be emphasized. We will examine abnormal behavior particularly as it relates to stress and poor welfare and design remediation, management, and modification programs to mitigate that behavior, with the goal of improving welfare. This course builds on topics covered in APP 1011 Principles of Animal Behavior and APP 1007 Wildlife in Captivity, and relates to APP 1008 Introduction to Animal Welfare but it is not necessary to have taken any of those courses nor is this a repeat of those courses. This course will be a mix of lecture, discussion, and hands-on work with animals. Students will design their own assessment and training programs, implement them, and record their progress and outcome. There will be several smaller research and writing assignments as well. Students will gain an understanding of the typical behavior of select animals, assessment techniques and indicators of poor welfare, and effective strategies for working with those animals in a variety of settings as well as appreciate the role of human companions and caretakers in the expression and perception of animal behavior.

Course Bulletin

141632	GIS for Conservation Medicine
Subject: MCM	Catalog Nbr: 591

This course will introduce students to the fundamental concepts of the Geographic Information Systems (GIS) as it relates to the one health paradigm and veterinary health. This course is designed for novice GIS students with specific focus on mapping and spatial analysis for human, animal, and environmental health applications. Examples include vulnerability analyses of animal habitats, monitoring disease outbreaks for public health, calculating deforestation and land cover change, site analysis for alternative energy sources, and many more. Technical topics to be covered include GIS data discovery; GPS field data collection; data structure and management; principles of cartographic visualization and design; and basic overlay tools, analysis and modeling. Classes will consist of both a lecture segment and an in-class activity/demonstration. Students will complete weekly tutorials or project assignments and conclude the semester with a final mapping/analysis project of their choosing.

141824	Principles of Epidemiology
Subject: IDGH	Catalog Nbr: 570

Epidemiology is the lynchpin science of public health. In combination with biostatistics, it is used to examine disease patterns and infer causes of diseases at population level, and many other types of issues such as whether a new drug is more effective than an old one, what the risk factors are for a given outcome, whether a new screening test is likely to be useful and, if so, in which population, what levels and types of air and water pollution should be of most concern, etc. To accomplish its varied objectives, epidemiology uses many different kinds of measures, study designs, and data analytic techniques. We will examine many of these in this course including: (1) Understand the basic structure of public health, its goals, and where epidemiology fits into the structure; (2) Know how to calculate and interpret important rates and measures used in epidemiology and public health and how to interpret confidence intervals around certain of these rates and measures; (3) Interpret basic epidemic curves; (4) Understand in general the design, strengths, weaknesses and ethical issues of the major types of epidemiologic studies; (5) Identify the three major causes of erroneous conclusions in epidemiologic research and how each one can be adjusted for or avoided; (6) Recognize effect modification (also called interaction) in data; (7) Learn how screening is employed in public health, including the basic measurements used to evaluate screening tests and the biases that can affect the accuracy of reported screening efficacy.

141825	Bioterrorism: Risks and Defense Strategies
Subject: IDGH	Catalog Nbr: 571

Terrorist attacks in many parts of the world has focused attention on the possibility that pathogens and toxins may be used as weapons targeting humans or economically important animals and plants. The issues surrounding bioterrorism and its critical complement, biodefense, are complex and require an understanding of sociopolitical factors as well as those of biology. This course seeks to provide the basis for (1) critically evaluating the risks associated with bioterrorism and (2) developing strategies for defending against as well as responding to the illegitimate use of biological agents. Each of the sessions will be structured around a key reading or two designed to illustrate general concepts. Original, peer reviewed publications or policy papers

Course Bulletin

will mainly serve as key readings.

141841	Topics in Animal Ethics
Subject: APP	Catalog Nbr: 1015
This course will use a series of student exercises, presentations, and discussions to explore the application of theories of ethics and cultural construction to issues surrounding human treatment of animals. Topics will include current theories of animal ethics, cross-cultural construction and categorization of animals, the ethics of pet-keeping, the relationship of animal mind to ethical standing, breeding and genetic manipulation of domestic animals, ethical paths toward humane treatment of wildlife, and others. Assignments will include essays, visual analyses, and student presentations.	

141842	Wildlife Module from Animals in Society II Course
Subject: APP	Catalog Nbr: 1016
This module of Animals & Society II focuses on wildlife and wildlife policy. Evaluation is based on a series of written exercises, oral presentations, and class participation. The module meets for eleven 2-hour sessions (22 contacts hours, and thus only 1.5 credits for the MCM program students). Students must get approval from Dr. Rutberg to take the module; familiarity with the basic structures of American government is strongly desired.	

142492	Research Methods
Subject: APP	Catalog Nbr: 1018
This course provides an exploration of survey design, content analysis, and qualitative techniques such as interviews, ethnography, and focus groups. Students in this elective course will complete design and preparation assignments and produce modified versions of the literature review and proposal.	

143489	Human-Animal Interactions
Subject: APP	Catalog Nbr: 1019
This interdisciplinary course explores human-animal relationships as a context for promoting health and well-being for humans, animals, and communities. The course focuses on integrative research and application in human-animal interaction, and will cover a range of topics such as the role of animals in promoting positive human development, animal-assisted therapy, animals in the family setting, and animals in educational and programmatic contexts. Additional context is provided in the form of class sessions on humane education and the role of animals in literature and art.	

143490	Introduction to Global Health

Course Bulletin

Subject:	Catalog Nbr:
IDGH	572

While debates abound on the definition – and utility – of this rapidly emerging field, it is fundamentally a multidisciplinary approach to understanding health and disease in populations, drawing on epidemiology, sociology, anthropology, political science, social sciences, clinical medicine, history, the list goes on.

Global health as a field reflects the need for increasingly complex and multidisciplinary approaches to understanding health and disease in populations, brought on by an increasingly interconnected and changing world. Global health not only considers the epidemiological and transmission dynamics of disease, but the social and political dynamics as well.
Course Goal
This course is designed to provide students with an overview of global health and equip students with the proper framework, context, and terminology to understand the social, political, and economic aspects of health and disease on a global scale.

143491	**Case Studies in Global Health**
Subject:	Catalog Nbr:
IDGH	573

This course will illuminate the complexity and multi-dimensionality of the evolving infectious disease pandemics, as illustration of the relationships between disease biology, society, and public policy. We will explore the history, changing trends, recent advances, and multidisciplinary strategies for addressing three independent and interacting infectious diseases: HIV, Ebola, and Tuberculosis. We will examine gender relations; poverty; stigma and discrimination; vulnerable populations; as well as global responses, from patient activism to 'global health' interventions. This course will build upon the introductory course in Global Health and course on Infectious Diseases in Global Health, but with a greater focus on social issues surrounding the pandemics, lived experiences of disease, the interactions between biology and social factors, and the political architectures of responses. The course will include lectures and documentaries, interactive classroom activities and discussions, and group projects and presentations.

143495	**Intermediate Statistics**
Subject:	Catalog Nbr:
APP	1021

143531	**MAPP Independent Study**
Subject:	Catalog Nbr:
APP	1022

Mentor-directed experiential or academic study of targeted issues in animal care, animal welfare, human-animal interactions, or animal policy.

Course Bulletin

143799	Fundamentals of Biostatistics
Subject:	Catalog Nbr:
MCM	592

Introductory statistics will be learned using an active approach, emphasizing practical applications of statistical concepts. Students will gain experience in analyzing data sets and presenting data. In addition, students will become familiar with using Excel for basic statistical analyses and more specialized programs for more advanced statistics, such as SPSS. Laptop computers are required.

143807	Case Study
Subject:	Catalog Nbr:
MCM	585

The case study will provide a capstone exercise that builds on a student's knowledge and skills to produce a comprehensive conservation medicine analysis of a current health problem and recommend strategies to address identified challenges. Each student will identify an issue and will be charged with leading a collaborative team involving other students and appropriate faculty. Cases will undergo a peer-review evaluation through our network of conservation medicine partners. At the end of the year, case studies will be compiled and submitted for publication. Students register for the Case Study during the fall and spring semesters, and are expected to complete their Case Study during the summer

143882	Special Events
Subject:	Catalog Nbr:
APP	9000

This is not a course, but a number assigned to special events that are not credit bearing. This is to enable information to go on TUSK for calendar purposes.

143883	Special Events
Subject:	Catalog Nbr:
MCM	9000

This is not a course, but a number assigned to special events that are not credit bearing. This is to enable information to go on TUSK for calendar purposes.

143884	Special Events
Subject:	Catalog Nbr:
IDGH	9000

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144368	Bioinformatics
Subject:	Catalog Nbr:

Course Bulletin

IDGH	1001			
2023 SPRG	Primary	Giovanni Widmer	giovanni.widmer@tufts.edu	

The course focuses on computational methods to analyze DNA and amino acid sequences. Four hours will be devoted to lectures. Each lecture will introduce a topic. Following each lecture, students will be guided through a computational analysis which students will run on their laptop. Students will learn to recognize different file formats, query and compare sequences and apply programs to extract biological information from complex sequence data. The exercises will emphasize the analysis of pathogenic microorganisms and their interaction with the host. Assessment will be based on three take-home exercises and a final 1 h in-class problem solving session.

Goal

Whether studying complex microbial populations or sequencing a plasmids, DNA and protein sequences are ubiquitous in biomedical research. The goal of the course is to demystify the analysis of sequence data and to provide basic familiarity with a few bioinformatics tools commonly used in this field.

144369	**Applications of Biotechnology**

Subject:	Catalog Nbr:			
IDGH	1002			
2024 SPRG	Primary	Charles Shoemaker	Charles.Shoemaker@tufts.edu	

Biotechnology is “the application of biological organisms, systems, or processes by various industries to learning about the science of life and the improvement of the value of materials and organisms such as pharmaceuticals, crops, and livestock” (ACS). Classes will explore different biotechnology applications, particularly those technologies of relevance to infectious disease. Students will learn how the technologies were developed, how they are being applied to global health issues, and how they are likely to evolve in the future. As part of the course, students will be asked to select biotechnologies they feel will be important to their personal career objectives, investigate these in depth and present their findings and views to the class followed by general discussion.

144992	**Research Methods**

Subject:	Catalog Nbr:
APP	504

144993	**Quantitative Methods**

Subject:	Catalog Nbr:
APP	506

Quantitative Methods

144994	**Tutorial I**

Subject:	Catalog Nbr:
APP	508

Course Bulletin

144996	**Legislative Case Study**
Subject:	Catalog Nbr:
APP	505

144997	**Tutorial II**
Subject:	Catalog Nbr:
APP	511

144998	**Seminar Series !**
Subject:	Catalog Nbr:
APP	510

144999	**Final Project**
Subject:	Catalog Nbr:
APP	515

145242	**Chiropteran Health**
Subject:	Catalog Nbr:
MCM	1010

One Health is an approach that recognizes that the health of people is closely connected to the health of animals and our shared environment (definition by the CDC).Under the One Health working and teaching frame, this selective will explore the interrelationships between bat health, human health, and ecosystem health. The student will learn about the taxonomy, anatomy, physiology of bats, population monitoring approaches and technologies, threats to bat populations and human/bat conflict mitigation. Numerous guest lecturers, consisting of conservationists, rehabilitators and wildlife scientists, will share their expert knowledge and give the student insight on real-life bat work. If allowed, field trips to zoological institutions housing chiropterans will be organized. The students will be exposed to on-campus population monitoring efforts and species identification.

145243	**Drones: Unmanned Aircraft Systems (UAS) for Field Data Collection, Mapping & Analysis**
Subject:	Catalog Nbr:

Course Bulletin

MCM	1011
This course covers the foundations of Unmanned Aircraft Systems (UAS) and provides students with the foundational skills to manage, plan and execute remote flight operations. Students will learn about the legal aspects of flying UAS and FAA requirements. Students will demonstrate the ability to collect and process imagery data for use in Geographic Information Systems (GIS) and for analysis. Students also develop skills that they can apply in multiple applications including conservation medicine, agriculture, natural and cultural resources management, emergency response, etc.	

145245	**Storytelling for Conservation**
Subject:	Catalog Nbr:
MCM	1012
What makes a compelling conservation story? How does a story take seed and spread? This course will explore the ways in which storytelling tools can help wildlife conservationists and animal advocates in their efforts to educate, persuade others, and create lasting results. We'll look at examples of great storytelling (in literature, film, social media, art, and photography) that has changed minds and influenced conservation and animal policies. We'll examine the role of storytelling in other cultures and as a way to bridge differences between social groups. We will explore new graphics and digital tools for communicating conservation messages. Over the semester, we'll discuss books, study visual arts, explore social media, and watch films, looking at a wide array of conservation issues, tools, and messages. Several expert storytellers will join us as guest speakers. A final storytelling project, using the tools we have examined, will be developed and presented by student teams.	

145806	**AVMA: Animal Welfare Assessment Contest**
Subject:	Catalog Nbr:
APP	1023
The Animal Welfare Assessment Contest (AWJAC) aims to provide a unique educational experience while strengthening student vocabulary and reasoning skills. The competition teaches students to assess the welfare of animals in a variety of settings using science-based methods and reasoning. Students are given the opportunity to weigh evidence and present sound evaluations. This contest ensures that tomorrow's leaders in the animal industries develop strong communication skills and acquire enhanced knowledge of animal welfare.	

146017	**Molecular and Cellular Immunology-UMass (BBS821)**
Subject:	Catalog Nbr:
BMS	1022

146174	**Infection & Immune Response-UMassMed (BBS 775)**
Subject:	Catalog Nbr:

Course Bulletin

BMS	1023

146413	Scientific Writing
Subject:	Catalog Nbr:
BMS	1024

Academic writing is its own literary genre with arcane styles, byzantine jargon, and capricious guidelines. Who is your audience? What is the "correct" style – 1st or 3rd person, citation formatting, images? Even once an author has written an article, dissertation, review, etc., the path to publishing poses problems. For example, must data be shared by the journal? What is an open-access journal? Why are editors emailing me for submissions? How can I avoid predatory publishing? If you write as part of your position and your article is published, who owns the article? The data? Reprints?
Through this independent study, authors at all skill levels will work one-on-one with the librarian to develop and disseminate their professional manuscript, while navigating the aforementioned issues and others that arise.

146447	Molecular & Cellular Immunology-UMass Med (BBS 821)
Subject:	Catalog Nbr:
BMS	1025

146510	Conservation Translocations: From Reintroductions to Rewilding
Subject:	Catalog Nbr:
MCM	1013

This elective course will introduce students to the science and practice of conservation translocations. We'll explore the many forms that translocations can take, from reintroductions of endangered species, to rewilding efforts aimed at restoring ecosystem function, to assisted colonizations designed to protect species from climate change and other threats. Each week, we will dive deep into the applied management strategies employed by translocation experts while grounding these strategies in their underlying scientific principles. We will draw upon the field of decision science to learn how to navigate the complex ecological and social challenges inherent to translocations. By the end of the semester, we will have investigated a diverse set of case studies demonstrating the broad applicability of translocations across taxa and their growing necessity for biodiversity conservation worldwide.

146670	Advanced Immunology-American Association of Immunologists
Subject:	Catalog Nbr:
BMS	1026

Course includes: Anatomy of the Immune Response, Innate Immunity: Pattern Recognition and Anti-microbial Mechanisms, Dendritic Cells, Innate Immunity: Gene Regulation, NK Cells — Their Receptors and Function in Health and Disease, Innate Immune Signaling: Nucleic Acid Sensors, Myeloid Cells in Immune Responses, B

Course Bulletin

Cell Memory, T Cell Memory, B Cell Tolerance and Autoimmunity, T Cell Tolerance and Autoimmunity, Immunotherapeutics, Redefining Human Immunology.