Course Bulletin

001188	Pathology Mentor
Subject: VET	Catalog Nbr: 1188

133789	Animals and Society I
Subject: APP	Catalog Nbr: 501
2016 FALL	Primary Emily McCobb emily.mccobb@tufts.edu
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: APP	Catalog Nbr: 502
2016 SPRG	Primary Allen Rutberg allen.rutberg@tufts.edu
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: APP	Catalog Nbr: 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: VET	Catalog Nbr: 521

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134248	Elective
Subject: VET	Catalog Nbr: 522

134328	Intro to Lab Anml Med
Subject: LAM	Catalog Nbr: 551
2015 SUMR	Primary David Lee-Parritz david.lee-parritz@tufts.edu

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 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 tours 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 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. The class holds a mock Animal Care and Use Committee meeting. Two written assignments are required. Same basic PhD course as VET 657.

134376	Surgery & Anesthesiology In Research Facilities
Subject: LAM	Catalog Nbr: 556
2016 FALL	Primary Angeline Warner angie.warner@tufts.edu
2016 FALL	Primary David Lee-Parritz david.lee-parritz@tufts.edu

This course is designed to provide the 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 with special emphasis on rodents and non-traditional species that are not typically covered in the veterinary curriculum. Pain assessment; analgesic management; determination of humane endpoints and methods of euthanasia are also covered. A rodent anesthesia laboratory is conducted allowing students to gain experience with the following: injectable and inhalant anesthetic agents, various methods of inhalant drug delivery (chamber, mask, and manifold systems), intubation techniques and monitoring techniques. The second half of the class focuses on the principles of aseptic surgery in research facilities including sterilization methods, surgical pack preparation and issues specific to rodents, USDA covered species, amphibians and reptiles. Minimally invasive surgical techniques, microsurgical techniques, and pre and post-operative care and support are also discussed. There are also practical handling laboratories involving rodents, rabbits and fish. These laboratories provide an opportunity for the students to learn appropriate restraint and handling techniques as well as practice common procedures such as injections, oral administration of compounds, catheter placement and blood collection. There are laboratories designed to provide anesthesia experience for rodents and swine.

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134393	Specialized Research Environments
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 is primarily composed of didactic sessions presented by specialists in the field and addresses a variety of broad topics. Biosafety in the laboratory animal facility is discussed with emphasis on zoonotic diseases, occupational health and safety programs, and biocontainment facility design and operation. Other subject matter includes: animal model development with emphasis placed on mouse genetics and nomenclature; behavioral studies including rodent and primate methodologies; statistics and experimental design; 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.

134409	Applied Learning Experience: Animal Facility Experience
Subject:	Catalog Nbr:
LAM	558

2016 SUMR	Primary	Angeline Warner	angie.warner@tufts.edu
2016 SUMR	Primary	David Lee-Parritz	david.lee-parritz@tufts.edu

Charles River Labs, Wyeth Laboratories, TMC, U. of Massachusetts Medical Center, Genzyme, and Massachusetts General Hospital and New England Primate Research Center agreed to accept students in their facilities during summers for either Animal Facility or Research Experiences, as well as their clinical electives. Options are available at other facilities as well.

ALE: Animal Facility Experience

The summer Animal Facility Experience consists of two 4-week in-depth training experiences at industry or academic laboratory animal facilities during the first or second summer after matriculation into the program. Students can apply to take the laboratory animal experience part of the program at any institution with an AAALAC- accredited laboratory animal program. New sites must be approved by the Laboratory Animal Medicine Graduate Program Committee. A student can arrange the two 4-week programs at one or two separate institutions the first summer.

During the summer, students work closely with veterinary staff and animal care staff for hands on experience with the animal care, enrichment and veterinary programs and are required to write a paper on ethical use of animals in research or environmental enrichment programs based on their didactic training and summer experience. Students are evaluated by the veterinary staff at the training institutions.

134470	Research: Planning and Techniques (mentor)
Subject:	Catalog Nbr:
CBS	561

Course Bulletin

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			
2015 FALL		Primary	Phyllis Mann	phyllis.mann@tufts.edu

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			
2015 FALL		Primary	Robert Bridges	robert.bridges@tufts.edu
2015 FALL		Primary	Mohammed Anwer	sawkat.anwer@tufts.edu

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:	Catalog Nbr:			
CBS	572			
2015 FALL		Primary	Robert Bridges	robert.bridges@tufts.edu

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.

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134568	Lab Meetings			
Subject:	Catalog Nbr:			
CBS	573			
2015 FALL	Primary	Robert Bridges		robert.bridges@tufts.edu
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:	Catalog Nbr:			
CBS	574			
2015 FALL	Primary	Robert Bridges		robert.bridges@tufts.edu
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:	Catalog Nbr:			
CBS	575			
2015 FALL	Primary	Robert Bridges		robert.bridges@tufts.edu
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:			
CBS	576			
2015 SUMR	Primary	Robert Bridges		robert.bridges@tufts.edu
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				

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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: CBS	Catalog Nbr: 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: MCM	Catalog Nbr: 580

2016 FALL	Primary	Alison Robbins	alison.robbins@tufts.edu

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.

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

2016 FALL	Primary	Julie Ellis	Julie.Ellis@tufts.edu
2016 FALL	Primary	Christopher Whittier	chris.whittier@tufts.edu

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.

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

This course will familiarize students with how to access, organize, analyze, interpret and communicate data from existing sources, including published research, databases of electronic medical records, bioinformatics and gene banks. Students will also have a chance to refresh their skills in biostatistics, with an emphasis on applications in population health.

134695	Field and Laboratory Techniques			
Subject:	Catalog Nbr:			
MCM	583			
2016 FALL		Primary	Alison Robbins	alison.robbins@tufts.edu

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:			
MCM	584			
2016 FALL		Primary	Alison Robbins	alison.robbins@tufts.edu
2016 FALL		Primary	Christopher Whittier	chris.whittier@tufts.edu

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			
2016 FALL		Primary	Alison Robbins	alison.robbins@tufts.edu
2016 FALL		Primary	Christopher Whittier	chris.whittier@tufts.edu

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

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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			
2016 SPRG		Primary	Janetrix Amuguni	Janetrix.Amuguni@tufts.edu
2016 SPRG		Primary	Felicia Nutter	Felicia.Nutter@tufts.edu

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			
2016 SPRG		Primary	David Gute	david.gute@tufts.edu
2016 SPRG		Primary	Stephen Levine	stephen.levine@tufts.edu

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			
2016 SPRG		Primary	Christopher Whittier	chris.whittier@tufts.edu

This course will familiarize students with methods for collecting data on health events, disease incidence and 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			
2016 SPRG		Primary	Alison Robbins	alison.robbins@tufts.edu

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	2016 SPRG	Primary	Elena Naumova	elena.naumova@tufts.edu
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			
	2016 FALL	Primary	Angeline Warner	angie.warner@tufts.edu
	2016 FALL	Primary	David Lee-Parritz	david.lee-parritz@tufts.edu
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			
	2016 SPRG	Primary	Saul Tzipori	saul.tzipori@tufts.edu
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.	

134897	**Journal Club and Seminar Series**			
Subject:	Catalog Nbr:			
BMS	607			
	2016 FALL	Primary	Charles Shoemaker	Charles.Shoemaker@tufts.edu
Students, post-doctoral fellows, scientific staff, and faculty members participate in a weekly Journal Club and				

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

134940	**Research**
Subject: VET	Catalog Nbr: 616

134982	**Parasite Biology**
Subject: BMS	Catalog Nbr: 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	**Fundamentals of Animal Research I: Biostatistics**
Subject: BMS	Catalog Nbr: 653
Basic statistics will be taught using an active approach, emphasizing practical applications of statistical concepts such as hypothesis testing, sampling and, statistical inference. 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. 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. Laptop computers are required.	

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135016	Fundamental Of Animal Research II: Ethics
Subject: BMS	Catalog Nbr: 654
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 and openness; (4) Allocation of credit and authorship practices; (5) Error and negligence in science; (6) Misconduct in science; (7) Use of animals in research; and (8) Responding to violations of ethical standards. The course meets weekly for 2 hours during November-December.	

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 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	

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135123	Principles of Biodefense
Subject: BMS	Catalog Nbr: 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: VET	Catalog Nbr: 698

138644	Transfer Credit
Subject: TRAN	Catalog Nbr: 9999

138660	Toxicological Pathology
Subject: BMS	Catalog Nbr: 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 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

Course Bulletin

Subject:	Catalog Nbr:			
MCM	590			
	2016 SUMR	Primary	Alison Robbins	alison.robbins@tufts.edu
	2016 SUMR	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**			
Subject:	Catalog Nbr:			
LAM	553			
	2016 FALL	Primary	Angeline Warner	angie.warner@tufts.edu
	2016 FALL	Primary	David Lee-Parritz	david.lee-parritz@tufts.edu

This course is designed to complement the second year of the veterinary curriculum which is mainly concerned with the pathophysiology of disease. This course focuses on viral, bacterial and parasitic pathogens of concern in the laboratory animal and research settings. Pathogens of importance to traditional laboratory animal species are covered with special emphasis on rodent diseases. In addition, diseases of concern to nontraditional laboratory animals such as swine, small ruminants, fish, amphibians, reptiles and birds are also discussed. The course also 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 including the use of sentinels for routine health monitoring of colonies. This course consists of didactic lectures and tutorial sessions with assigned readings, case studies and interactive discussions.

138670	**Laboratory Animal Medicine and Pathology**			
Subject:	Catalog Nbr:			
LAM	555			
	2016 SPRG	Primary	David Lee-Parritz	david.lee-parritz@tufts.edu

This course is designed to complement 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. A rodent surgery laboratory is offered at Charles River Labs in which students gain practical experience in rodent surgical methods by performing common procedures such as splenectomy, adrenalectomy, ovariectomy, embryo transfer, ovarian transplant and jugular vein cannulation.

138673	**Toxicological Pathology**
Subject:	Catalog Nbr:

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VET	609

139123	Parasite Biology
Subject:	Catalog Nbr:
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
Subject:	Catalog Nbr:
LAM	555

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

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139244	Research			
Subject:	Catalog Nbr:			
BMS	616			
2016 SUMR	Primary	Saul Tzipori	saul.tzipori@tufts.edu	
Guided research on a topic suitable for a doctoral Dissertation.				

139245	Applied Learning Experience: Research Experience			
Subject:	Catalog Nbr:			
LAM	559			
2016 SUMR	Primary	Angeline Warner	angie.warner@tufts.edu	
2016 SUMR	Primary	David Lee-Parritz	david.lee-parritz@tufts.edu	

Charles River Labs, Wyeth Laboratories, TMC, U. of Massachusetts Medical Center, Genzyme, and Massachusetts General Hospital and New England Primate Research Center agreed to accept students in their facilities during summers for either Animal Facility or Research Experiences, as well as their clinical electives. Options are available at other facilities as well.

The summer Research Experience consists of an 8-week research experience involving animals. This research experience must take place during the first or second summer of the program and be an 8-week in depth laboratory research experience, preferably an independent project, in an established research laboratory.

Students are required to work with an established biomedical research investigator and write a research report on the summer project. They are evaluated by the principle investigator of the laboratory.

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

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

139481	Shelter Visitations
Subject: APP	Catalog Nbr: 1002
2016 SPRG Primary Emily McCobb emily.mccobb@tufts.edu	
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

139484	Community Cat Clinics
Subject: APP	Catalog Nbr: 1005
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.	

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

139857	Humanitarian Studies In The Field
Subject:	Catalog Nbr:
MCM	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.	

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

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Subject:	Catalog Nbr:
APP	1006

139965	Wildlife in Captivity

Subject:	Catalog Nbr:
APP	1007

2016 FALL Primary Allen Rutberg allen.rutberg@tufts.edu

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

Subject:	Catalog Nbr:
APP	1008

2016 SPRG Primary Emily McCobb emily.mccobb@tufts.edu

This course blends readings, lectures, practical experience, discussion, and student projects to develop student understanding of 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. Students will consider aspects of assessing welfare, including stress, physical health, mental states, and quality of life and will be introduced to methods of conducting welfare assessments.

140030	Global Information Systems-Independent Study

Subject:	Catalog Nbr:
MCM	1004

140065	JAX Medical and Experimental Mammalian Genetics

Subject:	Catalog Nbr:
BMS	1008

140096	Community Cat Clinics

Subject:	Catalog Nbr:
APP	1005

2016 SPRG Primary Emily McCobb emily.mccobb@tufts.edu

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	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.

140216	**International Environmental Law**
Subject:	Catalog Nbr:
MCM	1005
2015 FALL	Primary Christopher Whittier chris.whittier@tufts.edu
	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 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.

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140382	Biostatistics II
Subject: BMS	Catalog Nbr: 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: BMS	Catalog Nbr: 1014
This course provides a thorough survey of major topics in cell biology, including membrane structure and 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: APP	Catalog Nbr: 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: APP	Catalog Nbr: 1009
2016 SPRG Primary Emily McCobb emily.mccobb@tufts.edu	
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: LAM	Catalog Nbr: 592
Students, along with faculty members, participate in a monthly journal club for discussion of current	

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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 Support at Tufts at Tech Veterinary Clinic

Subject:	Catalog Nbr:			
APP	1010			
	2016 SPRG	Primary	Emily McCobb	emily.mccobb@tufts.edu

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.

140487	Generalized Linear Models

Subject:	Catalog Nbr:
BMS	1015

This course is offered at UMass Medical School, Graduate School of Biomedical Sciences.

140490	Principles of Animal Behavior

Subject:	Catalog Nbr:			
APP	1011			
	2015 FALL	Primary	Seana Dowling-Guyer	Seana.Dowling_guyer@tufts.edu
	2016 SPRG	Primary	Emily McCobb	emily.mccobb@tufts.edu

An integrated approach to animal behavior with a focus on understanding how behavior reflects and responds to welfare and stress. Different approaches will be examined, including ethology, behaviorism/learning theory, developmental psychology, cognitive psychology, and Tinbergen's levels of causation.

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

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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	**Infectious Diseases of Humans and Animals I**

Subject:	Catalog Nbr:
IDGH	540

2016 FALL	Primary	Giovanni Widmer	giovanni.widmer@tufts.edu
2016 FALL	Primary	Gillian Beamer	Gillian.Beamer@tufts.edu

This course will cover the fundamental aspects of bacterial, viral, fungal and parasitic infections that are important to humans and animals. In Course I, a systems approach will be used to demonstrate infectious agents that primarily infect respiratory, gastrointestinal or urogenital tracts. The introductory lecture of each unit will review normal anatomy and physiology of each system. Additional lectures show the changes that occur with infection and disease. Pathogens of particular importance domestically and/or globally will be selected for in depth discussion with the students. Outside reading of published research papers will be used for discussion points and to establish a deeper understanding of important infectious diseases.

140829	**Applied Immunology and Vaccinology**

Subject:	Catalog Nbr:
IDGH	541

2016 FALL	Primary	Abhineet Sheoran	abhineet.sheoran@tufts.edu

This course will teach the principles of immunology and comparative immunology and then apply them to understand immune responses against selected infectious agents, immunotherapies and immunodiagnostics. The course will also teach how knowledge of the immune response against an infectious disease is applied to designing and developing effective vaccines, and other aspects of vaccine development. The published research papers will be discussed to provide a deeper understanding of basic and applied aspects of immunology.

140830	**Research Training with Lab Rotation**

Subject:	Catalog Nbr:
IDGH	542

2016 FALL	Primary	Abhineet Sheoran	abhineet.sheoran@tufts.edu

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.

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140831	Microbiology and Immunology Techniques

Subject: IDGH | Catalog Nbr: 543

2016 FALL	Primary	Abhineet Sheoran	abhineet.sheoran@tufts.edu

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 Excel for basic statistical analyses and more specialized programs for more advanced statistics, such as SPSS. Laptop computers are required.

140833	Research Ethics

Subject: IDGH | Catalog Nbr: 545

2015 FALL	Primary	Mohammed Anwer	sawkat.anwer@tufts.edu
2016 FALL	Primary	Robert Bridges	robert.bridges@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

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Subject:	Catalog Nbr:			
IDGH	546			
	2016 FALL	Primary	Abhineet Sheoran	abhineet.sheoran@tufts.edu

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	**Infectious Diseases of Humans and Animals II**

Subject:	Catalog Nbr:			
IDGH	547			
	2016 SPRG	Primary	Giovanni Widmer	giovanni.widmer@tufts.edu
	2016 SPRG	Primary	Gillian Beamer	Gillian.Beamer@tufts.edu

A systems-based approach will be utilized to present infectious agents that primarily infect the nervous system, skin, and blood (including the reticuloendothelial system). The introductory lecture of each unit will briefly describe the anatomical (including histological) and physiological features of the organs of that system, and list infectious agents that primarily infect that system and cause pathology and disease. Model bacterial, viral, fungal and parasitic pathogens that cause disease domestically and/or globally will be selected for in-depth discussion. The etiology, pathogenesis, immunology, epidemiology, diagnosis, prevention and control of these selected pathogens will be discussed in detail. Reading of pertinent primary scientific literature will be assigned to facilitate discussion and deeper understanding.

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:

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IDGH	549

Theoretical aspects of the course will cover various models of infectious disease research, such as gerbils, guinea pigs, hamsters, mice, non-human primates, rabbits, rats, and swine. The course will get practical training with mostly conventional animal models, such as mice, hamsters and rats. However, limited experience will be provided with gnotobiotic piglet model of enteric infections. Students will learn methods of handling, feeding and care of animals, oral inoculations and systemic injections, observing and recording clinical signs of the disease, humanely euthanizing the animals, collection of blood and organs for immunological, microbiological and histological analysis, and disposal of carcass. The students will process serum and other samples in-vitro, analyze, write report and present data to the class.

140838	**Principles of Biodefense**
Subject:	Catalog Nbr:
IDGH	560

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) 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 will mainly serve as key readings. Groups of 2-3 students, depending on class size, will be assigned the task of presenting such a reading each week for a structured class discussion.

140839	**Food Safety**
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,

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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 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:	Catalog Nbr:
IDGH	565
This course will draw on lectures given earlier on the specific diseases that have been associated with pandemics. Key historic events will be discussed and the lessons learned from them. This set of lectures will highlight the factors that contribute to emergence, transmission, geographic locations, species of animals and pathogens most frequently associated with the emergence of pandemics. In addition, the evolutionary attributes of certain microbes that are most likely to continue to lead to the rise of new pandemic microbial strains through genetic drift, shift, and genetic reassortants. The ability of scientists to generate new reassortants in their laboratories will help predict likely future pandemics and help prepare for them. But such	

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activities also carry serious risks of accidental or deliberate release of such lab strains into the environment and into the animal and human populations.

140844	Training in Leadership, Communication Skills, Reporting and Conduct
Subject: IDGH	Catalog Nbr: 566
2016 SUMR	Primary Deborah Kochevar Deborah.Kochevar@tufts.edu
This course will teach how to develop mastery in teamwork and team building, and understanding the audience and media, building networks and managing the flow of information. This course will also teach writing of proposals, contracts and subcontracts to federal agencies and private foundations, pre- and post-award management, media and policy, the structure/role and responsibilities of IACUC, IRB and IBC institutional committees, protocol writing, and protocol amendments and submission.	

140845	Basics of Good Laboratory Practice
Subject: IDGH	Catalog Nbr: 567

140846	Principles of Laboratory Management and Biosafety
Subject: IDGH	Catalog Nbr: 568
2016 SUMR	Primary Abhineet Sheoran abhineet.sheoran@tufts.edu
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	Develop and Write a Research Proposal
Subject: IDGH	Catalog Nbr: 569
2016 SUMR	Primary Abhineet Sheoran abhineet.sheoran@tufts.edu
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, 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	

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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			
2016 FALL		Primary	Megan Mueller	Megan.Mueller@tufts.edu
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			
2016 FALL		Primary	Megan Mueller	Megan.Mueller@tufts.edu
2016 FALL		Primary	Seana Dowling-Guyer	Seana.Dowling_guyer@tufts.edu
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			
2016 FALL		Primary	Phyllis Mann	phyllis.mann@tufts.edu
2016 FALL		Primary	Allen Rutberg	allen.rutberg@tufts.edu
This course introduces students to the basics of statistical methods and research design. Students learn to state hypotheses, evaluate sampling procedures, create and manage data sets, and carry out basic statistical testing. Examples are drawn from research in veterinary medicine, animal science, human-animal relationships, and animal ecology.				

140851	**Communicating Policy Positions**			
Subject:	Catalog Nbr:			
APP	524			
2016 SPRG		Primary	Allen Rutberg	allen.rutberg@tufts.edu
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				

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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			
2016 SPRG	Primary	Seana Dowling-Guyer	Seana.Dowling_guyer@tufts.edu	
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			
2016 FALL	Primary	Allen Rutberg	allen.rutberg@tufts.edu	
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			
2016 SUMR	Primary	Allen Rutberg	allen.rutberg@tufts.edu	
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			
2016 SUMR	Primary	Allen Rutberg	allen.rutberg@tufts.edu	
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

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Subject:	Catalog Nbr:			
APP	517			
2016 SPRG		Primary	Phyllis Mann	phyllis.mann@tufts.edu
2016 SPRG		Primary	Megan Mueller	Megan.Mueller@tufts.edu

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			
2016 SPRG		Primary	Allen Rutberg	allen.rutberg@tufts.edu

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

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			
2016 FALL		Primary	Carolyn Talmadge	Carolyn.Talmadge@tufts.edu

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

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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 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	

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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.

141533	**Paws for People**

Subject: APP | Catalog Nbr: 1013

2016 SPRG | Primary | Emily McCobb | emily.mccobb@tufts.edu

1) Delta Training (12 hours)
Two 6 hour sessions or 6 weeks of 2 hr courses
Class taught by Delta instructors on becoming a registered visitor; what the animal handler needs to know, following this class students will be eligible to apply to the Delta Society for registration as a trained visitor. There is a $80 fee for students to take this Delta Course. This includes a book and paying the lecturers. However, the course director has agreed to waive the 80 fee if students are willing to use a borrowed workbook from Paws for People, rather than purchase their own book.
There is also a fee payable to the Delta Society if the student chooses to become registered with them. Registration is voluntary and not required as part of the selective.
2) Evaluations
After completing the training the student will help perform evaluations of volunteers and their dogs. The student will spend two days assisting with evaluations and will also observe two visits for a total of 20 hours.
3) Visitation Experiences
The last 8 hours of the selective will consist of visitation by the student and a short (20 minutes only) presentation to the Tufts Paws for People Advisory Board summarizing their experiences.
4) Research Assignment
The student will prepare a 10-15 page research paper on a topic related to animal assisted therapy (topic to be pre-approved). In addition the student will prepare a 15-20 minute presentation on their paper to be presented to the Paws for People Steering Committee.

141551	**Applied Animal Behavior**

Subject: APP | Catalog Nbr: 1014

2016 SPRG | Primary | Seana Dowling-Guyer | Seana.Dowling_guyer@tufts.edu

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,

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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.

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.