

# Course Bulletin

<b>100005</b>	<b>Graduate Research</b>		
Subject:	CMDB	Catalog Nbr:	0298
These courses provide guided research on a topic suitable for a doctoral thesis.			

<b>100015</b>	<b>Graduate Research</b>		
Subject:	CMDB	Catalog Nbr:	0299
	2018 SUMR	Primary	Ira Herman ira.berman@tufts.edu
	2018 SUMR	Primary	John Castellot john.castellot@tufts.edu
	2019 SUMR	Primary	Brent Cochran brent.cochran@tufts.edu
These courses provide guided research on a topic suitable for a doctoral thesis.			

<b>100025</b>	<b>Masters Degree Only</b>		
Subject:	CMDB	Catalog Nbr:	0402

<b>100047</b>	<b>PhD Degree Only</b>		
Subject:	CMDB	Catalog Nbr:	0403
Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.			

<b>100060</b>	<b>PhD Degree Only</b>		
Subject:	CMDB	Catalog Nbr:	0404
Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.			

<b>100078</b>	<b>PhD Degree Only</b>		
Subject:	CMDB	Catalog Nbr:	0405
Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.			

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<b>102889</b>		<b>Membranes &amp; Trafficking</b>			
Subject:	Catalog Nbr:				
ISP	209A				
2018 FALL	Secondary	Daniel Cox	dan.cox@tufts.edu		
2019 FALL	Primary	Michael Forgac	michael.forgac@tufts.edu		
2019 FALL	Secondary	Garabed Sahagian	gary.sahagian@tufts.edu		
2019 FALL	Secondary	John Castellot	john.castellot@tufts.edu		
2019 FALL	Secondary	Ralph Isberg	ralph.isberg@tufts.edu		
2019 FALL	Secondary	Peter Juo	Peter.Juo@tufts.edu		
2019 FALL	Secondary	Gerard Reijmers	Leon.Reijmers@tufts.edu		
2019 FALL	Secondary	Jamie Maguire	Jamie.Maguire@tufts.edu		
2019 FALL	Secondary	Christopher Dulla	Chris.Dulla@tufts.edu		
2019 FALL	Secondary	Alan Kopin	alan.kopin@tufts.edu		
2019 FALL	Secondary	Karl Munger	Karl.Munger@tufts.edu		
2019 FALL	Secondary	Malavika Raman	Malavika.Raman@tufts.edu		
<p>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.</p>					

<b>102982</b>		<b>Cell &amp; Molecular Genetics</b>			
Subject:	Catalog Nbr:				
ISP	210A				
<p>This course covers molecular genetics and basic concepts in developmental biology.</p>					

<b>103003</b>		<b>Molecular Cell Biology of Development</b>			
Subject:	Catalog Nbr:				
ISP	210B				
2019 SPRG	Primary	Victor Hatini	Victor.Hatini@tufts.edu		
2019 SPRG	Secondary	John Castellot	john.castellot@tufts.edu		
2019 SPRG	Secondary	Michael Forgac	michael.forgac@tufts.edu		
2019 SPRG	Secondary	James Schwob	jim.schwob@tufts.edu		
2019 SPRG	Secondary	Charlotte Kuperwasser	Charlotte.Kuperwasser@tufts.edu		
2019 SPRG	Secondary	Li Zeng	Li.Zeng@tufts.edu		
2019 SPRG	Secondary	Peter Juo	Peter.Juo@tufts.edu		
2019 SPRG	Secondary	Gordon Huggins	Gordon.Huggins@tufts.edu		
<p>This course introduces students to the basic cellular and molecular mechanisms involved in gametogenesis, fertilization, early embryonic development, pattern formation, and organogenesis. The course emphasizes how human disease often recapitulates development.</p>					

<b>104392</b>		<b>Qualifying Exam</b>			
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Subject: CTS	Catalog Nbr: 0000
Students present and defend a proposal for research consisting of a statement of an original research problem in which a scientific question is asked and the experimental approach to answering the question is explained in a written proposal. The proposal is presented orally to the faculty.	

<b>104467</b>	<b>PhD Degree Only</b>
Subject: CTS	Catalog Nbr: 0404
Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.	

<b>104503</b>	<b>Study Design Seminar</b>		
Subject: CTS	Catalog Nbr: 0500		
2019 FALL	Primary	David Kent	david.kent@tufts.edu
2019 FALL	Primary	Karen Freund	Karen.Freund@tufts.edu
These seminars use proposed and ongoing research projects to explore issues in study design. The course provides investigators and trainees the opportunity to present a research-related problem they are encountering and engages students in a discussion of the approach to the problem and an appropriate plan of action.			

<b>104524</b>	<b>Translational &amp; Molecular Epidemiology</b>
Subject: CTS	Catalog Nbr: 0501
This course aims to address some of the main challenges of current translational research in the interface of epidemiology and molecular medicine.	

<b>104542</b>	<b>Bridging the Bench-To-Bedside Gap</b>
Subject: CTS	Catalog Nbr: 0502
This course seeks to diminish the "bench-to-bedside" gap by exposing clinical graduate students to basic science research. Students focus on major questions that are ready for future scientific investigation, how scientific discoveries have influenced clinical practice, and how clinical practice has affected basic research. Examination of active projects at Tufts Medical Center introduces students to translational science in action.	

<b>104602</b>	<b>Introduction to Biostatistical Methods I</b>
Subject:	Catalog Nbr:

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CTS	0506				
	2019 SUMR	Primary	Sarah Pagni		Sarah.Pagni@tufts.edu
<p>This course is the first half of a two-part course which presents the practical application of biostatistical methods for exploring and analyzing health data. Methods for working with data and exploring basic associations are presented through case examples and clinical research projects. CTS 0506 and 0507 are considered equivalent to 0527.</p>					

<b>104617</b>	<b>Introduction To Biostatistics II</b>				
	Subject:	Catalog Nbr:			
	CTS	0507			
	2019 FALL	Primary	Sarah Pagni		Sarah.Pagni@tufts.edu
<p>This course is the second half of a two-part course which presents the practical application of biostatistical methods for exploring and analyzing health data. Methods for working with data and exploring basic associations are presented through case examples and clinical research projects. CTS 0506 and 0507 are considered equivalent to 0527.</p>					

<b>104658</b>	<b>Predictive Models</b>				
	Subject:	Catalog Nbr:			
	CTS	0510			
	2019 FALL	Primary	David Kent		david.kent@tufts.edu
<p>This course explores the use of statistical models to predict clinical outcomes for retrospective review and as prospective decision aids. Emphasis is placed on integrating statistical and clinical thinking to construct models that are both statistically and clinically sound and that give accurate predictions when generalized to other populations.</p>					

<b>104676</b>	<b>Machine Learning in Predictive Medicine</b>				
	Subject:	Catalog Nbr:			
	CTS	0511			
<p>This course introduces computer science students and clinicians to practical applications of machine learning to solving problems in clinical medicine through creation of collaborative research teams working on unsolved problems with a clinical researcher. The short-term goal is for each team to produce a report presented at the end of the course. The long-term goal is to build collaborative relationships and the advancement of interdisciplinary work between computer scientists and clinical researchers.</p>					

<b>104693</b>	<b>Comparative Effectiveness Research Survey</b>				
	Subject:	Catalog Nbr:			
	CTS	0512			
<p>The course describes the current state of CER and evidence-based medicine (EBM). The tools of this kind of work are defined including various forms of CER from clinical trials, registry and observational research, technology assessments, and evidence reports. Methodologies used are explained, for example effectiveness</p>					

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trials, decision analysis, cost-effectiveness analysis, systematic review, and meta-analysis.

<b>104708</b>	<b>Clinical Research Project-Certificate Candidates</b>			
Subject: CTS	Catalog Nbr: 0514			
2019 SPRG	Primary	David Kent	david.kent@tufts.edu	
2019 SPRG	Primary	Jessica Paulus	Jessica.Paulus@tufts.edu	
2019 SPRG	Primary	Joshua Cohen	Joshua_T.Cohen@tufts.edu	
2019 SPRG	Primary	Brian Chow	Brian.Chow@tufts.edu	
<p>Students develop mentored research plans with mentors (or mentoring teams) that permits them to demonstrate these skills through the development of a protocol, a report, or research manuscript. The mentoring teams are required to have at least one member who is on the faculty of the Sackler CTS program. The project design is led by students, so they learn the role of principal investigator. This course is required for the Certificate Program, and is not available to non-certificate students.</p>				

<b>104768</b>	<b>Clinical Research Project/Thesis Research- First Year</b>			
Subject: CTS	Catalog Nbr: 0515			
<p>First year master's students begin to learn how to complete comprehensive independent clinical research project, which includes framing a research question and specific project aims, identifying useful data sources, developing appropriate methods, identifying and defending against sources of bias, implementing/managing a project, and writing up a thesis in the form of a publishable article or monograph.</p>				

<b>104826</b>	<b>Clinical Research Project/Thesis Research- Second Year</b>			
Subject: CTS	Catalog Nbr: 0516			
2019 SUMR	Primary	David Kent	david.kent@tufts.edu	
<p>Second year master's students continue and complete their independent clinical research projects. Students gain additional skills in framing a research question and specific project aims, identifying useful data sources, developing appropriate methods, identifying and defending against sources of bias, implementing/managing the project, and writing up the thesis in the form of a publishable article or monograph.</p>				

<b>104881</b>	<b>Clinical Research Project/Thesis Research- PhD Candidates</b>			
Subject: CTS	Catalog Nbr: 0517			
2019 SUMR	Primary	David Kent	david.kent@tufts.edu	
<p>PhD students complete comprehensive independent clinical research doctoral-level project, which includes framing a research question and specific project aims, identifying useful data sources, developing appropriate methods, identifying and defending against sources of bias, implementing/managing the project and writing up the thesis in the form of a publishable article and PhD thesis.</p>				

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<b>104898</b>	<b>Advanced Thesis Research</b>			
Subject:	Catalog Nbr:			
CTS	0518			
2019 FALL	Primary	Karen Freund		Karen.Freund@tufts.edu
The course is for students who do not complete their theses in the customary timeframe and wish to pursue further research. The Program Director, in consultation with the student's thesis committee and program mentor, determines the number of credits.				

<b>104915</b>	<b>Concentration Practicum</b>			
Subject:	Catalog Nbr:			
CTS	0519			
2019 FALL	Primary	Jessica Paulus		Jessica.Paulus@tufts.edu
2019 SPRG	Primary	David Kent		david.kent@tufts.edu
2019 SPRG	Primary	Benjamin Wessler		Benjamin.Wessler@tufts.edu
This course is an independent mentored experience for students interested in advanced study and skill development in a particular area. This course requires written approval of the Program Director in order to register.				

<b>104952</b>	<b>Introduction to Clinical Epidemiology</b>			
Subject:	Catalog Nbr:			
CTS	0523			
2019 FALL	Primary	Jessica Paulus		Jessica.Paulus@tufts.edu
2019 FALL	Primary	Robert Goldberg		robert.goldberg@tufts.edu
This course provides students with an overview of the epidemiologic approach to the study of disease causation, its natural history, and epidemiologic methods. This course reviews the application of various observational and experimental research designs and strategies utilized in clinical and epidemiological research. Didactic instruction, readings, and problem sets are used to create each module: investigation of disease outbreaks, sources of health information, observational studies, randomized clinical trials, measures of morbidity and mortality, sources of and controls for bias evaluation of diagnostic and screening tests, and development of surveillance studies.				

<b>104969</b>	<b>Introduction to Clinical Care Research</b>			
Subject:	Catalog Nbr:			
CTS	0525			
2018 SUMR	Secondary	David Snyderman		david.snyderman@tufts.edu
2019 SUMR	Primary	David Kent		david.kent@tufts.edu
2019 SUMR	Primary	Jessica Paulus		Jessica.Paulus@tufts.edu
2019 SUMR	Primary	Robert Goldberg		robert.goldberg@tufts.edu
2019 SUMR	Secondary	Angie Rodday		Angie.Rodday@tufts.edu

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2019 SUMR	Secondary	Lori Price	Lori.Price@tufts.edu
2019 SUMR	Secondary	Jonathan Garlick	Jonathan.Garlick@tufts.edu
2019 SUMR	Secondary	Karen Freund	Karen.Freund@tufts.edu
2019 SUMR	Secondary	Robin Ruthazer	robin.ruthazer@tufts.edu
2019 SUMR	Secondary	Thomas Concannon	Thomas.Concannon@tufts.edu
2019 SUMR	Secondary	Raveedhara Bannuru	Raveendhara.Bannuru@tufts.edu
2019 SUMR	Secondary	Gordon Huggins	Gordon.Huggins@tufts.edu
2019 SUMR	Secondary	Denise Daudelin	Denise.Daudelin@tufts.edu
2019 SUMR	Secondary	John Wong	john_b.wong@tufts.edu
2019 SUMR	Secondary	Andreas Klein	Andreas.Klein@tufts.edu
2019 SUMR	Secondary	James Chambers	James.Chambers@tufts.edu
2019 SUMR	Secondary	Pei-Jung Lin	plin@tufts.edu
2019 SUMR	Secondary	William Harvey	William.Harvey@tufts.edu
2019 SUMR	Secondary	Harmon Jordan	harmon.jordan@tufts.edu

This course, meeting three hours daily over a four-week summer session, teaches students how to formulate a clinical research hypothesis and to develop it into a clinical research project. Students acquire an understanding of basic and advanced principles of study design and issues in conducting biomedical research involving human subjects.

<b>104985</b>	<b>Biostatistics I</b>			
Subject:	Catalog Nbr:			
CTS	0527			
2018 FALL	Secondary	Musie Ghebremichael	Musie.Ghebremichael@tufts.edu	
2019 FALL	Primary	Angie Rodday	Angie.Rodday@tufts.edu	
2019 FALL	Primary	Farzad Noubary	Farzad.Noubary@tufts.edu	
This course introduces basic principles and applications of statistics to problems in clinical research. Topics covered include descriptive statistics, probability and random variation, sampling, hypothesis testing, proportions, measures of frequency, t-tests, chi-square tests, one-way analysis of variance, correlation, linear regression and nonparametric statistics.				

<b>105046</b>	<b>Scientific Manuscript Writing</b>			
Subject:	Catalog Nbr:			
CTS	0537			
2019 FALL	Primary	Jessica Paulus	Jessica.Paulus@tufts.edu	
2019 FALL	Primary	Robert Goldberg	robert.goldberg@tufts.edu	
2019 SPRG	Primary	David Kent	david.kent@tufts.edu	
This course focuses on principles of scientific manuscript writing. The student learns how to develop a manuscript by reviewing the specific issues of style, authorship and volume of information that should be incorporated into a research paper.				

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<b>105065</b>	<b>Scientific Grant Writing</b>			
Subject:	Catalog Nbr:			
CTS	0538			
2019 FALL	Primary	David Kent		david.kent@tufts.edu
2019 FALL	Primary	Robert Goldberg		robert.goldberg@tufts.edu
The purpose of this course is to teach the principles of clinical research grant writing. Participants learn the importance of, and how to select, investigators and co-investigators as well as the identification of potential funding sources and other important aspects of grant writing.				

<b>105102</b>	<b>Scientific Writing, Peer Review &amp; Presentations</b>			
Subject:	Catalog Nbr:			
CTS	0539			
2019 FALL	Primary	David Kent		david.kent@tufts.edu
2019 FALL	Secondary	Robert Goldberg		robert.goldberg@tufts.edu
Students focus on principals of scientific review and grant peer review. This involves critiquing manuscripts and reviewing research grants for mock study section meetings. Students are encouraged and given an opportunity to present their scientific writings and oral presentations for critique on an ongoing basis.				

<b>105120</b>	<b>Ethics of Clinical Investigation</b>			
Subject:	Catalog Nbr:			
CTS	0540			
2019 SPRG	Primary	Susan Parsons		Susan.Parsons@tufts.edu
2019 SPRG	Secondary	Angie Rodday		Angie.Rodday@tufts.edu
2019 SPRG	Secondary	David Kent		david.kent@tufts.edu
The goal of this course is to increase awareness of research ethics and their practical applications by medical practitioners and researchers – specifically with regard to clinical investigations. The curriculum addresses the interrelationships between ethics, law and professional practice standards and explores the role and workings of Institutional Review Boards.				

<b>105158</b>	<b>Principles of Drug Development</b>			
Subject:	Catalog Nbr:			
CTS	0555			
2019 SPRG	Primary	Kenneth Kaitin		Kenneth.Kaitin@tufts.edu
This course examines the important economic, political, legal and scientific issues that face academic clinical investigators who work in partnership with industry sponsors and government regulators to design and conduct clinical studies.				

<b>105251</b>	<b>Introduction To Clinical Trials</b>			
Subject:	Catalog Nbr:			
CTS	0561			



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2019 FALL	Primary	Anastassios Pittas	anastassios.pittas@tufts.edu
2019 FALL	Secondary	Paul Fuss	paul.fuss@tufts.edu
2019 FALL	Secondary	Ellen Vickery	No Email on file.
2019 FALL	Secondary	Patricia Sheehan	Patricia_Ryan.Sheehan@tufts.edu

This course considers the various problems and options available in the design and conduct of clinical trials, including classical efficacy trials and "effectiveness trials." Issues to be covered include ethics, experimental design, coordination and operations, database development, interim analysis, safety monitoring and analysis, and reporting.

<b>105271</b>	<b>Topics in Clinical Trials</b>		
Subject:	Catalog Nbr:		
CTS	0562		
This is a seminar course that explores special topics in clinical trials. Topics include internet-based clinical trials, N of 1 trials, trials in special populations and overseas, industry sponsored trials and multicenter trials.			

<b>105306</b>	<b>Introduction to Health Services Research</b>		
Subject:	Catalog Nbr:		
CTS	0566		
2019 SPRG	Primary	Karen Freund	Karen.Freund@tufts.edu
2019 SPRG	Primary	Amy Almerico-LeClair	Amy.LeClair@tufts.edu
2019 SPRG	Secondary	Pei-Jung Lin	plin@tufts.edu
2019 SPRG	Secondary	Elena Byhoff	Elena.Byhoff@tufts.edu
This course introduces students to the concepts and methods that distinguish health services and health policy research from other fields. Faculty cover major topics in health services/health policy research including outcomes research design and methods, health economics, pharmacoconomics, access and payment for health services, healthcare quality and quality improvement.			

<b>105457</b>	<b>Introduction to Evidence Based-Medicine</b>		
Subject:	Catalog Nbr:		
CTS	0581		
2019 SPRG	Primary	Raveedhara Bannuru	Raveendhara.Bannuru@tufts.edu
2019 SPRG	Secondary	Gowri Raman	Gowri.Raman@tufts.edu
2019 SPRG	Secondary	James Chambers	James.Chambers@tufts.edu
This course covers the principles of systematic review processes, evaluation of studies and bodies of evidence as used in the conduct of systematic reviews, meta-analyses and the development of evidence-based clinical practice guidelines. The course focuses on studies of treatment efficacy.			

<b>105474</b>	<b>Genetic Epidemiology</b>		
Subject:	Catalog Nbr:		

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CTS 0582

This course is an introduction to the concepts and methodology of genetic epidemiology, including novel methods of molecular biology, quantitative genetics, study design for genetic traits, segregation analysis and linkage analysis.

<b>105491</b>	<b>Introduction to Decision Analysis</b>			
Subject:	Catalog Nbr:			
CTS	0584			
2019 SPRG	Primary	John Wong	john_b.wong@tufts.edu	
This course is a working overview of the principles of decision analysis as applied to medicine, making optimal choices in the face of uncertainty. Formal decision analysis has become a well-recognized and accepted research discipline for examining clinical options facing patients, physicians and policymakers.				

<b>105533</b>	<b>Special Topics in Clinical and Translational Science</b>			
Subject:	Catalog Nbr:			
CTS	0593			
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.				

<b>105554</b>	<b>Special Topics in Clinical and Translational Science</b>			
Subject:	Catalog Nbr:			
CTS	0594			
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic. {COIRRECT CREDITS}				

<b>108388</b>	<b>Graduate Biochemistry</b>			
Subject:	Catalog Nbr:			
BCHM	0223			
2018 FALL	Secondary	Kurtz Paulson	eric.paulson@tufts.edu	
2018 FALL	Secondary	James Munro	James.Munro@tufts.edu	
2019 FALL	Primary	Alex Bohm	Andrew.Bohm@tufts.edu	
2019 FALL	Secondary	James Baleja	jim.baleja@tufts.edu	
2019 FALL	Secondary	Peter Bullock	peter.bullock@tufts.edu	
2019 FALL	Secondary	Brian Schaffhausen	brian.schaffhausen@tufts.edu	
2019 FALL	Secondary	William Bachovchin	william.bachovchin@tufts.edu	
2019 FALL	Secondary	Michael Forgac	michael.forgac@tufts.edu	
2019 FALL	Secondary	Albert Tai	albert.tai@tufts.edu	
2019 FALL	Secondary	Alexei Degterev	Alexei.Degterev@tufts.edu	
2019 FALL	Secondary	Marta Gaglia	Marta.Gaglia@tufts.edu	
This course provides a graduate-level discussion of the structure and function of biologically important				

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molecules. Problems of protein and nucleic acid biochemistry are emphasized.

<b>108410</b>	<b>Advanced Graduate Biochemistry</b>			
Subject:	Catalog Nbr:			
BCHM	0224			
<p>Advanced Graduate Biochemistry is intended to allow students with strong biochemistry backgrounds to explore areas of biochemistry relevant to their interests in a more detailed way. It is offered in parallel with BCHM223 Graduate Biochemistry. It is intended for MD/PhD students who have taken Medical Foundations I and for PhD students coming to the Sackler School with a substantial background in biochemistry. PhD students are allowed to transfer to this course after the first BCHM223 examination if they meet the performance requirements set by the Course Director.</p>				

<b>108532</b>	<b>Biochemistry of Gene Expression &amp; Signal Transduction</b>			
Subject:	Catalog Nbr:			
BCHM	0230			
2019 SPRG	Primary	Amy Yee	amy.yee@tufts.edu	
2019 SPRG	Secondary	Kurtz Paulson	eric.paulson@tufts.edu	
2019 SPRG	Secondary	Larry Feig	larry.feig@tufts.edu	
2019 SPRG	Secondary	Brian Schaffhausen	brian.schaffhausen@tufts.edu	
2019 SPRG	Secondary	Brent Cochran	brent.cochran@tufts.edu	
2019 SPRG	Secondary	Marta Gaglia	Marta.Gaglia@tufts.edu	
2019 SPRG	Secondary	Karl Munger	Karl.Munger@tufts.edu	
2019 SPRG	Secondary	Christine Lary	Chrstitine.Duate@tufts.edu	
<p>This course covers the molecular mechanisms of gene expression and signal transduction. The fundamental mechanisms underlying transcription, RNA processing, translation, and DNA replication are highlighted, and the integration of these fundamental mechanisms into molecular and cellular regulation of proliferation and signal transduction is discussed. Current literature is emphasized.</p>				

<b>108657</b>	<b>Graduate Seminar</b>			
Subject:	Catalog Nbr:			
BCHM	0291			
2019 FALL	Primary	Brent Cochran	brent.cochran@tufts.edu	
<p>Visiting speakers from the Boston community and beyond present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.</p>				

<b>108697</b>	<b>Graduate Seminar</b>			
Subject:	Catalog Nbr:			
BCHM	0292			
2019 SPRG	Primary	Brent Cochran	brent.cochran@tufts.edu	
<p>Visiting speakers from the Boston community and beyond present their scientific research to all members of</p>				

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the program, including faculty, students, and post-doctoral fellows.

<b>108770</b>	<b>Journal Club</b>
Subject: BCHM	Catalog Nbr: 0295
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.	

<b>108787</b>	<b>Journal Club</b>
Subject: BCHM	Catalog Nbr: 0296
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.	

<b>108810</b>	<b>Graduate Research</b>
Subject: BCHM	Catalog Nbr: 0297
These courses provide guided research on a topic suitable for a doctoral thesis.	

<b>108837</b>	<b>Graduate Research</b>
Subject: BCHM	Catalog Nbr: 0298
These courses provide guided research on a topic suitable for a doctoral thesis.	

<b>108863</b>	<b>Graduate Research</b>
Subject: BCHM	Catalog Nbr: 0299
2019 SUMR	Primary Larry Feig
larry.feig@tufts.edu	
These courses provide guided research on a topic suitable for a doctoral thesis.	

<b>108885</b>	<b>Masters Degree Only</b>
Subject: BCHM	Catalog Nbr: 0402

<b>108909</b>	<b>PhD Degree Only</b>
Subject:	Catalog Nbr:

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BCHM 0403

Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis

**108938**

**PhD Degree Only**

Subject: Catalog Nbr:  
BCHM 0404

Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis

**108962**

**PhD Degree Only**

Subject: Catalog Nbr:  
BCHM 0405

Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis

**109050**

**Biochemistry of Gene Expression**

Subject: Catalog Nbr:  
BCHM 230A

2019 SPRG	Primary	Amy Yee	amy.yee@tufts.edu
2019 SPRG	Secondary	Marta Gaglia	Marta.Gaglia@tufts.edu
2019 SPRG	Secondary	Christine Lary	Chrstitine.Duate@tufts.edu

The fundamental mechanisms underlying transcription, RNA processing, translation, and DNA replication are highlighted in this course. Current literature is emphasized. This course represents the first part of Biochemistry 230 and may be taken as a separate course.

**109079**

**Biochemistry of Signal Transduction**

Subject: Catalog Nbr:  
BCHM 230B

2019 SPRG	Primary	Amy Yee	amy.yee@tufts.edu
2019 SPRG	Secondary	Kurtz Paulson	eric.paulson@tufts.edu
2019 SPRG	Secondary	Larry Feig	larry.feig@tufts.edu
2019 SPRG	Secondary	Brian Schaffhausen	brian.schaffhausen@tufts.edu
2019 SPRG	Secondary	Brent Cochran	brent.cochran@tufts.edu
2019 SPRG	Secondary	Karl Munger	Karl.Munger@tufts.edu

The integration of fundamental mechanisms into molecular and cellular regulation of proliferation and signal transduction is discussed. Current literature is emphasized. This course represents the second part of

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Biochemistry 230 and may be taken as a separate course.

<b>109102</b>	<b>Molecular Recognition in Biology</b>
Subject: BCHM	Catalog Nbr: 231A
This course builds on graduate biochemistry, providing detailed instruction on how to design and interpret binding experiments, how to visualize and analyze macromolecular structures, and how to apply these techniques in laboratory research.	

<b>109123</b>	<b>Drug Design</b>
Subject: BCHM	Catalog Nbr: 231B
Survey and critical analysis of selected case histories of drug design, discovery, and development, including issues related to commercialization such as market size, patents, and licenses.	

<b>109312</b>	<b>Pathobiology</b>
Subject: CMP	Catalog Nbr: 0230
This is a discussion-based course that introduces graduate students to human disease, familiarizes them with pathological specimens and patients, provides examples of how scientific discovery and clinical practice have influenced each other, and uses clinical problems as a starting point for hypothesis-driven research.	

<b>109384</b>	<b>Graduate Seminar</b>
Subject: CMP	Catalog Nbr: 0291
2019 FALL	Primary Brent Cochran <a href="mailto:brent.cochran@tufts.edu">brent.cochran@tufts.edu</a>
Visiting speakers from the Boston community and beyond present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.	

<b>109405</b>	<b>Graduate Seminar</b>
Subject: CMP	Catalog Nbr: 0292
2019 SPRG	Primary Brent Cochran <a href="mailto:brent.cochran@tufts.edu">brent.cochran@tufts.edu</a>
Visiting speakers from the Boston community and beyond present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.	

<b>109497</b>	<b>Journal Club</b>
Subject:	Catalog Nbr:

# Course Bulletin

CMP            0295
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.

<b>109519</b>	<b>Journal Club</b>
Subject:        Catalog Nbr: CMP            0296	
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.	

<b>109541</b>	<b>Graduate Research</b>
Subject:        Catalog Nbr: CMP            0297	
These courses provide guided research on a topic suitable for a doctoral thesis.	

<b>109568</b>	<b>Graduate Research</b>
Subject:        Catalog Nbr: CMP            0298	
These courses provide guided research on a topic suitable for a doctoral thesis.	

<b>109587</b>	<b>Graduate Research</b>
Subject:        Catalog Nbr: CMP            0299	
2019 SUMR        Primary        Brent Cochran	brent.cochran@tufts.edu
These courses provide guided research on a topic suitable for a doctoral thesis.	

<b>109603</b>	<b>Masters Degree Only</b>
Subject:        Catalog Nbr: CMP            0402	

<b>109623</b>	<b>PhD Degree Only</b>
Subject:        Catalog Nbr: CMP            0403	
Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis	

# Course Bulletin

<b>109641</b>	<b>PhD Degree Only</b>
Subject: CMP	Catalog Nbr: 0404
Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.	

<b>109661</b>	<b>PhD Degree Only</b>
Subject: CMP	Catalog Nbr: 0405
Students are enrolled in this course when they receive permission to write from their thesis committee, and represents the effort in the final preparation and writing of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis	

<b>110372</b>	<b>Qualifying Exam</b>
Subject: CMDB	Catalog Nbr: 0000
Students present and defend a proposal for research consisting of a statement of an original research problem in which a scientific question is asked and the experimental approach to answering the question is explained in a written proposal. The proposal is presented orally to the faculty.	

<b>110452</b>	<b>Medical Histology</b>
Subject: CMDB	Catalog Nbr: 0203
2018 FALL	Primary Jeffrey Marchant <a href="mailto:jeffrey.marchant@tufts.edu">jeffrey.marchant@tufts.edu</a>
This elective Medical School course introduces the student to the organization of a variety of cells, tissues, and organ systems. The lectures present information on the relationships between structure and function (i.e., physiology, biochemistry, and development), while the laboratories involve tissue and organ identification, providing both a practical background in cell and tissue biology.	

<b>110619</b>	<b>Developmental Biology</b>
Subject: CMDB	Catalog Nbr: 0235
This course introduces students to modern developmental biology with an emphasis on the cellular and molecular mechanisms involved. General topic areas include fertilization and early development, mechanisms of cell determination and differentiation, and cell-cell and cell-matrix interactions.	

<b>110876</b>	<b>Graduate Seminar</b>
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# Course Bulletin

Subject: Catalog Nbr: CMDB 0291 2019 FALL Primary Brent Cochran brent.cochran@tufts.edu
Visiting speakers from the Boston community and beyond present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.

<b>110897</b>	<b>Graduate Seminar</b>
Subject: Catalog Nbr: CMDB 0292 2019 SPRG Primary Brent Cochran brent.cochran@tufts.edu	
Visiting speakers from the Boston community and beyond present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.	

<b>110931</b>	<b>Journal Club</b>
Subject: Catalog Nbr: CMDB 0295 2019 FALL Primary Heber Nielsen heber.nielsen@tufts.edu 2019 FALL Primary Gordon Huggins Gordon.Huggins@tufts.edu Subject: Catalog Nbr: CMDB 0295	
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group	

<b>110961</b>	<b>Journal Club</b>
Subject: Catalog Nbr: CMDB 0296 2019 SPRG Primary Heber Nielsen heber.nielsen@tufts.edu 2019 SPRG Primary Gordon Huggins Gordon.Huggins@tufts.edu Subject: Catalog Nbr: CMDB 0296	
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group	

<b>110981</b>	<b>Graduate Research</b>
Subject: Catalog Nbr: CMDB 0297 2019 FALL Primary Brent Cochran brent.cochran@tufts.edu	
These courses provide guided research on a topic suitable for a doctoral thesis.	

# Course Bulletin

<b>120717</b>	<b>Probability and Statistics for Basic Sciences</b>			
Subject: ISP	Catalog Nbr: 0220			
2019 SPRG	Primary	Daniel Cox		dan.cox@tufts.edu
This course provides an introduction to the principles of probability and statistics and emphasizes the application of these disciplines to the analysis of basic science biomedical research data. Topics include: summarizing data, testing for differences between means, analysis of variance, laws of probability, common probability distributions, the analysis of categorical data, correlation, linear regression, nonlinear curve fitting, and exponential processes.				

<b>120748</b>	<b>Laboratory Rotations</b>			
Subject: ISP	Catalog Nbr: 0234			
2019 FALL	Primary	Brent Cochran		brent.cochran@tufts.edu
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories				

<b>120763</b>	<b>Laboratory Rotations</b>			
Subject: ISP	Catalog Nbr: 0235			
2019 SPRG	Primary	Brent Cochran		brent.cochran@tufts.edu
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

<b>120784</b>	<b>Laboratory Rotations</b>			
Subject: ISP	Catalog Nbr: 0236			
2018 SUMR	Primary	Ira Herman		ira.herman@tufts.edu
2018 SUMR	Primary	John Castellot		john.castellot@tufts.edu
2019 SUMR	Primary	Brent Cochran		brent.cochran@tufts.edu
8-10 week laboratory rotation for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories				

<b>120859</b>	<b>Journal Club</b>			
Subject: ISP	Catalog Nbr: 0295			
2018 FALL	Primary	Ira Herman		ira.herman@tufts.edu
2019 FALL	Primary	Brent Cochran		brent.cochran@tufts.edu
2019 FALL	Primary	Amy Yee		amy.yee@tufts.edu
Students select articles from the current literature, analyze their significance, and present them for discussion				

# Course Bulletin

in a seminar group.

<b>120875</b>	<b>Journal Club</b>			
Subject:	Catalog Nbr:			
ISP	0296			
2019 SPRG	Primary	Brent Cochran	brent.cochran@tufts.edu	
2019 SPRG	Primary	Amy Yee	amy.yee@tufts.edu	
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.				

<b>121168</b>	<b>Cell Behavior</b>			
Subject:	Catalog Nbr:			
ISP	209B			
2019 SPRG	Primary	John Castellot	john.castellot@tufts.edu	
2019 SPRG	Secondary	Daniel Jay	daniel.jay@tufts.edu	
2019 SPRG	Secondary	Ira Herman	ira.herman@tufts.edu	
2019 SPRG	Secondary	Michael Forgac	michael.forgac@tufts.edu	
2019 SPRG	Secondary	Victor Hatini	Victor.Hatini@tufts.edu	
2019 SPRG	Secondary	Peter Juo	Peter.Juo@tufts.edu	
This course covers major topics in cell biology, including cell motility and mitosis; cell-cell and cell-matrix interactions; and receptor-mediated endocytosis.				

<b>123526</b>	<b>Qualifying Exam</b>			
Subject:	Catalog Nbr:			
GENE	0000			
Students present and defend a proposal for research consisting of a statement of an original research problem in which a scientific question is asked and the experimental approach to answering the question is explained in a written proposal. The proposal is presented orally to the faculty.				

<b>123606</b>	<b>Introduction to Genetics</b>			
Subject:	Catalog Nbr:			
GENE	0201			
2018 FALL	Primary	Brent Cochran	brent.cochran@tufts.edu	
2018 FALL	Primary	Alexander Poltorak	Alexander.Poltorak@tufts.edu	
2018 FALL	Secondary	Victor Hatini	Victor.Hatini@tufts.edu	
2018 FALL	Secondary	Peter Juo	Peter.Juo@tufts.edu	
2018 FALL	Secondary	Pamela Yelick	Pamela.Yelick@tufts.edu	
2018 FALL	Secondary	Claudette Gardel	Claudette.Gardel@tufts.edu	
2018 FALL	Secondary	Gordon Huggins	Gordon.Huggins@tufts.edu	
2018 FALL	Secondary	Lucy Liaw	Lucy.Liaw@tufts.edu	

# Course Bulletin

Basic principles and current issues in genetics are the subject of the course. The focus will be on basic genetic principles. Topics will include Mendelian analysis, linkage, recombination/gene conversion, chromosomal abnormalities, crossover and segregation, developmental genetics and differentiation, chromosome structure, chromatin, position effects, meiosis and mitosis. Student presentations of research papers are used to familiarize the class with the manner in which genetic approaches can be applied experimentally.

<b>123650</b>		<b>Cancer Genetics</b>			
Subject:	Catalog Nbr:				
GENE	0203				
2018 FALL	Primary	Brent Cochran		brent.cochran@tufts.edu	
2018 FALL	Primary	Karl Munger		Karl.Munger@tufts.edu	
2018 FALL	Secondary	Garabed Sahagian		gary.sahagian@tufts.edu	
2018 FALL	Secondary	Ira Herman		ira.herman@tufts.edu	
2018 FALL	Secondary	Amy Yee		amy.yee@tufts.edu	
2018 FALL	Secondary	Stephen Bunnell		Stephen.Bunnell@tufts.edu	
2018 FALL	Secondary	Charlotte Kuperwasser		Charlotte.Kuperwasser@tufts.edu	
2018 FALL	Secondary	Alexei Degterev		Alexei.Degterev@tufts.edu	
2018 FALL	Secondary	Cheryl London		Cheryl.London@tufts.edu	
2018 FALL	Secondary	Rachel Buchsbaum		rachel.buchsbaum@tufts.edu	
2018 FALL	Secondary	Philip Hinds		Phil.Hinds@tufts.edu	
2018 FALL	Secondary	Andreas Klein		Andreas.Klein@tufts.edu	
2018 FALL	Secondary	Wasif Saif		Wasif.Saif@tufts.edu	
2018 FALL	Secondary	Suriya Jeyapalan		No Email on file.	
<p>The course reviews widely-held ideas and current research on the genetic aspects of carcinogenesis. An introduction to cancer concepts is followed by a focus on specific mechanisms and models illustrating the ways in which normal cellular processes are disrupted in particular types of cancers. The course emphasizes problem solving and readings from the current literature.</p>					

<b>123720</b>		<b>Mammalian Genetics</b>			
Subject:	Catalog Nbr:				
GENE	0205				
2019 SPRG	Primary	Mary Handel		Mary_Ann.Handel@tufts.edu	
2019 SPRG	Secondary	Carol Bult		Carol.Bult@tufts.edu	
2019 SPRG	Secondary	Gregory Carter		Gregory.Carter@tufts.edu	
2019 SPRG	Secondary	Robert Burgess		Robert.Burgess@tufts.edu	
2019 SPRG	Secondary	Gareth Howell		Gareth.Howell@tufts.edu	
2019 SPRG	Secondary	Steven Munger		Steven.Munger@tufts.edu	
<p>The course reviews the genetic principles that apply to mammals, including genetic mechanisms of sex determination, genetic imprinting, and mitochondrial inheritance. Attention is focused on the ways in which mutation is manifested in disease phenotypes in humans, and the methodologies that are currently used to perform genetic analysis of mammals.</p>					

# Course Bulletin

123785	Medical & Experimental Mammalian Genetics			
Subject: GENE	Catalog Nbr: 0208			
2018 SUMR	Primary	Mary Handel		Mary_Ann.Handel@tufts.edu
2019 SUMR	Primary	Jennifer Trowbridge		Jennifer.Trowbridge@tufts.edu
2019 SUMR	Primary	Gareth Howell		Gareth.Howell@tufts.edu
<p>The course is an intensive, two-week immersion into mammalian genetics with presenters providing background and current research in important areas of mammalian genetics and its impact on health and disease. This course is offered at The Jackson Laboratory, Bar Harbor, ME. Students in the Mammalian Genetics Track have priority for this course; a limited number of slots are available for other Sackler students with permission from the Genetics program and the Dean's Office.</p>				

123914	Laboratory Rotations			
Subject: GENE	Catalog Nbr: 0234			
2019 FALL	Primary	Pamela Yelick		Pamela.Yelick@tufts.edu
<p>8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.</p>				

123936	Laboratory Rotations			
Subject: GENE	Catalog Nbr: 0235			
2019 SPRG	Primary	Pamela Yelick		Pamela.Yelick@tufts.edu
2019 SPRG	Primary	Gareth Howell		Gareth.Howell@tufts.edu
<p>8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.</p>				

123953	Laboratory Rotations			
Subject: GENE	Catalog Nbr: 0236			
Subject: GENE	Catalog Nbr: 0236			
2018 SUMR	Primary	Rajendra Kumar-Singh		Rajendra.Kumar-Singh@tufts.edu
2019 SUMR	Primary	Pamela Yelick		Pamela.Yelick@tufts.edu
2019 SUMR	Primary	Gareth Howell		Gareth.Howell@tufts.edu
<p>8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.</p>				

# Course Bulletin

<b>123972</b>	<b>Research Presentations</b>		
Subject: GENE	Catalog Nbr: 0289		
2019 FALL	Primary	Pamela Yelick	Pamela.Yelick@tufts.edu
Students present progress reports on their research for questions and constructive criticism as well as gain experience in presenting data and leading discussion.			

<b>123991</b>	<b>Research Presentations</b>		
Subject: GENE	Catalog Nbr: 0290		
2019 SPRG	Primary	Pamela Yelick	Pamela.Yelick@tufts.edu
Students present progress reports on their research for questions and constructive criticism as well as gain experience in presenting data and leading discussion.			

<b>124062</b>	<b>Graduate Seminar</b>		
Subject: GENE	Catalog Nbr: 0291		
2019 FALL	Primary	Pamela Yelick	Pamela.Yelick@tufts.edu
Visiting speakers from the Boston community and beyond present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.			

<b>124097</b>	<b>Graduate Seminar</b>		
Subject: GENE	Catalog Nbr: 0292		
2019 SPRG	Primary	Pamela Yelick	Pamela.Yelick@tufts.edu
Visiting speakers present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows. Fall and Spring.			

<b>124116</b>	<b>Special Topics in Genetics</b>		
Subject: GENE	Catalog Nbr: 0293		
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.			

<b>124144</b>	<b>Special Topics in Genetics</b>		
Subject: GENE	Catalog Nbr: 0294		
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.			

# Course Bulletin

<b>124194</b>	<b>Journal Club</b>			
Subject:	Catalog Nbr:			
GENE	0295			
2019 FALL	Primary	Karl Munger		Karl.Munger@tufts.edu
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.				

<b>124231</b>	<b>Journal Club</b>			
Subject:	Catalog Nbr:			
GENE	0296			
2019 SPRG	Primary	Karl Munger		Karl.Munger@tufts.edu
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.				

<b>124255</b>	<b>Graduate Research</b>			
Subject:	Catalog Nbr:			
GENE	0297			
These courses provide guided research on a topic suitable for a doctoral thesis.				

<b>124275</b>	<b>Graduate Research</b>			
Subject:	Catalog Nbr:			
GENE	0298			
These courses provide guided research on a topic suitable for a doctoral thesis.				

<b>124293</b>	<b>Graduate Research</b>			
Subject:	Catalog Nbr:			
GENE	0299			
2018 SUMR	Primary	Rajendra Kumar-Singh		Rajendra.Kumar-Singh@tufts.edu
2019 SUMR	Primary	Pamela Yelick		Pamela.Yelick@tufts.edu
These courses provide guided research on a topic suitable for a doctoral thesis.				

<b>124323</b>	<b>Masters Degree Only</b>			
Subject:	Catalog Nbr:			
GENE	0402			

# Course Bulletin

<b>124347</b>	<b>PhD Degree Only</b>		
Subject:	GENE	Catalog Nbr:	0403
Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.			

<b>124365</b>	<b>PhD Degree Only</b>		
Subject:	GENE	Catalog Nbr:	0404
Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.			

<b>124386</b>	<b>PhD Degree Only</b>		
Subject:	GENE	Catalog Nbr:	0405
Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.			

<b>124411</b>	<b>Systems Genetics</b>		
Subject:	GENE	Catalog Nbr:	0410
This one-week course covers computational and experimental approaches to genetic studies that utilize whole genome approaches. Individuals interested in statistical and computational methods as well as biological problems are welcome. Topics include genetic mapping, gene expression microarray analysis and computational modeling of complex systems. This course is offered at The Jackson Laboratory, Bar Harbor, ME. Students in the Mammalian Genetics Track have priority for this course; a limited number of slots are available for other Sackler students with permission from the program and the Dean's Office.			

<b>124436</b>	<b>Experimental Models of Human Cancer</b>		
Subject:	GENE	Catalog Nbr:	0450
	2018 SUMR	Primary	Gareth Howell Gareth.Howell@tufts.edu
	2019 SUMR	Primary	Mingyang Lu Mingyang.Lu@tufts.edu
This ten-day graduate-level genetics course is designed for individuals entering the field of mouse genetics. The course focuses on the mouse as an experimental tool in cancer research. This course is offered at The Jackson Laboratory, Bar Harbor, ME. Students in the Mammalian Genetics Track have priority for this course; a			



# Course Bulletin

limited number of slots are available for other Sackler students with permission from the Genetics program and the Dean's Office.

<b>124459</b>	<b>Mammalian Genetics I</b>
Subject: GENE	Catalog Nbr: 205A
The course reviews the genetic principles that apply to mammals, including genetic mechanisms of sex determination, genetic imprinting, and mitochondrial inheritance. Attention is focused on the ways in which mutation is manifested in disease phenotypes in humans.	

<b>124475</b>	<b>Mammalian Genetics II</b>
Subject: GENE	Catalog Nbr: 205B
The course explores the methodologies that are currently used to perform genetic analysis of mammals.	

<b>125165</b>	<b>Qualifying Exam</b>
Subject: MMB	Catalog Nbr: 0000
Students present and defend a proposal for research consisting of a statement of an original research problem in which a scientific question is asked and the experimental approach to answering the question is explained in a written proposal. The proposal is presented orally to the faculty.	

<b>125406</b>	<b>Host Pathogen Interface</b>
Subject: MMB	Catalog Nbr: 0210
2019 SPRG	Primary      Joan Meccas      joan.meccas@tufts.edu
The goal of this course is to critically read and evaluate the scientific literature on bacterial pathogens and host defenses, with particular but not exclusive emphasis on innate immune defenses. Students are required to read at least two papers per topic and discuss them in the group.	

<b>125430</b>	<b>Bacterial-Host Cell Interaction</b>
Subject: MMB	Catalog Nbr: 0211
2019 SPRG	Primary      Ralph Isberg      ralph.isberg@tufts.edu
The goal of this course is to critically read and evaluate the scientific literature on the cellular biology of bacterial pathogens, with particular emphasis on cultured cell models of microbial diseases. Students are required to read at least two papers per topic and discuss them in the group.	

# Course Bulletin

<b>125473</b>	<b>Animal Virology</b>			
Subject: MMB	Catalog Nbr: 0214			
Molecular aspects of viral replication and host-cell interactions are emphasized. Topics include virion structure; mechanisms of nucleic acid replication, transcription, and translation; virion assembly and release; genetics; mechanisms of transformation by oncogenic viruses; responses of the host to viral infection, tumor viruses and tumor cells; and mechanisms of persistent and slow virus infections. Prerequisites: a course in molecular biology or working knowledge of molecular techniques.				

<b>125598</b>	<b>Introduction to Infectious Diseases</b>			
Subject: MMB	Catalog Nbr: 0223			
2019 SUMR	Primary	Ralph Isberg	ralph.isberg@tufts.edu	
2019 SUMR	Primary	Linden Hu	linden.hu@tufts.edu	
2019 SUMR	Primary	Geneve Allison	Geneve.Allison@tufts.edu	
This course is comprised of three integrated components; a Medical Microbiology Tutorial designed to introduce students to pathogens and pathophysiology of infectious diseases, Infectious Diseases Problem-Based Learning designed to introduce students to clinical cases, and a Teaching Clinic designed to expose students to real clinical cases and treatment options.				

<b>125630</b>	<b>Laboratory Rotations</b>			
Subject: MMB	Catalog Nbr: 0234			
2019 FALL	Primary	Ekaterina Heldwein	Katya.Heldwein@tufts.edu	
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

<b>125651</b>	<b>Laboratory Rotations</b>			
Subject: MMB	Catalog Nbr: 0235			
2019 SPRG	Primary	Ekaterina Heldwein	Katya.Heldwein@tufts.edu	
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

<b>125665</b>	<b>Laboratory Rotations</b>			
Subject: MMB	Catalog Nbr: 0236			
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

# Course Bulletin

125685	Microbial Genetics & Microbiology				
Subject:	Catalog Nbr:				
MMB	0241				
2019 FALL	Primary	Andrew Camilli		andrew.camilli@tufts.edu	
2019 FALL	Secondary	Michael Malamy		michael.malamy@tufts.edu	
2019 FALL	Secondary	Claudette Gardel		Claudette.Gardel@tufts.edu	
<p>The goal of this course is to learn about the structure, growth, and genetics of bacteria and lambda bacteriophage. This course consists of text book reading, lectures and presentation and discussion of journal articles. Students are required to read one or two papers per topic and be prepared to discuss them in the group.</p>					

125712	Applied Ethics for Scientists				
Subject:	Catalog Nbr:				
MMB	0275				
2019 SPRG	Primary	Shumin Tan		Shumin.Tan@tufts.edu	
<p>This course is a discussion/seminar course that treats selected topics related to ethical behavior in scientific work. Topics covered include fraud, plagiarism, data selection and analysis, record keeping, animal welfare, personnel issues, genetic screening and gene therapy, and conflict of interest. Enrollment is restricted to third and fourth year graduate students.</p>					

125727	Graduate Seminar				
Subject:	Catalog Nbr:				
MMB	0291				
2019 FALL	Primary	Ekaterina Heldwein		Katya.Heldwein@tufts.edu	
<p>Visiting speakers present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.</p>					

125748	Graduate Seminar				
Subject:	Catalog Nbr:				
MMB	0292				
2019 SPRG	Primary	Ekaterina Heldwein		Katya.Heldwein@tufts.edu	
<p>Visiting speakers present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.</p>					

125769	Special Topics in Molecular Microbiology				
Subject:	Catalog Nbr:				
MMB	0293				
2018 FALL	Primary	Ekaterina Heldwein		Katya.Heldwein@tufts.edu	
2019 FALL	Primary	Ralph Isberg		ralph.isberg@tufts.edu	

# Course Bulletin

In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.

<b>125789</b>	<b>Special Topics in Molecular Microbiology</b>
Subject: MMB	Catalog Nbr: 0294
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.	

<b>125805</b>	<b>Journal Club</b>
Subject: MMB	Catalog Nbr: 0295
2019 FALL	Primary Ekaterina Heldwein
Katya.Heldwein@tufts.edu	
These courses provide in-depth study and discussion of specific topics involving the critical review of current literature in a small group format. Given by faculty and graduate students (years two through four) and attended by all program members.	

<b>125836</b>	<b>Journal Club</b>
Subject: MMB	Catalog Nbr: 0296
2019 SPRG	Primary Ekaterina Heldwein
Katya.Heldwein@tufts.edu	
These courses provide in-depth study and discussion of specific topics involving the critical review of current literature in a small group format. Given by faculty and graduate students (years two through four) and attended by all program members.	

<b>125856</b>	<b>Graduate Research</b>
Subject: MMB	Catalog Nbr: 0297
These courses provide guided research on a topic suitable for a doctoral thesis.	

<b>125868</b>	<b>Graduate Research</b>
Subject: MMB	Catalog Nbr: 0298
These courses provide guided research on a topic suitable for a doctoral thesis.	

<b>125887</b>	<b>Graduate Research</b>
Subject: MMB	Catalog Nbr: 0299

# Course Bulletin

2019 SUMR

Primary

Ekaterina Heldwein

Katya.Heldwein@tufts.edu

These courses provide guided research on a topic suitable for a doctoral thesis.

<b>125908</b>	<b>Masters Degree Only</b>
Subject: MMB	Catalog Nbr: 0402

<b>125927</b>	<b>PhD Degree Only</b>
Subject: MMB	Catalog Nbr: 0403
<p>Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.</p>	

<b>125955</b>	<b>PhD Degree Only</b>
Subject: MMB	Catalog Nbr: 0404
<p>Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.</p>	

<b>125976</b>	<b>PhD Degree Only</b>
Subject: MMB	Catalog Nbr: 0405
<p>Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.</p>	

<b>126450</b>	<b>Qualifying Exam</b>
Subject: IMM	Catalog Nbr: 0000
<p>Students present and defend a proposal for research consisting of a statement of an original research problem in which a scientific question is asked and the experimental approach to answering the question is explained in a written proposal. The proposal is presented orally to the faculty.</p>	

<b>126717</b>	<b>Introduction to Immunology</b>
Subject:	Catalog Nbr:

# Course Bulletin

IMM	0212			
	2018 FALL	Primary	John Iacomini	John.Iacomini@tufts.edu
	2019 FALL	Primary	Henry Wortis	henry.wortis@tufts.edu
	2019 FALL	Secondary	Peter Brodeur	peter.brodeur@tufts.edu
	2019 FALL	Secondary	Stephen Bunnell	Stephen.Bunnell@tufts.edu
	2019 FALL	Secondary	Pedram Hamrah	Pedram.Hamrah@tufts.edu
	2019 FALL	Secondary	Xudong Li	Xudong.Li@tufts.edu
	2019 FALL	Secondary	Shruti Sharma	Shruti.Sharma@tufts.edu
	2019 FALL	Secondary	Marta Rodriguez Garcia	Marta.Rodriguez_Garcia@tufts.edu
<p>This is a survey based on lectures, texts, problem-solving and small group tutorials. Topics include the cellular basis of innate and adaptive immune responses, the mechanism of antigen receptor gene rearrangement, principles of tissue transplantation and the genetic and mechanistic problems underlying autoimmune and hypersensitivity diseases.</p>				

<b>126797</b>	<b>Imm Mechs of Disease I</b>			
	Subject:	Catalog Nbr:		
	IMM	0215		
<p>The course covers the pathogenesis of major infectious diseases including current knowledge of immune responses and approaches to prevention, diagnosis and treatment. Current studies of autoimmunity, hypersensitivity, leukemia and lymphoma are also covered.</p>				

<b>126840</b>	<b>Immunological Mechanisms In Disease</b>			
	Subject:	Catalog Nbr:		
	IMM	0216		
	2019 SPRG	Primary	Mercio Perrin	mercio.perrin@tufts.edu
	2019 SPRG	Secondary	Andrew Camilli	andrew.camilli@tufts.edu
	2019 SPRG	Secondary	Edouard Vannier	edouard.vannier@tufts.edu
	2019 SPRG	Secondary	Alexander Poltorak	Alexander.Poltorak@tufts.edu
	2019 SPRG	Secondary	Athar Chishti	Athar.Chishti@tufts.edu
	2019 SPRG	Secondary	John Leong	John.Leong@tufts.edu
	2019 SPRG	Secondary	Jonathan Davis	Jonathan.Davis@tufts.edu
	2019 SPRG	Secondary	Parisa Kalantari	Parisa.Kalantari@tufts.edu
<p>The course covers the pathogenesis of major infectious diseases including current knowledge of immune responses and approaches to prevention, diagnosis and treatment. Current studies of autoimmunity, hypersensitivity, leukemia and lymphoma are also covered.</p>				

<b>126857</b>	<b>1st Year Journal Club</b>			
	Subject:	Catalog Nbr:		
	IMM	0217		
	2019 FALL	Primary	Henry Wortis	henry.wortis@tufts.edu
	2019 FALL	Secondary	Peter Brodeur	peter.brodeur@tufts.edu

# Course Bulletin

2019 FALL	Secondary	John Iacomini	John.Iacomini@tufts.edu
2019 FALL	Secondary	Xudong Li	Xudong.Li@tufts.edu
First-year students meet with the course director to discuss articles essential for an understanding of contemporary immunology. The development of analytic skills is emphasized.			

<b>127114</b>	<b>Scientific &amp; Grant Wtng</b>		
Subject: IMM	Catalog Nbr: 0233		
This course provides graduate students with the opportunity to develop the basic skills essential to the effective oral and written communication of scientific findings and research proposals. The course is a combination of lectures, writing assignments, and oral communication practice sessions with feedback provided by the faculty.			

<b>127136</b>	<b>Laboratory Rotations</b>		
Subject: IMM	Catalog Nbr: 0234		
2019 FALL	Primary	Alexander Poltorak	Alexander.Poltorak@tufts.edu
2019 FALL	Primary	Honorine Ward	honorine.ward@tufts.edu
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.			

<b>127165</b>	<b>Laboratory Rotations</b>		
Subject: IMM	Catalog Nbr: 0235		
2019 SPRG	Primary	Henry Wortis	henry.wortis@tufts.edu
2019 SPRG	Primary	Honorine Ward	honorine.ward@tufts.edu
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.			

<b>127179</b>	<b>Laboratory Rotations</b>		
Subject: IMM	Catalog Nbr: 0236		
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.			

<b>127217</b>	<b>Research Presentations</b>		
Subject: IMM	Catalog Nbr: 0289		
2019 FALL	Primary	Honorine Ward	honorine.ward@tufts.edu

# Course Bulletin

Students present progress reports on their research for questions and constructive criticism as well as gain experience in presenting data and leading discussion.

<b>127238</b>	<b>Research Presentations</b>
Subject: IMM	Catalog Nbr: 0290
2019 SPRG	Primary Honorine Ward honorine.ward@tufts.edu
Students present progress reports on their research for questions and constructive criticism as well as gain experience in presenting data and leading discussion.	

<b>127260</b>	<b>Graduate Seminar</b>
Subject: IMM	Catalog Nbr: 0291
2019 FALL	Primary Honorine Ward honorine.ward@tufts.edu
Visiting speakers present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.	

<b>127291</b>	<b>Graduate Seminar</b>
Subject: IMM	Catalog Nbr: 0292
2019 SPRG	Primary Honorine Ward honorine.ward@tufts.edu
Visiting speakers present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.	

<b>127310</b>	<b>Special Topics in Immunology</b>
Subject: IMM	Catalog Nbr: 0293
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.	

<b>127329</b>	<b>Special Topics in Immunology</b>
Subject: IMM	Catalog Nbr: 0294
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.	

<b>127347</b>	<b>Journal Club</b>
Subject:	Catalog Nbr:



# Course Bulletin

IMM	0295				
	2019 FALL	Primary	Stephen Bunnell	Stephen.Bunnell@tufts.edu	
Students in the research portion of their training meet to present and discuss recent papers of importance.					

<b>127367</b>	<b>Journal Club</b>				
	Subject:	Catalog Nbr:			
	IMM	0296			
	2019 SPRG	Primary	Stephen Bunnell	Stephen.Bunnell@tufts.edu	
Students in the research portion of their training meet to present and discuss recent papers of importance.					

<b>127391</b>	<b>Graduate Research</b>				
	Subject:	Catalog Nbr:			
	IMM	0297			
These courses provide guided research on a topic suitable for a doctoral thesis.					

<b>127403</b>	<b>Graduate Research</b>				
	Subject:	Catalog Nbr:			
	IMM	0298			
These courses provide guided research on a topic suitable for a doctoral thesis.					

<b>127430</b>	<b>Graduate Research</b>				
	Subject:	Catalog Nbr:			
	IMM	0299			
	2018 SUMR	Primary	Henry Wortis	henry.wortis@tufts.edu	
	2019 SUMR	Primary	Alexander Poltorak	Alexander.Poltorak@tufts.edu	
	2019 SUMR	Primary	Honorine Ward	honorine.ward@tufts.edu	
These courses provide guided research on a topic suitable for a doctoral thesis.					

<b>127436</b>	<b>Qualifying Exam</b>				
	Subject:	Catalog Nbr:			
	NRSC	0000			
Students present and defend a proposal for research consisting of a statement of an original research problem in which a scientific question is asked and the experimental approach to answering the question is explained in a written proposal. The proposal is presented orally to the faculty.					

<b>127448</b>	<b>Masters Degree Only</b>				
	Subject:	Catalog Nbr:			
	IMM	0402			

# Course Bulletin

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<b>127451</b>	<b>Cellular and Molecular Tutorials in Neuroscience</b>			
Subject:	Catalog Nbr:			
NRSC	0200			
2018 FALL	Secondary	Daniel Cox	dan.cox@tufts.edu	
2018 FALL	Secondary	Yongjie Yang	Yongjie.Yang@tufts.edu	
2018 FALL	Secondary	Thomas Biederer	Thomas.Biederer@tufts.edu	
2019 FALL	Primary	Christopher Dulla	Chris.Dulla@tufts.edu	
2019 FALL	Secondary	Michele Jacob	michele.jacob@tufts.edu	
2019 FALL	Secondary	Peter Juo	Peter.Juo@tufts.edu	
2019 FALL	Secondary	Gerard Reijmers	Leon.Reijmers@tufts.edu	
2019 FALL	Secondary	Jamie Maguire	Jamie.Maguire@tufts.edu	
2019 FALL	Secondary	Dong Kong	Dong.Kong@tufts.edu	
<p>These small group tutorial sessions will introduce students to key principles in cellular and molecular neuroscience, provide students with the historical context in which key advances have been made, and engage students and faculty in informal, one-on-one discussions to deepen understanding of the material.</p>				

<b>127475</b>	<b>PhD Degree Only</b>			
Subject:	Catalog Nbr:			
IMM	0403			
<p>Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.</p>				

<b>127491</b>	<b>PhD Degree Only</b>			
Subject:	Catalog Nbr:			
IMM	0404			
<p>Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.</p>				

<b>127512</b>	<b>Developmental Neurobiology</b>			
Subject:	Catalog Nbr:			
NRSC	0205			
<p>This is a small group, interactive course exploring the mechanisms underlying the formation of the differentiated nervous system. Morphological, biochemical, immunological, and molecular approaches are examined, with an emphasis on the utility of experimental model systems.</p>				

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<b>127521</b>	<b>PhD Degree Only</b>
Subject: IMM	Catalog Nbr: 0405
Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is automatically awarded upon completion of the thesis.	

<b>127621</b>	<b>Systems Neuroscience</b>		
Subject: NRSC	Catalog Nbr: 0310		
2019 SPRG	Primary	Maribel Rios	Maribel.Rios@tufts.edu
2019 SPRG	Primary	Giuseppina Tesco	Giuseppina.Tesco@tufts.edu
2019 SPRG	Secondary	Daniel Jay	daniel.jay@tufts.edu
2019 SPRG	Secondary	Bryan Ho	Bryan.Ho@tufts.edu
2019 SPRG	Secondary	Beverly Rubin	beverly.rubin@tufts.edu
2019 SPRG	Secondary	Daniel Cox	dan.cox@tufts.edu
2019 SPRG	Secondary	Paul Abourjaily	Paul.Abourjaily@tufts.edu
2019 SPRG	Secondary	Gerard Reijmers	Leon.Reijmers@tufts.edu
2019 SPRG	Secondary	Jamie Maguire	Jamie.Maguire@tufts.edu
2019 SPRG	Secondary	Christopher Dulla	Chris.Dulla@tufts.edu
2019 SPRG	Secondary	Yongjie Yang	Yongjie.Yang@tufts.edu
2019 SPRG	Secondary	Josh Katz	No Email on file.
2019 SPRG	Secondary	Ron Riesenburger	No Email on file.
2019 SPRG	Secondary	Lester Leung	Lester.Leung@tufts.edu
2019 SPRG	Secondary	David Weinberg	david.weinberg@tufts.edu
2019 SPRG	Secondary	Eric Dinnerstein	Eric.Dinnerstein@tufts.edu
This course, a cross-listing with Tufts University School of Medicine, focuses on the structural and functional organization of the integrated nervous system with significant exposure to neurological disease processes.			

<b>127641</b>	<b>Synapse Neurobiology</b>		
Subject: NRSC	Catalog Nbr: 0213		
2018 FALL	Primary	Michele Jacob	michele.jacob@tufts.edu
2018 FALL	Primary	Gerard Reijmers	Leon.Reijmers@tufts.edu
2018 FALL	Secondary	Daniel Cox	dan.cox@tufts.edu
2018 FALL	Secondary	Peter Juo	Peter.Juo@tufts.edu
2018 FALL	Secondary	Jamie Maguire	Jamie.Maguire@tufts.edu
2018 FALL	Secondary	Christopher Dulla	Chris.Dulla@tufts.edu
2018 FALL	Secondary	Yongjie Yang	Yongjie.Yang@tufts.edu
2018 FALL	Secondary	Thomas Biederer	Thomas.Biederer@tufts.edu
This small group discussion course provides students with an in-depth understanding of how synapses function, how activity modulates function, and how synaptic ensembles coordinate simple behaviors.			

# Course Bulletin

<b>127741</b>	<b>Scientific Communication and Writing Principles</b>			
Subject:	Catalog Nbr:			
NRSC	0220			
2019 FALL	Primary	Paul Davies		Paul.Davies@tufts.edu
A discussion and workshop-style course underscoring the fundamental principles underlying expository writing. This course centers on the improvement of each student's existing skills through interactive writing exercises. Enrollment is limited to 10 students.				

<b>127752</b>	<b>Neuroscience Laboratory Techniques</b>			
Subject:	Catalog Nbr:			
NRSC	0233			
2018 FALL	Secondary	Alenka Lovy		Alenka.Lovy@tufts.edu
2019 FALL	Primary	Jamie Maguire		Jamie.Maguire@tufts.edu
2019 FALL	Secondary	Selene Lomoio		Selene.Lomoio@tufts.edu
The series of workshops exposes student to fundamental laboratory techniques, including tissue culture, genotyping, microscopy, immunohistochemistry, rodent handling, protein quantification, and experimental design. Restricted to first-year Neuroscience students.				

<b>127776</b>	<b>Laboratory Rotation</b>			
Subject:	Catalog Nbr:			
NRSC	0234			
2019 FALL	Primary	Thomas Biederer		Thomas.Biederer@tufts.edu
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

<b>127803</b>	<b>Laboratory Rotations</b>			
Subject:	Catalog Nbr:			
NRSC	0235			
2019 SPRG	Primary	Thomas Biederer		Thomas.Biederer@tufts.edu
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

<b>127822</b>	<b>Laboratory Rotation</b>			
Subject:	Catalog Nbr:			
NRSC	0236			
Subject:	Catalog Nbr:			
NRSC	0236			
2019 SUMR	Primary	Thomas Biederer		Thomas.Biederer@tufts.edu
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental				

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design and theoretical aspects of the diverse research problems under investigation in various laboratories.

<b>127830</b>		<b>Biochemical Foundations in Neuroscience</b>			
Subject:	Catalog Nbr:				
NRSC	0251				
2018 FALL	Secondary	Kurtz Paulson		eric.paulson@tufts.edu	
2018 FALL	Secondary	Daniel Cox		dan.cox@tufts.edu	
2018 FALL	Secondary	James Munro		James.Munro@tufts.edu	
2019 FALL	Primary	Thomas Biederer		Thomas.Biederer@tufts.edu	
2019 FALL	Secondary	James Baleja		jim.baleja@tufts.edu	
2019 FALL	Secondary	Peter Bullock		peter.bullock@tufts.edu	
2019 FALL	Secondary	Larry Feig		larry.feig@tufts.edu	
2019 FALL	Secondary	Brian Schaffhausen		brian.schaffhausen@tufts.edu	
2019 FALL	Secondary	William Bachovchin		william.bachovchin@tufts.edu	
2019 FALL	Secondary	Michael Forgac		michael.forgac@tufts.edu	
2019 FALL	Secondary	Albert Tai		albert.tai@tufts.edu	
2019 FALL	Secondary	Alex Bohm		Andrew.Bohm@tufts.edu	
2019 FALL	Secondary	Peter Juo		Peter.Juo@tufts.edu	
2019 FALL	Secondary	Alexei Degterev		Alexei.Degterev@tufts.edu	
2019 FALL	Secondary	Stephen Moss		Stephen.Moss@tufts.edu	
2019 FALL	Secondary	Gerard Reijmers		Leon.Reijmers@tufts.edu	
2019 FALL	Secondary	Yongjie Yang		Yongjie.Yang@tufts.edu	
2019 FALL	Secondary	Marta Gaglia		Marta.Gaglia@tufts.edu	
<p>This course covers fundamental biochemical principles, with special emphasis on mechanisms of particular importance to nervous system function, including neural signaling and non-equilibrium processes. Students will also be exposed to quantitative molecular approaches to studying the nervous system.</p>					

<b>127868</b>		<b>Neurogenetics</b>			
Subject:	Catalog Nbr:				
NRSC	0263				
<p>The course reviews principles of forward and reverse genetics, presents several animal model systems that are employed in neurogenetics research, and provides examples of genetic approaches that are used to study the molecules and neural circuits that regulate distinct neurobiological processes or are known to be altered in neurological disease states.</p>					

<b>127898</b>		<b>Research Presentations</b>			
Subject:	Catalog Nbr:				
NRSC	0289				
2019 FALL	Primary	Michele Jacob		michele.jacob@tufts.edu	
<p>Students present progress reports on their research for questions and constructive criticism as well as gain experience in presenting data and leading discussion.</p>					

# Course Bulletin

<b>127942</b>	<b>Research Presentations</b>			
Subject:	Catalog Nbr:			
NRSC	0290			
2019 SPRG	Primary	Michele Jacob		michele.jacob@tufts.edu
Students present progress reports on their research for questions and constructive criticism as well as gain experience in presenting data and leading discussion.				

<b>127981</b>	<b>Graduate Seminar</b>			
Subject:	Catalog Nbr:			
NRSC	0291			
2019 FALL	Primary	Michele Jacob		michele.jacob@tufts.edu
2019 FALL	Primary	Thomas Biederer		Thomas.Biederer@tufts.edu
Visiting speakers present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.				

<b>128024</b>	<b>Graduate Seminar</b>			
Subject:	Catalog Nbr:			
NRSC	0292			
2019 SPRG	Primary	Michele Jacob		michele.jacob@tufts.edu
2019 SPRG	Primary	Thomas Biederer		Thomas.Biederer@tufts.edu
Visiting speakers present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.				

<b>128062</b>	<b>Special Topics in Neuroscience</b>			
Subject:	Catalog Nbr:			
NRSC	0293			
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.				

<b>128101</b>	<b>Special Topics in Neuroscience</b>			
Subject:	Catalog Nbr:			
NRSC	0294			
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.				

<b>128157</b>	<b>Journal Club</b>			
Subject:	Catalog Nbr:			

# Course Bulletin

NRSC	0295				
	2019 FALL	Primary	Thomas Biederer	Thomas.Biederer@tufts.edu	
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.					

<b>128193</b>	<b>Journal Club</b>				
	Subject:	Catalog Nbr:			
	NRSC	0296			
	2019 SPRG	Primary	Thomas Biederer	Thomas.Biederer@tufts.edu	
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.					

<b>128216</b>	<b>Graduate Research</b>				
	Subject:	Catalog Nbr:			
	NRSC	0297			
These courses provide guided research on a topic suitable for a doctoral thesis.					

<b>128237</b>	<b>Graduate Research</b>				
	Subject:	Catalog Nbr:			
	NRSC	0298			
	2019 SPRG	Primary	Thomas Biederer	Thomas.Biederer@tufts.edu	
These courses provide guided research on a topic suitable for a doctoral thesis.					

<b>128248</b>	<b>Graduate Research</b>				
	Subject:	Catalog Nbr:			
	NRSC	0299			
	2019 SUMR	Primary	Thomas Biederer	Thomas.Biederer@tufts.edu	
These courses provide guided research on a topic suitable for a doctoral thesis.					

<b>128272</b>	<b>Masters Degree Only</b>				
	Subject:	Catalog Nbr:			
	NRSC	0402			

<b>128290</b>	<b>PhD Degree Only</b>				
	Subject:	Catalog Nbr:			
	NRSC	0403			
Students enroll in this course when they receive permission to write and defend their theses from their thesis					

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committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is awarded upon completion of the thesis.

<b>128311</b>	<b>PhD Degree Only</b>		
Subject: NRSC	Catalog Nbr: 0404		
Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is awarded upon completion of the thesis.			

<b>128330</b>	<b>PhD Degree Only</b>		
Subject: NRSC	Catalog Nbr: 0405		
Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is awarded upon completion of the thesis.			

<b>128378</b>	<b>Biochemical Foundations in Neuroscience Receptor/Channel Mechanisms</b>			
Subject: NRSC	Catalog Nbr: 251B			
2019 FALL	Primary	Thomas Biederer	Thomas.Biederer@tufts.edu	
2019 FALL	Secondary	Larry Feig	larry.feig@tufts.edu	
2019 FALL	Secondary	Daniel Cox	dan.cox@tufts.edu	
2019 FALL	Secondary	Peter Juo	Peter.Juo@tufts.edu	
2019 FALL	Secondary	Stephen Moss	Stephen.Moss@tufts.edu	
2019 FALL	Secondary	Gerard Reijmers	Leon.Reijmers@tufts.edu	
2019 FALL	Secondary	Yongjie Yang	Yongjie.Yang@tufts.edu	
This course is the middle section of the Biochemical Foundations in Neuroscience course, focusing predominantly on mechanisms of enzyme, receptor, and channel function in the nervous system.				

<b>130459</b>	<b>Clinical Implications of Basic Research</b>			
Subject: SKMD	Catalog Nbr: 0210			
2019 SPRG	Primary	James Schwob	jim.schwob@tufts.edu	
This journal club course for MD/PhD students is organized around the "Clinical Implications of Basic Research" column published in the New England Journal of Medicine. Students read a primary paper(s) highlighted in the column or one that is similar to those highlighted and discuss the work. The primary goal of this required course, which meets for one hour every other week, is to encourage and teach students to continually ask how basic research can impact clinical medicine. The format also encourages students to sharpen their communication skills in a relaxed atmosphere.				



# Course Bulletin

<b>136161</b>	<b>Structural Biology</b>			
Subject:	Catalog Nbr:			
SK	0202			
2018 SUMR	Primary	James Baleja	jim.baleja@tufts.edu	
2018 SUMR	Primary	Alex Bohm	Andrew.Bohm@tufts.edu	
This course covers the basic theory and practice of Macromolecular Crystallography and NMR				

<b>136175</b>	<b>Tissue Engineering</b>			
Subject:	Catalog Nbr:			
SK	0203			
This course covers Stem Cell Biology and Tissue Scaffolds, the Principles of Bioreactor Design and Integrative Approaches to Tissue Engineering.				

<b>136203</b>	<b>Imaging Techniques</b>			
Subject:	Catalog Nbr:			
SK	0204			
This course covers Light Microscopy/Immunofluorescence, Confocal Microscopy and Electron Microscopy. Computer-based image analysis is incorporated into these modules. The samples generated during the Tissue Engineering module are used.				

<b>136219</b>	<b>Mentored Undergrad Teaching</b>			
Subject:	Catalog Nbr:			
SK	0205			
This course offers an opportunity for Sackler students to obtain mentored teaching experience. Each Sackler student collaborates with a TUSM and a Friedman student to develop a syllabus and three lectures on one of five disease topics (osteoporosis, breast cancer, asthma, metabolic syndrome, heart disease). Lectures are delivered to undergraduate Biology majors at Pine Manor College, Chestnut Hill, MA. Prerequisites: Year 3 or above.				

<b>136275</b>	<b>Applied Ethics for Scientists</b>			
Subject:	Catalog Nbr:			
SK	0275			
2019 FALL	Primary	Jamie Maguire	Jamie.Maguire@tufts.edu	
2019 FALL	Secondary	Daniel Jay	daniel.jay@tufts.edu	
2019 FALL	Secondary	Henry Wortis	henry.wortis@tufts.edu	
2019 FALL	Secondary	Alex Bohm	Andrew.Bohm@tufts.edu	
2019 FALL	Secondary	Lara Sloboda	Lara.Sloboda@tufts.edu	
2019 FALL	Secondary	Najla Fiaturi	Najla.Fiaturi@tufts.edu	

# Course Bulletin

2019 FALL	Secondary	Marta Gaglia	Marta.Gaglia@tufts.edu
2019 FALL	Secondary	Malavika Raman	Malavika.Raman@tufts.edu
2019 FALL	Secondary	Shumin Tan	Shumin.Tan@tufts.edu

The course is built around case study reading material and requires highly interactive discussion in which students analyze specific scenarios of ethical issues encountered in a research environment. Topics include: academic integrity issues/ fraud and misconduct/plagiarism/ data handling/notebooks, mentoring and conflict resolution and ethical use of animals and human subjects.

<b>136292</b>	<b>Biomedical Techniques &amp; Research</b>			
Subject:	Catalog Nbr:			
SK	0299			
2018 FALL	Primary	Alexei Degterev	Alexei.Degterev@tufts.edu	
2018 SUMR	Primary	Karl Munger	Karl.Munger@tufts.edu	
2019 FALL	Primary	Brian Schaffhausen	brian.schaffhausen@tufts.edu	
2019 FALL	Primary	Maria Alcaide Alonso	Pilar.Alcaide@tufts.edu	
2019 SPRG	Primary	Alex Bohm	Andrew.Bohm@tufts.edu	
2019 SPRG	Primary	Honorine Ward	honorine.ward@tufts.edu	
2019 SPRG	Primary	Marta Gaglia	Marta.Gaglia@tufts.edu	
2019 SPRG	Primary	Caroline Genco	Caroline.Genco@tufts.edu	
This course includes research with selected advisor. Visiting Students Only.				

<b>136304</b>	<b>Clinical Implications of Basic Research</b>			
Subject:	Catalog Nbr:			
SKMD	0209			
2019 FALL	Primary	James Schwob	jim.schwob@tufts.edu	
This journal club course for MD/PhD students is organized around the "Clinical Implications of Basic Research" column published in the New England Journal of Medicine. Students read a primary paper(s) and discuss the work. The primary goal of this required course, is to encourage and teach students to continually ask how basic research can impact clinical medicine. The format also encourages students to sharpen their communication skills in a relaxed atmosphere.				

<b>136336</b>	<b>Laboratory Rotations</b>			
Subject:	Catalog Nbr:			
SKMD	0299			
2018 SUMR	Primary	Daniel Jay	daniel.jay@tufts.edu	
6-8 week laboratory rotations are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

<b>137576</b>	<b>Qualifying Exam</b>			
Subject:	Catalog Nbr:			

# Course Bulletin

PPET 0000

Students present and defend a proposal for research consisting of a statement of an original research problem in which a scientific question is asked and the experimental approach to answering the question is explained in a written proposal. The proposal is presented orally to the faculty.

137616	Translational Pharmacology I			
Subject: PPET	Catalog Nbr: 0211			
2019 FALL	Primary	Najla Fiaturi	Najla.Fiaturi@tufts.edu	
2019 FALL	Secondary	David Greenblatt	dj.greenblatt@tufts.edu	
2019 FALL	Secondary	Margery Beinfeld	margery.beinfeld@tufts.edu	
2019 FALL	Secondary	Richard Shader	richard.shader@tufts.edu	
2019 FALL	Secondary	Michael Forgac	michael.forgac@tufts.edu	
2019 FALL	Secondary	Jerold Harmatz	jerold.harmatz@tufts.edu	
2019 FALL	Secondary	Karina Meiri	karina.meiri@tufts.edu	
2019 FALL	Secondary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
2019 FALL	Secondary	Alexei Degterev	Alexei.Degterev@tufts.edu	
2019 FALL	Secondary	Paul Abourjaily	Paul.Abourjaily@tufts.edu	
<p>This course is a survey of some of the major classes of drugs, with particular emphasis on mechanisms of action and relevant organ systems and cellular physiology. Students are introduced to the central concepts, models and techniques in pharmacology.</p>				

137629	Clinical Pharmacology			
Subject: PPET	Catalog Nbr: 0212			
<p>This course is devoted to the discussion and presentation of therapeutic topics and the basic principles of therapeutic pharmacology. Subjects that are highlighted include: therapeutic drug monitoring, evaluation of side effects and toxicity, critical evaluation of clinical trial data, pharmacokinetic design of dose regimens, drugs in special populations and medical and legal issues in clinical pharmacology. A mixture of lecture, readings and clinical case-oriented problem-solving is used. Extensive independent study and reading is required.</p>				

137645	Addiction Medicine			
Subject: PPET	Catalog Nbr: 0213			
2019 SPRG	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
<p>This course is offered in conjunction with the Medical School. It provides an overview of the mechanisms of action of drugs of abuse and their treatment, as well as the fundamentals of treatment of addiction in clinical practice.</p>				

# Course Bulletin

<b>137683</b>	<b>Principles of Immunopharmacology</b>			
Subject:	PPET	Catalog Nbr:	0218	
This course investigates the appraisal of molecular mechanisms by which drugs can affect cellular processes underlying clinical syndromes such as hypersensitivity, rejection, autoimmunity and neuroimmune disorders. Emphasis is placed on select cases of how certain compounds were chosen for drug development and why many such promising drugs failed.				

<b>137698</b>	<b>Behavioral Pharmacology</b>			
Subject:	PPET	Catalog Nbr:	0219	
This course is an in-depth examination of the mechanisms by which selected psychoactive agents alter mood and behavior with emphasis on the role of neurotransmitters and their receptors.				

<b>137710</b>	<b>Advances in Neurochem</b>			
Subject:	PPET	Catalog Nbr:	0220	
This course focuses on the problem-based approach to the actions of neurotransmitters and neuromodulators and related drugs at the molecular and cellular level.				

<b>137724</b>	<b>Pharmacokinetics in Biological Systems</b>			
Subject:	PPET	Catalog Nbr:	0221	
	2019 FALL	Primary	David Greenblatt	dj.greenblatt@tufts.edu
	2019 FALL	Secondary	Jerold Harmatz	jerold.harmatz@tufts.edu
This course focuses on the uptake and clearance of drugs, using problem-solving exercises and computer modeling to analyze data from original experiments				

<b>137735</b>	<b>Toxicology</b>			
Subject:	PPET	Catalog Nbr:	0222	
This course is an in-depth examination of the basic principles of toxicology based on discussion and presentation of selected examples. Subjects considered include apoptosis/necrosis, molecular mechanisms of neurotoxicities, species difference in toxicities, and chemical mutagenesis.				

<b>137756</b>	<b>Neuropeptides</b>			
Subject:	PPET	Catalog Nbr:	0224	
This course entails detailed reading and critical review of the classical and modern literature on the discovery,				

# Course Bulletin

chemistry, anatomical distribution, biosynthesis, physiology, pharmacology and current and possible future clinical uses of neuropeptides.

<b>137777</b>	<b>Introduction to Drug Metabolism</b>			
Subject:	Catalog Nbr:			
PPET	0225			
This is a readings and presentation course designed to illustrate the processes involved with drug metabolism, to describe the non-drug (non-substrate) factors influencing drug metabolism, and to review and critique methods used for the study of drug metabolism.				

<b>137850</b>	<b>Translational Pharmacology II</b>			
Subject:	Catalog Nbr:			
PPET	0232			
2019 SPRG	Primary	Najla Fiaturi	Najla.Fiaturi@tufts.edu	
2019 SPRG	Secondary	Theoharis Theoharides	theoharis.theoharides@tufts.edu	
2019 SPRG	Secondary	John Castellot	john.castellot@tufts.edu	
2019 SPRG	Secondary	Margery Beinfeld	margery.beinfeld@tufts.edu	
2019 SPRG	Secondary	Hao Chen	Howard.Chen@tufts.edu	
2019 SPRG	Secondary	Gerard Reijmers	Leon.Reijmers@tufts.edu	
2019 SPRG	Secondary	Athar Chishti	Athar.Chishti@tufts.edu	
2019 SPRG	Secondary	Jonathan Davis	Jonathan.Davis@tufts.edu	
2019 SPRG	Secondary	Robert Blanton Jr.	Robert.Blanton@tufts.edu	
2019 SPRG	Secondary	Tine Vindenes	Tine.Vindenes@tufts.edu	
This course continues with the topics covered in Translational Pharmacology I. It covers major classes of drugs and the concepts, models and techniques in pharmacology.				

<b>137860</b>	<b>Scientific Writing and Presentation Skills</b>			
Subject:	Catalog Nbr:			
PPET	0233			
2019 FALL	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
2019 FALL	Secondary	David Greenblatt	dj.greenblatt@tufts.edu	
This course provides graduate students with the opportunity to develop the basic skills essential to the effective oral and written communication of scientific findings and research proposals. The course is a combination of lectures, writing assignments, and oral communication practice sessions.				

<b>137871</b>	<b>Laboratory Rotations</b>			
Subject:	Catalog Nbr:			
PPET	0234			
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

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<b>137881</b>	<b>Laboratory Rotations</b>
Subject: PPET	Catalog Nbr: 0235
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.	

<b>137889</b>	<b>Laboratory Rotations</b>
Subject: PPET	Catalog Nbr: 0236
8-10 week laboratory rotations for first-year students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.	

<b>137918</b>	<b>Graduate Seminar</b>
Subject: PPET	Catalog Nbr: 0291
2019 FALL	Primary Emmanuel Pothos <a href="mailto:emmanuel.pothos@tufts.edu">emmanuel.pothos@tufts.edu</a>
Visiting speakers present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.	

<b>137928</b>	<b>Graduate Seminar</b>
Subject: PPET	Catalog Nbr: 0292
2019 SPRG	Primary Brent Cochran <a href="mailto:brent.cochran@tufts.edu">brent.cochran@tufts.edu</a>
2019 SPRG	Primary Amy Yee <a href="mailto:amy.yee@tufts.edu">amy.yee@tufts.edu</a>
2019 SPRG	Primary Alexei Degterev <a href="mailto:Alexei.Degterev@tufts.edu">Alexei.Degterev@tufts.edu</a>
Visiting speakers present their scientific research to all members of the program, including faculty, students, and post-doctoral fellows.	

<b>137939</b>	<b>Special Topics in Pharmacology</b>
Subject: PPET	Catalog Nbr: 0293
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.	

<b>137959</b>	<b>Special Topics in Pharmacology</b>
Subject: PPET	Catalog Nbr: 0294

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In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.

<b>137978</b>	<b>Journal Club</b>			
Subject:	Catalog Nbr:			
PPET	0295			
2019 FALL	Primary	Najla Fiaturi	Najla.Fiaturi@tufts.edu	
2019 FALL	Secondary	Jerold Harmatz	jerold.harmatz@tufts.edu	
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.				

<b>137989</b>	<b>Journal Club</b>			
Subject:	Catalog Nbr:			
PPET	0296			
2019 SPRG	Primary	Najla Fiaturi	Najla.Fiaturi@tufts.edu	
2019 SPRG	Secondary	Jerold Harmatz	jerold.harmatz@tufts.edu	
2019 SPRG	Secondary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
Students select articles from the current literature, analyze their significance, and present them for discussion in a seminar group.				

<b>138000</b>	<b>Graduate Research</b>			
Subject:	Catalog Nbr:			
PPET	0297			
2019 FALL	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
These courses provide guided research on a topic suitable for a doctoral thesis.				

<b>138007</b>	<b>Graduate Research</b>			
Subject:	Catalog Nbr:			
PPET	0298			
2019 SPRG	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
These courses provide guided research on a topic suitable for a doctoral thesis.				

<b>138017</b>	<b>Graduate Research</b>			
Subject:	Catalog Nbr:			
PPET	0299			
2019 SUMR	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
These courses provide guided research on a topic suitable for a doctoral thesis.				

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<b>138026</b>	<b>Masters Degree Only</b>		
	Subject:	Catalog Nbr:	
	PPET	0402	

<b>138033</b>	<b>PhD Degree Only</b>		
	Subject:	Catalog Nbr:	
	PPET	0403	
<p>Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is awarded upon completion of the thesis.</p>			

<b>138043</b>	<b>PhD Degree Only</b>		
	Subject:	Catalog Nbr:	
	PPET	0404	
<p>Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is awarded upon completion of the thesis.</p>			

<b>138052</b>	<b>PhD Degree Only</b>		
	Subject:	Catalog Nbr:	
	PPET	0405	
<p>Students enroll in this course when they receive permission to write and defend their theses from their thesis committees. This course represents the effort in the final preparation of the doctoral thesis. A grade of "S" is awarded upon completion of the thesis.</p>			

<b>138644</b>	<b>Transfer Credit</b>		
	Subject:	Catalog Nbr:	
	TRAN	9999	

<b>138797</b>	<b>Tutorial in Neural Systems and Disease Mechanisms</b>			
	Subject:	Catalog Nbr:		
	NRSC	0312		
	2019 SPRG	Primary	Maribel Rios	Maribel.Rios@tufts.edu
	2019 SPRG	Primary	Giuseppina Tesco	Giuseppina.Tesco@tufts.edu
	2019 SPRG	Secondary	Larry Feig	larry.feig@tufts.edu
	2019 SPRG	Secondary	Michele Jacob	michele.jacob@tufts.edu
	2019 SPRG	Secondary	F Jackson	rob.jackson@tufts.edu



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2019 SPRG	Secondary	Klaus Miczek	klaus.miczek@tufts.edu
2019 SPRG	Secondary	Gerard Reijmers	Leon.Reijmers@tufts.edu
2019 SPRG	Secondary	Jamie Maguire	Jamie.Maguire@tufts.edu
2019 SPRG	Secondary	Christopher Dulla	Chris.Dulla@tufts.edu
2019 SPRG	Secondary	Yongjie Yang	Yongjie.Yang@tufts.edu
2019 SPRG	Secondary	Dong Kong	Dong.Kong@tufts.edu

This tutorial is designed as a companion course to NRSC 0310, in order to expand students' understanding of research approaches to common neurological diseases. In preparation for each discussion, students will read historical and recent publications relevant to the class topic, followed by critical discussions of past research advances made and future approaches that might prove most effective in translational research efforts.

<b>139088</b>	<b>Advanced Cellular Immunology</b>			
Subject:	Catalog Nbr:			
IMM	0245			
2019 FALL	Primary	Henry Wortis	henry.wortis@tufts.edu	
2019 FALL	Secondary	Stephen Bunnell	Stephen.Bunnell@tufts.edu	
2019 FALL	Secondary	Alexander Poltorak	Alexander.Poltorak@tufts.edu	
2019 FALL	Secondary	Cheryl London	Cheryl.London@tufts.edu	
2019 FALL	Secondary	Maria Alcaide Alonso	Pilar.Alcaide@tufts.edu	
2019 FALL	Secondary	Xudong Li	Xudong.Li@tufts.edu	
2019 FALL	Secondary	Shruti Sharma	Shruti.Sharma@tufts.edu	
<p>This course is designed to give students a solid background in contemporary Cellular Immunology. The course will be based on a lecture series supplemented by extensive readings from the current literature. Thirty minutes of each course is dedicated to discuss the assigned reading material, which is two papers per lecture. Prerequisite: IMM 0212 or equivalent.</p>				

<b>139091</b>	<b>System Approaches to Immunology</b>			
Subject:	Catalog Nbr:			
IMM	0252			
2019 SPRG	Primary	Alexander Poltorak	Alexander.Poltorak@tufts.edu	
<p>The course introduces mouse as the main model for studies of human biology. It starts with the mouse genetics, continues with classical genetic analysis in the mouse, and moves to genetic basis of immunological phenomena such as receptor editing, B-cell tolerance and autoimmunity. At the end, two lectures and hands-on workshops familiarize students with the basics of microarray analysis and next generation sequencing.</p>				

<b>139092</b>	<b>Immunochemistry- Signaling and Dynamics</b>			
Subject:	Catalog Nbr:			
IMM	0250			
2019 SPRG	Primary	Stephen Bunnell	Stephen.Bunnell@tufts.edu	
<p>The course covers the genetic basis for lymphocyte differentiation, receptor gene rearrangement, T and B cell antigen-receptor diversity and selection, tolerance, autoimmunity and gene expression.</p>				

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<b>139171</b>	<b>Laboratory Research Experience</b>			
Subject:	Catalog Nbr:			
PPET	0134			
2019 FALL	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
16-20 week laboratory rotations for Master's students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

<b>139172</b>	<b>Laboratory Research Experience</b>			
Subject:	Catalog Nbr:			
PPET	0135			
2019 SPRG	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
16-20 week laboratory rotations for Master's students are designed to provide experience with experimental design and theoretical aspects of the diverse research problems under investigation in various laboratories.				

<b>139204</b>	<b>Teaching Infectious Diseases</b>			
Subject:	Catalog Nbr:			
SK	0115			
The course provides the background to teach about infectious disease in high school classrooms. The course is based on a 10th – 12th grade (Biology II) curriculum that has been developed by a partnership between a group of Boston teachers and infectious disease specialists from Tufts Medical School. The goal of the course is to teach the key scientific concepts underlying the curriculum - how bacteria, viruses, and parasites cause infectious diseases and how the immune system defends the body against the attack, as well as the pedagogical strategies to deliver the content in the classroom using a variety of inquiry-based constructivist approaches.				

<b>139290</b>	<b>Rotation</b>			
Subject:	Catalog Nbr:			
SK	0236			

<b>139373</b>	<b>Applying Quality Improvement Methods in Healthcare and Public Health</b>			
Subject:	Catalog Nbr:			
CTS	0231			
2019 SPRG	Primary	Denise Daudelin	Denise.Daudelin@tufts.edu	
This course aims to provide a broad overview of current trends, core concepts, and methods in quality improvement (QI) and demonstrate their application to healthcare, clinical research and public health. The course focuses on application, and includes didactic instruction, group discussions, and a small group QI project. The semester long QI project involves collaboration with hospital staff or public health practitioners.				

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<b>139453</b>	<b>Special Topics in Cell, Molecular, and Developmental Biology</b>			
Subject:	Catalog Nbr:			
CMDB	0293			
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic. Fall and Spring.				

<b>139454</b>	<b>Special Topics in Cell, Molecular, and Developmental Biology</b>			
Subject:	Catalog Nbr:			
CMDB	0294			
2019 SPRG	Primary	Brent Cochran	brent.cochran@tufts.edu	
2019 SUMR	Primary	Alex Bohm	Andrew.Bohm@tufts.edu	

<b>139463</b>	<b>Macromolecular Structural Determination</b>			
Subject:	Catalog Nbr:			
BCHM	0202			
This is an intensive workshop covering the basic theory and practice of modern protein crystallography and NMR. The course alternates between lectures, hands-on demos, and computer exercises.				

<b>139466</b>	<b>Post-placement Rotation</b>			
Subject:	Catalog Nbr:			
SK	0234			

<b>139467</b>	<b>Post-placement Rotation</b>			
Subject:	Catalog Nbr:			
SK	0235			
Subject:	Catalog Nbr:			
SK	0235			

<b>139826</b>	<b>Advanced Scientific Ethics</b>			
Subject:	Catalog Nbr:			
SK	0375			
2019 FALL	Primary	Jamie Maguire	Jamie.Maguire@tufts.edu	
This is an NIH-mandated refresher course for responsible conduct of research (RCR) for 5th year students. It builds on SK 0275, Scientific Ethics; students will work in teams to develop a new case study addressing an				

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RCR issue, provide a written in depth analysis and teach the case study to a small group of students enrolled in SK 0275 under the supervision of the course director. The class provides opportunities for team building, writing, ethical analysis and teaching; grading will be based on the quality of case study and analysis, teaching, effort and participation.

<b>140064</b>	<b>Advanced Topics in Biostatistics</b>			
Subject:	Catalog Nbr:			
CTS	0533			
2019 FALL	Primary	Angie Rodday	Angie.Rodday@tufts.edu	
2019 FALL	Primary	Norma Terrin	norma.terrinn@tufts.edu	
2019 FALL	Primary	Farzad Noubary	Farzad.Noubary@tufts.edu	
<p>This course provides background in advanced applied statistical methods in clinical research. Topics in the course include Poisson, multinomial, and ordinal regression, competing risk survival models, longitudinal data analysis, and hierarchical mixed models. The course provides students with the statistical foundations of these methods and their applications in clinical research.</p>				

<b>140127</b>	<b>Advanced Epidemiology &amp; Regression Methods: An Integrated Approach</b>			
Subject:	Catalog Nbr:			
CTS	0575			
2019 SPRG	Primary	Angie Rodday	Angie.Rodday@tufts.edu	
2019 SPRG	Primary	Jessica Paulus	Jessica.Paulus@tufts.edu	
2019 SPRG	Primary	Farzad Noubary	Farzad.Noubary@tufts.edu	
<p>This course serves as an introduction to more advanced topics in epidemiologic study design and biostatistical modeling with a focus on multivariate regression methods. It begins with the randomized clinical trial as a paradigm, and proceed to examine observational designs in depth, including prospective and retrospective cohorts, and those sampling from an underlying cohort (i.e. case-control). Design, sampling and analysis strategies and the biases that are specific to each study design will be discussed.</p>				

<b>140320</b>	<b>Design and Analysis of Bioequivalence Studies</b>			
Subject:	Catalog Nbr:			
PPET	0281			
2019 SPRG	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
<p>A generic drug is bioequivalent to a brand name drug when their bioavailabilities (assessed by the respective plasma concentration time curves) after administration in the same molar dose are essentially the same. The comparison of the bioavailabilities is examined by conducting a bioequivalence study. The course will train the students in the design and data analysis of bioequivalence studies.</p>				

<b>140762</b>	<b>Basic Skills for Scientists I</b>			
Subject:	Catalog Nbr:			
SK	0101			

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2019 FALL	Primary	Henry Wortis	henry.wortis@tufts.edu
2019 FALL	Secondary	Maribel Rios	Maribel.Rios@tufts.edu
This three-module course is designed to give trainees basic skills in oral and written presentation, in approaches to the reading of the scientific literature, and designing experiments and interpreting quantitative data.			

<b>140763</b>	<b>Basic Skills for Scientists II</b>		
Subject: SK	Catalog Nbr: 0102		
2019 SPRG	Primary	Henry Wortis	henry.wortis@tufts.edu
2019 SPRG	Primary	Maria Alcaide Alonso	Pilar.Alcaide@tufts.edu
2019 SPRG	Secondary	Misha Eliasziw	Misha.Eliasziw@tufts.edu
2019 SPRG	Secondary	Karl Munger	Karl.Munger@tufts.edu
2019 SPRG	Secondary	Aimee Shen	Aimee.Shen@tufts.edu
This three module course is designed to give trainees basic skills in in presenting data and in writing grant applications.			

<b>141543</b>	<b>Translational Medicine - Drug Discovery to Clinical Development</b>		
Subject: PPET	Catalog Nbr: 0205		
2019 FALL	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu
2019 FALL	Primary	Chandrasekhar Natarajan	Chandrasekhar.Natarajan@tufts.edu
This comprehensive course covers key processes from drug discovery to development, including the progression and translation of scientific information through different development stages and the transition to clinical studies, to increase the probability of creating a successful therapeutic product The goal is to impart sufficient background to provide an overall understanding of Translational Medicine that is integral to scientific rationale in Drug Research and Development.			

<b>141547</b>	<b>Mouse Transgenic Model</b>		
Subject: CMDB	Catalog Nbr: 0350		
This course provides an overview of using the mouse to develop transgenic models of gene expression and gene targeting. In the first half of this course, students will discuss basic transgenic and gene targeting construct design, methods to generate transgenic mice by microinjection methods, and conditional and inducible systems. In the second half of the course, the focus will be on genome editing techniques such as CRISPR/Cas9, zinc finger nucleases, and TALENs, as well as their applications.			

<b>141552</b>	<b>Introduction to Infectious and Inflammatory Diseases</b>		
Subject: IMM	Catalog Nbr: 0223		

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2019 SUMR	Primary	Miguel Stadecker	miguel.stadecker@tufts.edu
2019 SUMR	Primary	Andrew Plaut	andrew.plaut@tufts.edu
2019 SUMR	Secondary	Ralph Isberg	ralph.isberg@tufts.edu

This course is comprised of three integrated components; 1) a Medical Microbiology and Inflammation/Immunology Tutorial designed to introduce students to pathogens and pathophysiology of infectious and inflammatory diseases, 2) Infectious and Inflammatory Diseases Problem-Based Learning designed to introduce students to clinical cases, and 3) Teaching Clinics designed to expose students to real clinical cases and treatment options.

<b>141613</b>	<b>Survey of Clinical Care Research</b>			
Subject:	Catalog Nbr:			
CTS	0125			
2018 SUMR	Primary	David Kent	david.kent@tufts.edu	
2018 SUMR	Primary	Mihaela Stefan	Mihaela.Stefan@tufts.edu	
<p>This course offers an introduction to contemporary topics and instruments in clinical care research, with a focus on the role of outcomes research, health economics, systematic reviews and clinical decision making in clinical and translational science. Foundational concepts in clinical trial design (pragmatic and explanatory), meta-analysis and systematic review, health services research, bench-to-bedside translational research, decision analysis, pharmaco-economics and prediction models are surveyed by program faculty. This course also reinforces and applies core concepts in biostatistics and epidemiology by illustrating how study designs and statistical approaches may be applied in the context of these designs and analytic approaches, as well as highlighting pitfalls to certain applications.</p>				

<b>141614</b>	<b>Principles of Biostatistics for Clinical Research</b>			
Subject:	Catalog Nbr:			
CTS	0127			
<p>This course introduces the basic principles and applications of statistics, as they are applied to problems in clinical research. The emphasis is on developing an understanding of the assumptions, limitations, practical considerations and critical thinking in the use of statistical methods in data arising from continuous, binary, and time-to-event data. This course will also introduce biostatistical modeling with a focus on multivariate regression methods. Through webinars, the course will include data exercises and class discussion of articles from the scientific literature that apply methods covered in lectures.</p>				

<b>141615</b>	<b>Elements of Epidemiology for Clinical Research</b>			
Subject:	Catalog Nbr:			
CTS	0123			
<p>This course serves as an introduction to topics in epidemiologic study design and analysis, with a focus on those relevant to clinical epidemiology and comparative effectiveness research. After examining the randomized clinical trial as a paradigm, the course proceeds to review the major observational designs, including ecologic, cross-sectional, cohort, and case-control studies. For each study design, relevant sampling and analytical strategies, measures of association and the attendant biases will be covered. Principles and methods will be illustrated through several interactive webinars that include discussion of articles from the</p>				

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literature, data analytic exercises, and causal diagrams.

<b>141715</b>	<b>Health Economics</b>			
Subject: CTS	Catalog Nbr: 0557			
2019 FALL	Primary	James Chambers	James.Chambers@tufts.edu	
2019 FALL	Secondary	Tara Lavelle	Tara.Lavelle@tufts.edu	
2019 FALL	Secondary	David Kim	dd.kim@tufts.edu	
<p>This course aims to introduce health care professionals and clinical researchers to key economic concepts and their relation to health care. The course is designed for students with no or rudimentary understanding of economics. In addition to providing students with a foundation in economics, the course will provide students with an understanding of the structure and performance of the US health care system, and an introduction to methods for the economic evaluation of medical technology. The course will also include lectures on the regulation of medical technology, health care innovation, and emerging health policy trends. Coursework will include a workshop in which students will gain hands-on experience manipulating economic evaluations for medical technology.</p>				

<b>142318</b>	<b>Inflammation and Chronic Inflammatory Diseases</b>			
Subject: IMM	Catalog Nbr: 0230			
2019 FALL	Primary	Maria Alcaide Alonso	Pilar.Alcaide@tufts.edu	
2019 FALL	Secondary	Miguel Stadecker	miguel.stadecker@tufts.edu	
2019 FALL	Secondary	Li Zeng	Li.Zeng@tufts.edu	
2019 FALL	Secondary	Giuseppina Tesco	Giuseppina.Tesco@tufts.edu	
2019 FALL	Secondary	Cheryl London	Cheryl.London@tufts.edu	
2019 FALL	Secondary	Athan Kuliopulos	athan.kuliopulos@tufts.edu	
2019 FALL	Secondary	Robert Blanton Jr.	Robert.Blanton@tufts.edu	
2019 FALL	Secondary	Xudong Li	Xudong.Li@tufts.edu	
2019 FALL	Secondary	Shruti Sharma	Shruti.Sharma@tufts.edu	
2019 FALL	Secondary	Maher Ghamloush	Maher.Ghamloush@tufts.edu	
<p>The course focuses on reading primary literature about the role of inflammation in several chronic diseases. The emphasis is on understanding the role of the immune response during the initiation and progression of chronic inflammatory diseases. The course will explore human diseases and delve into available animal models for such conditions, discuss the beneficial vs pathological aspects of inflammation in various diseases, and ongoing therapies and clinical trials for such conditions.</p>				

<b>142319</b>	<b>Clinical Trial Practicum</b>			
Subject: CTS	Catalog Nbr: 0520			
<p>This course is designed to explore how to design and run real-world clinical trials. Course activities will include hands-on activities in the CTSC with clinical trial principal investigators and staff, invitations to attend IRB and Scientific Review Committees, and meetings with the CTSC Scientific Director and administrative leadership.</p>				

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Through these activities, students will be exposed to some of the cornerstones of launching and implementing a clinical trial. Topics to be covered include cohort identification, patient recruitment, protection of human subjects, disease registries (especially for rare diseases), data collection (biological samples and patient questionnaires) and organizing and managing patient visits at the Clinical and Translational Research Center at Tufts Medical Center.

<b>142383</b>	<b>Foundations in Biostatistics and Computational Biology</b>			
Subject: CMDB	Catalog Nbr: 0320			
2018 FALL	Primary	Gregory Carter		Gregory.Carter@tufts.edu
2018 FALL	Primary	Christine Lary		Chrstitine.Duate@tufts.edu
Introduction to biostatistics with application to the biomedical sciences and genetics, and introduction to computational biology.				

<b>142483</b>	<b>Building Diversity in Biomedical Sciences Summer Research Experience</b>			
Subject: SK	Catalog Nbr: 0099			
Summer residential research program designed to develop interest and talent in underrepresented minority students in STEM.				

<b>142496</b>	<b>CNS Drug Discovery</b>			
Subject: NRSC	Catalog Nbr: 0277			
2018 FALL	Primary	Thomas Biederer		Thomas.Biederer@tufts.edu
2018 FALL	Secondary	Philip Haydon		Philip.Haydon@tufts.edu
2018 FALL	Secondary	Rudy Schreiber		Rudy.Schreiber@tufts.edu
This course covers the process of bringing a new pharmaceutical treatment against disorders of the central nervous system (CNS) to the market, starting at the conception of a novel idea. Compared to other disease areas, CNS drug discovery faces – literally – several additional barriers. Most importantly, therapeutics need to cross the blood-brain-barrier in order to reach their site of action. This provides unique challenges throughout the discovery and development stages, especially for large molecules like antibodies. Moreover, CNS drug discovery has a high need for innovation in areas such as biomarker development and drug delivery. Students will gain an understanding of pre-clinical research, including molecular, biological, neuroanatomical, electrophysiological, and behavioral techniques; biomarker development and strategy, as well as proof of mechanism and concept testing in volunteers and patients.				

<b>142692</b>	<b>Advanced Topics in Microbiology O</b>			
Subject: MMB	Catalog Nbr: 0260			
2019 SPRG	Primary	James Munro		James.Munro@tufts.edu



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2019 SPRG	Secondary	Michael Malamy	michael.malamy@tufts.edu
2019 SPRG	Secondary	Marta Gaglia	Marta.Gaglia@tufts.edu
2019 SPRG	Secondary	Shumin Tan	Shumin.Tan@tufts.edu

This collection of lectures of four trending topics in Microbiology is offered in odd years.

<b>142693</b>	<b>Advanced Topics in Microbiology E</b>		
Subject:	Catalog Nbr:		
MMB	026E		
This collection of lectures of four trending topics in Microbiology is offered in even years.			

<b>143029</b>	<b>Special Topics in Genetics A</b>		
Subject:	Catalog Nbr:		
GENE	293A		
In-depth information is provided on selected topics. Students may also pursue guided individual study of an approved topic.			

<b>143078</b>	<b>Design and Execution of Clinical Trials</b>			
Subject:	Catalog Nbr:			
PPET	0261			
2019 SPRG	Primary	Emmanuel Pothos	emmanuel.pothos@tufts.edu	
2019 SPRG	Primary	Paul Beninger	Paul.Beninger@tufts.edu	
2019 SPRG	Primary	Orest Hurko	Orest.Hurko@tufts.edu	
2019 SPRG	Secondary	David Greenblatt	dj.greenblatt@tufts.edu	
2019 SPRG	Secondary	Jonathan Davis	Jonathan.Davis@tufts.edu	
This course will provide graduate students with an understanding of the basic principles and methodology by which a putative therapeutic agent that has been proven safe and effective in preclinical animal models can be developed into one that is suitable for marketing for clinical use in human patients.				

<b>143189</b>	<b>Externship</b>		
Subject:	Catalog Nbr:		
SK	0899		
Summer internship experience in biotech, pharmaceuticals, and other biomedical industry. Requires application, program consent, mentor consent, and dean's office approval; must have completed 2 complete academic years and the Qualifying Exam.			

<b>143441</b>	<b>Master's Continuation</b>		
Subject:	Catalog Nbr:		
PPET	0103		
Student who have not completed their Master's Research by the end of the 2-year program enroll in this			

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course during their third fall term. There is no tuition charge for this course, but all enrolled students must pay the laboratory fee.

<b>143846</b>	<b>BU Cross Registration</b>
Subject: SKBU	Catalog Nbr: 0550
BU Cross Registration	

<b>144162</b>	<b>Introduction to Genetics</b>		
Subject: GENE	Catalog Nbr: 0301		
2019 FALL	Primary	Brent Cochran	brent.cochran@tufts.edu
2019 FALL	Primary	Alexander Poltorak	Alexander.Poltorak@tufts.edu
<p>This course serves as an introduction to genetics, building on student prior knowledge of Mendelian Genetics Principles, to provide a solid knowledge and understanding of the basic principles of Genetics for research in eukaryotes, and how they have developed as the field has matured.</p> <p>The goal of this course is to teach students modern methods of genetic analysis of model organisms, ranging from simple eukaryotic yeast to humans. Students will learn how to use molecular genetics to answer biological questions and read current literature in genetics.</p> <p>The second part of the course will introduce mouse as the main model for studies of human biology, development and disease. It will start with mouse genetics, will continue with classical genetic analyses in the mouse, and will move to genetic basis of immunological phenomena such as receptor editing, B-cell tolerance and autoimmunity. Experience with reading current primary literature in the field will also be included. At the completion of the course, two lectures and hands-on workshops will have familiarized students with the basics of microarray analysis and next generation sequencing (NGS).</p>			

<b>144163</b>	<b>Health Care Activism, Community Health, and Patient-Centered Research</b>
Subject: CTS	Catalog Nbr: 0549
<p>This introductory course focuses on principles and methods that can be used to support the involvement of stakeholders in research. The course will examine three approaches to stakeholder and community engagement that have addressed theory, principles, challenges, and potential benefits.</p> <p>The three approaches include patient-centered research in which researchers collaborate with the public to make research more useful, community-based health research in which researchers and communities work together to co-create research, and health care activism in which individuals come together to influence stewards of publicly-funded research.</p>	

<b>144228</b>	<b>Glia-Neuron Interactions in Development and Disease</b>
Subject: NRSC	Catalog Nbr: 0248

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This course will introduce and discuss development of different glial cell types in several model systems and how they distinctly interact with neurons and the physiological and pathological significance of their interactions will be discussed. In addition, unique experimental approaches to study glia will also be included.

<b>144398</b>	<b>Brandeis Cross Registration</b>
Subject: SKBR	Catalog Nbr: 0550
Brandeis Cross Registration	