

Course Bulletin

103583	Chemical Process Principles			
Subject:	Catalog Nbr:			
CHBE	0010			
2024 FALL	Primary	James Van Deventer	James.Van Deventer@tufts.edu	
Introduction to chemical and biological process calculations emphasizing unit operations, process stoichiometry, material and energy balances, states of matter, and continuous steady state and transient processes. Introduction to computational tools for process engineering calculations.				

103643	Chemical Engineering Thermodynamics			
Subject: CHBE		Catalog Nbr: 0011		
2024 SPRG		Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
Thermodynamic concepts - first and second laws, heat, work, energy, entropy, equilibrium, reversibility, equations of state - are introduced in process contexts. Phase equilibria, chemical potential, fugacity, and colligative properties are also discussed.				

103699	Transport Phenomena I			
Subject: CHBE		Catalog Nbr: 0021		
2024 SPRG		Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
Fundamentals of fluid mechanics and their applications to the design and understanding of flow phenomena in industrial and biological processes. Enrollment requirement: CHEM 2, PHY 11, and MATH 51 (concurrent or completed)				

103757	Transport Phenomena II			
Subject: CHBE		Catalog Nbr: 0022		
2024 FALL		Primary	Derek Mess	Derek.Mess@tufts.edu
2024 FALL		Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu
Principles of heat and mass transfer. Steady-state conduction and diffusion processes. Convective transport of heat and mass in laminar and turbulent flows in conduits and over various surfaces. Applications to design of heat exchangers. Natural convection. Combined heat and mass transfer applications. Recommendations: CHBE 10, 11; MATH 42 (formerly MATH 13).				

103906	Applied Numerical Methods For Chemical & Biological Engineering				
Subject: CHBE		Catalog Nbr: 0039			
2024 FALL		Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu	
Numerical analysis methods and their implementation using commercially available software are reviewed.					

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Scientific programming methodology. Application of commercial process simulation software to the analysis of chemical and biological process models.

103945	Chemical And Biological Separations			
Subject:		Catalog Nbr:		
CHBE		0045		
2024 SPRG		Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu
Design and analysis of separation processes. Equilibrium-stage processes, stagewise separation processes, mass transfer operations, and rate-controlled separations. Fundamental study of distillation, extraction, adsorption, membrane separation, and precipitation & crystallization processes.				
Pre-Requisite: CHBE 22				

103965	Chemical And Biological Engineering Laboratory			
Subject: CHBE		Catalog Nbr: 0051		
2024 FALL		Primary	Laura Place	Laura.Place@tufts.edu
Laboratory experiments related to fundamental concepts characterizing chemical and biological systems and processes. Experience is gained in planning and executing the experiments and critically analyzing the collected data to achieve a deeper understanding of the underlying concepts. Oral presentations and written reports are an integral part of this laboratory course.				

103986	Chemical And Biological Engineering Laboratory			
Subject:		Catalog Nbr:		
CHBE		0052		
2024 SPRG		Primary	Derek Mess	Derek.Mess@tufts.edu
Open-ended laboratory projects in an area of applied and industrial interest of chemical and biological engineering. Students work in groups and choose one project for the whole term. They are asked to not only analyze the results of a given experiment but also decide what are the important experiments to perform as part of their overall plan to bring their project to a successful conclusion Oral presentations and written reports are an integral part of this laboratory course.				

104016	Various Topics In Computer Science		
Subject: CS		Catalog Nbr: 0009	
Please see departmental website for detailed information. Recommendations: A sincere interest in learning more about computer science and no prior programming experience.			

104031	Product & Process Design			
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Subject:	Catalog Nbr:			
CHBE	0060			
2023 SPRG	Primary	Daniel Ryder	daniel.ryder@tufts.edu	
2024 SPRG	Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu	
This is a capstone design course covering the principles of design and economic evaluation through the preliminary design of a commercial project related to a product or a process. Working in groups on assigned or selected portions of the overall project, students are required to make integrated use of a wide variety of fundamentals and principles gained from previous courses. Computational laboratories are supplemented by lectures. Use of design software.				

104049	Molecular Biotechnology			
Subject:	Catalog Nbr:			
CHBE	0162			
2024 FALL	Primary	Monir Ejemel	Monir.Ejemel@tufts.edu	
(Cross-listed as BME 162 and BIO 162.) Overview of key aspects of molecular biology and engineering aspects of biotechnology. Lecture topics include molecular biology, recombinant DNA techniques, immunology, cell biology, protein purification, fermentation, cell culture, combinatorial methods, bioethics, and bioinformatics with review and discussion of primary literature. Comprehensive technical paper on an emerging topic. Students may not receive credit for both BME/CHBE/BIO 162 and BME 33. Recommendations: CHEM 1, BIO 13 or permission of instructor.				

104066	Independent Study			
Subject:	Catalog Nbr:			
CHBE	0093			
Guided Individual study of an approved topic. Designed to develop self- teaching skills of the advanced undergraduate. Appraisal of the student's knowledge in the chosen topic based on written and and/ or oral examination. Please see departmental website for specific details. Recommendations: Permission of department .				

104086	Independent Study			
Subject:	Catalog Nbr:			
CHBE	0094			
Guided individual study of an approved topic. Designed to develop self-teaching skills of the advanced undergraduate. Appraisal of the student's knowledge in the chosen topic based on written and/or oral examination. Prerequisite: consent of the department. Please see departmental website for specific details.				

104132	Undergraduate Research			
Subject:	Catalog Nbr:			
CHBE	0095			
2024 FALL	Primary	Daniel Ryder	daniel.ryder@tufts.edu	

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2024 FALL	Primary	David Kaplan	david.kaplan@tufts.edu
2024 FALL	Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu
2024 FALL	Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu
2024 FALL	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 FALL	Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
2024 FALL	Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
2024 FALL	Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu
2024 FALL	Primary	James Van Deventer	James.Van_Deventer@tufts.edu
2024 FALL	Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu
2024 FALL	Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
2024 FALL	Primary	Milo Koretsky	Milo.Koretsky@tufts.edu
2024 SPRG	Primary	Soha Hassoun	soha.hassoun@tufts.edu
2024 SPRG	Primary	Christos Georgakis	Christos.Georgakis@tufts.edu
2024 SPRG	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 SPRG	Primary	Graham Leverick	Graham.Leverick@tufts.edu
Preparation of a report based on personal research, design, or experiment. Please see departmental website for specific details.			

104192	Honors Thesis Research A		
Subject: CHBE	Catalog Nbr: 0096		
2024 FALL	Primary	Daniel Ryder	daniel.ryder@tufts.edu
2024 FALL	Primary	David Kaplan	david.kaplan@tufts.edu
2024 FALL	Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu
2024 FALL	Primary	Christos Georgakis	Christos.Georgakis@tufts.edu
2024 FALL	Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu
2024 FALL	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 FALL	Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
2024 FALL	Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
2024 FALL	Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu
2024 FALL	Primary	James Van Deventer	James.Van_Deventer@tufts.edu
2024 FALL	Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu
2024 FALL	Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
2024 FALL	Primary	Milo Koretsky	Milo.Koretsky@tufts.edu
Supervised research in chemical and biological engineering leading to the completion of the undergraduate honors thesis. Please see the Departmental website for specific program details and qualification requirements.			

104248	Internship In Chemical & Biological Engineering		
Subject: CHBE	Catalog Nbr: 0099		

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2024 FALL	Primary	Daniel Ryder	daniel.ryder@tufts.edu
2024 FALL	Primary	Maria Flytzani-Stephanopoulos	No Email on file.
2024 FALL	Primary	Soha Hassoun	soha.hassoun@tufts.edu
2024 FALL	Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu
2024 FALL	Primary	Linda Abriola	Linda.Aabriola@tufts.edu
2024 FALL	Primary	Christos Georgakis	Christos.Georgakis@tufts.edu
2024 FALL	Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu
2024 FALL	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 FALL	Primary	Derek Mess	Derek.Mess@tufts.edu
2024 FALL	Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
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2024 FALL	Primary	James Van Deventer	James.Van_Deventer@tufts.edu
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2024 SPRG	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 SPRG	Primary	Nav Nidhi Rajput	No Email on file.
2024 SUMR	Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
2024 SUMR	Primary	Milo Koretsky	Milo.Koretsky@tufts.edu

A mentored professional experience in engineering at an off-site organization. The internship must conform to all the requirements of the School of Engineering Internship Program. The department will grant course credit for internships if all of the following conditions are met: 1) The project is approved in advance by the department, 2) a faculty mentor has supervisory and technical control of any work that receives credit, and 3) a written report is submitted that is evaluated by the faculty adviser and the outside institutional supervisor. Recommendations: Junior or senior standing.

104290	Reactor Design		
Subject: CHBE	Catalog Nbr: 0102	2024 SPRG	Primary
		Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
Treatment of chemical reaction equilibrium and kinetic fundamentals and application of them to the design of reactors. Topics include interpretation of reaction-rate data, establishment of reaction mechanism and rate-controlling steps, sizing, and optimization of reactors. Use of personal computer software is encouraged.			

104334	Separation Processes		
Subject: CHBE	Catalog Nbr: 0104		
Material on mass-transfer separation processes beyond that covered by the undergraduate unit operations course. Computational techniques employing digital computers are emphasized. Recommendations: CHBE 45			

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104353	Membrane Separation Processes	
	Subject:	Catalog Nbr:
	CHBE	0107
Fundamentals of liquid/solid, liquid mixture, and gas mixture separations using synthetic membranes. Processes include microfiltration, ultrafiltration, reverse osmosis, electrodialysis, and gas permeation, with applications to industrial process streams, bioprocessing, water purification, and hazardous waste control; also novel membrane reactors and membrane extraction. Emphasis on application of mass transfer and fluid flow principles; also process configuration selection, to design and scale-up. Recommendations: CHBE 45.		

104399	Process Dynamics And Control			
Subject: CHBE		Catalog Nbr: 0109		
2024 FALL		Primary	Daniel Ryder	daniel.ryder@tufts.edu
Mathematical modeling of chemical processes with ordinary differential equations. Feedback, feedforward, and environmental control. Block diagrams. Laplace transformation. Linearization techniques. Frequency response. Laboratory exposure to instrumentation.				

104420	Introduction Optimization		
Subject:		Catalog Nbr:	
CHBE		0110	
Intorduction to fundamental method of optimization with application to problems related to chemical and biological systems and processes; nature of optimization problem; one-dimensional and multivaribale unconstrained optimization; linear programming; non-linear programming with constriants; mixed-integer programming; selected applications.			

104459	Thermal-fluid Transport I			
Subject: CHBE		Catalog Nbr: 0111		
2024 FALL		Primary	Marc Hodes	Marc.Hodes@tufts.edu
(Cross-listed as ME 150). Advanced topics in fluid mechanics. Viscous and inviscid flows. Strain rate, vorticity and streamline coordinates. Differential conservation laws for mass, momentum and energy. Dimensional analysis. Lubrication flows. Momentum and thermal laminar boundary layers. Laminar-turbulent transition. Reynolds stress and turbulence modeling. Turbulent boundary layers. Flow modeling. Recommendations: ES 8 or ME 51 or graduate standing.				

104481	Thermal-fluid Transport II			
Subject: CHBE		Catalog Nbr: 0112		

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2023 SPRG	Primary	Marc Hodes	Marc.Hodes@tufts.edu
2024 SPRG	Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu
(Cross-listed as ME 151). Multi-dimensional conduction. Transient conduction including moving boundary problems. External forced and natural convection. Internal forced and natural convection. Developing flows and transition to turbulence. Condensation and boiling heat transfer. Radiation and conjugate heat transfer involving radiation. Temperature and heat flux measurements. Numerical techniques. Recommendations: ME 111 Thermal-Fluid Transport I or equivalent.			

104507	Introduction To Computer Science		
Subject:	Catalog Nbr:		
CS	0011		
2023 SUMR	Primary	James Mattei	James.Mattei@tufts.edu
2023 SUMR	Primary	Di Zhou	Di.Zhou@tufts.edu
2024 FALL	Primary	Megan Monroe	Megan.Monroe@tufts.edu
2024 SPRG	Primary	Richard Townsend	Richard.Townsend@tufts.edu
The study of computer science centers on two complementary aspects of the discipline. First, computer science is fundamentally concerned with the problem-solving methodologies it derives from its foundational fields: the design principles of engineering, mathematical theory, and scientific empirical study. Second, these methodologies are applied in the complex context of a modern day computing system. In this course we will address both of these important aspects. As a means for developing your design skills, we will discuss the fundamental features of a high level, general purpose programming language — namely C++ — and learn how to use it as a tool for problem solving. We will also consider the performance of solutions, and how to apply both analytical and empirical assessment techniques. Finally, we will explore the Unix operating system as a context for problem solving. Recommendations: High school algebra. No prior programming experience is necessary.			

104569	Principles Of Polymerization		
Subject:	Catalog Nbr:		
CHBE	0121		
(Cross-listed with MSE 137) Synthesis of polymeric materials. Three major types of polymerization--step, chain, and ring-opening--are reviewed with emphasis on reaction mechanisms, kinetics, and thermodynamics of the reactions, and their relationships to molecular weight and molecular structures of macromolecules. Recommendations: Physical and organic chemistry			

104592	Physical Chemistry Of Polymers		
Subject:	Catalog Nbr:		
CHBE	0122		
2024 FALL	Primary	Ayşe Asatekin	Ayşe.Asatekin@tufts.edu
(Cross-listed with MSE 138) Physicochemical properties of polymeric materials with emphasis on the relationship between molecular architecture and physical properties. Topics include polymer solution theories, thermal transitions, conformational analysis, polymer microstructure, crystallinity and morphology, the rubbery and glassy states, rheology, and statistical thermodynamics.			

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Recommendations: CHBE 11

104621	Data Structures			
Subject: CS		Catalog Nbr: 0015		
2023 SUMR		Primary	Fabrizio Santini	Fabrizio.Santini@tufts.edu
2023 SUMR		Primary	Matthew Russell	Matthew.Russell613354@tufts.edu
2024 FALL		Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
2024 SPRG		Primary	Martin Allen	Martin.Allen@tufts.edu
A second course in computer science. Data structures and algorithms are studied through major programming projects. Topics include linked lists, trees, graphs, dynamic storage allocation, and recursion. Enrollment priority given to freshmen or sophomores; computer science majors or minors; or majors or minors that list CS15 as a requirement or elective.				

104635	Air Pollution and Control	
	Subject:	Catalog Nbr:
	CHBE	0136
(Cross-listed as CHBE 136) A study of health and environmental effects from air pollution, dispersion modeling, air pollution laws and regulations, fate and transport of air pollution, and design of pollution control equipment and processes. Recommendations: (ES 8 & CEE 32) or CHBE 22		

104656	Hazardous Waste Treatment Technologies	
	Subject:	Catalog Nbr:
	CHBE	0138
(Cross-listed as CEE 138.) Hazardous waste treatment options based on physical, chemical, biological, and thermal processing technologies. Brief review of definitions and appropriate hazardous waste legislation. Introduction to pollution prevention. Traditional end-of-pipe treatment technologies. Applications to include solvent recovery, chemical fixation, land disposal, biodegradation, and special wastes. Incineration and associated environmental discharges constitute a major portion of course. Emerging technologies and evaluation of technical/economic process viability. Recommendations: Senior standing or consent of instructor.		

104659	Web Programming			
Subject: CS		Catalog Nbr: 0020		
2024 FALL		Primary	Lisa Diorio	Lisa.Diorio@tufts.edu
An introduction to techniques, principles, and practices of writing computer programs for the World Wide Web. Server and browser capabilities and limits. Media types, handlers, and limitations. Web programming languages and techniques. Web security, privacy, and commerce. Lectures augmented with programming				

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projects illustrating concepts and current practice.

104678	Surface And Colloid Chemistry			
Subject:	Catalog Nbr:			
CHBE	0140			
2023 SPRG	Primary	Matthew Panzer		Matthew.Panzer@tufts.edu
Emphasis on fundamental concepts: attractive and repulsive forces between particles in a dispersion; stabilization and flocculation of a dispersion, electrokinetic phenomena; surfactants; contact angle and wetting; phenomena at curved interfaces; capillarity; rheology of suspensions; drying of coatings; emulsions. For students in chemical engineering and other disciplines in which surface chemistry plays an important role. Prerequisites: CHBE 21 and CHEM 31				

104699	Biochemical Engineering			
Subject:	Catalog Nbr:			
CHBE	0160			
2024 FALL	Primary	Nikhil Nair		Nikhil.Nair@tufts.edu
Thermodynamics of biological reactions, principles of fermentation processes, and chemical engineering applications to bioreactor analysis are studied. Recommendations: CHBE 102.				

104720	Game Design			
Subject:	Catalog Nbr:			
CS	0023			
2024 FALL	Primary	Jason Wiser		Jason.Wiser@tufts.edu
Processes, procedures, methodologies, and principles of game design. Managing teamwork, project scope and user experience. Paper and digital prototyping, including the use of software for programming, art, and audio production. Recommendations: CS 15				

104760	Protein Purification			
Subject:	Catalog Nbr:			
CHBE	0161			
2023 SPRG	Primary	James Angelo		No Email on file.
2024 SPRG	Primary	Junjie Chen		Junjie.Chen@tufts.edu
Methods of purifying proteins at a large scale for therapeutic or industrial uses. Focus on unit operations found in a typical process flowsheet including centrifugation, membrane filtration, most modes of chromatography, and lyophilization. Topics include introduction to protein chemistry and analytical methods, effects of production host choice, and protein stability. Process economics, GMP operations and validation, and case studies of biotechnology industry separations.				

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104783	Molecular Biotechnology
Subject: CHBE	Catalog Nbr: 0262
(Cross-listed as BME 262 and BIO 264.) Overview of key aspects of molecular biology and engineering aspects of biotechnology. Lecture topics include molecular biology, recombinant DNA techniques, immunology, cell biology, protein purification, fermentation, cell culture, combinatorial methods, and bioinformatics. Includes a semester-long technical project and oral presentation. (Also offered as lower-level.)	

104806	Recombinant Dna Techniques
Subject: CHBE	Catalog Nbr: 0163
(Cross-listed as BIO 163 & BME 163) This lecture and laboratory course is designed to familiarize the student with methods employed to produce recombinant products. The lectures cover fundamental aspects of the recombinant DNA methodologies used in the laboratory as well as some commercial applications of the techniques. The laboratory provides hands-on experience with the key skills used in genetic engineering including DNA isolation, restriction enzyme mapping, cloning and selection, protein expression, gel electrophoresis, polymerase chain reaction, DNA sequencing, and related techniques. Students may not receive credit for both BME 163 and BME 33. Recommendations: CHEM 1, BIO 13, or permission of instructor.	

104831	Biomaterials and Regenerative Medicine
Subject: CHBE	Catalog Nbr: 0164
2024 FALL	Primary Yu-Ting Dingle Yu-ting.Dingle@tufts.edu
(Cross-listed as BME 153.) Fundamental concepts of biomaterials and regenerative medicine (biomaterial types, synthesis, properties, mechanisms of degradation, biological interfaces, inflammation and related issues). Specific focus on biomaterials related to regenerative medicine. Course independent of, but complementary to, BME 154. Recommendations: Junior standing, BIO13, CHEM 1, or consent of instructor	

104850	Cell/microbe Cultivation
Subject: CHBE	Catalog Nbr: 0166
2024 SPRG	Primary Emmanouhl Tzanakakis Emmanuel.Tzanakakis@tufts.edu
In-depth examination of microbial and mammalian cell cultivation and concomitant production of commercially important products. Mechanism and methods of measurement and quantitative analysis of growth, product formation, and nutrient utilization kinetics in characterizing and optimizing for cell mass or product formation. Discussion of fundamental parameters controlling bioreactor design and scale-up. Systems studied include production of proteins in recombinant organisms, antibiotics, amino acids, and the cultivation of mammalian cells. Recommendations: Permission of Instructor	

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104859	Machine Structure & Assembly-language Programming				
Subject:		Catalog Nbr:			
CS		0040			
2024 FALL		Primary	Mark Sheldon	Mark.Sheldon@tufts.edu	
2024 SPRG		Primary	Noah Mendelsohn	Noah.Mendelsohn@tufts.edu	
Structure of machine-level data and code, including memory, cache, registers, machine arithmetic, and bitwise operations. Encapsulating machine functionality through interfaces and abstract data types. Structure of assembly code, relocatable object code, and binary machine code, and the translations between them. Applications of machine-level operations and code translations in programming projects. High demand (see "course notes" for signup procedure).					

104871	Metabolic&cellular Engin			
Subject: CHBE		Catalog Nbr: 0167		
2024 FALL		Primary	Gautham Sridharan	Gautham.Sridharan@tufts.edu
The goal is to present a framework for quantitative analysis of cellular functions, and introduce students to metabolic engineering. Metabolic engineering is a systems-oriented approach to the problem of remodeling and reconfiguring the many molecular components of the cell in order to achieve a desirable phenotype. Unlike molecule-centric approaches, which focus on only the final product-forming reaction, metabolic engineering emphasizes the metabolic pathway in its entirety. Course material analyzes cell-level processes as molecular systems. The processes to be discussed include: metabolism, protein synthesis, and regulation of gene expression. Analyses of these processes will emphasize an engineering, problem solving-oriented perspective, and will be integrated with discussions on core metabolic engineering methods: metabolic modeling, genetic engineering, and analytical biochemistry. Complementary disciplines very recently added to the metabolic engineering toolbox will also be discussed: omics technologies, computational systems biology, and synthetic biology. Selected metabolic engineering applications, including conversion of biomass into fuels, will be further explored through case studies and reviews of the current literature. Recommendations: Open to graduate students and seniors. Backgrounds in biochemistry, numerical methods, and chemical kinetics is highly recommended.				

104940	Special Topics	
Subject:	Catalog Nbr:	
CS	0050	
Content and prerequisites to be announced. Please see departmental website for specific details.		

104955	Design And Analysis Of Experiments		
Subject: CHBE		Catalog Nbr: 0170	
The course starts with a brief introduction to applied statistics with emphasis to hypothesis testing and, in particular, the Analysis of Variance. It then examines how to design experiments and analyze the data they			

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yield. Various designs are discussed and their respective differences, advantages, and disadvantages are noted. In particular, factorial, fractional factorial, response surface, and optimal designs are examined in detail.

104978	Clean Energy Technologies And Policy Issues	
	Subject:	Catalog Nbr:
	CHBE	0173
(Cross-listed with Fletcher School.) This course considers current issues in power generation, identifying the technologies used to meet Clean Air Act regulations by the electric utilities and automobile manufacturers. Topics include the electric utility deregulation, distributed power sources, new energy markets, fuel efficiency, and global effects of fossil fuel use. Alternative fuels and engines will be examined from the point of view of technology readiness and global market penetration to curb air pollution and decrease carbon emissions. The costs of energy technologies and the global impacts of present policies in the U. S. and abroad will be evaluated.		

104981	Discrete Mathematics			
Subject:	Catalog Nbr:			
CS	0061			
2023 SUMR	Primary	Emmely Rogers	Emmely.Rogers@tufts.edu	
2024 FALL	Primary	Karen Edwards	Karen.Edwards@tufts.edu	
(Cross-listed as MATH 61). Sets, relations and functions, logic and methods of proof, combinatorics, graphs and digraphs.				
Recommendations: MATH 32 or COMP 11 or permission of instructor.				

104997	Drug Product Formulation				
Subject:	Catalog Nbr:				
CHBE	0185				
2024 SPRG	Primary	Bernardo Perez-Ramirez	Bernardo.Perez_Ramirez@tufts.edu		
(Cross-listed as BME 185). Drug Product Formulation.					

105019	Special Topics			
Subject:	Catalog Nbr:			
CHBE	0193			
2023 FALL	Primary	Lorena Grundy	Lorena.Grundy@tufts.edu	
Guided individual study of an approved topic to develop the art of self-teaching. Appraisal of the student's knowledge in the approved area will be based on a written and/or oral examination. Arrangements with a department member are required by the student prior to registration in the course. For master's degree candidates. Please see departmental website for specific details.				

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105039	Special Topics			
Subject: CHBE		Catalog Nbr: 0194		
2024 SPRG		Primary	Gautham Sridharan	Gautham.Sridharan@tufts.edu
2024 SPRG		Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
Guided individual study of an approved topic to develop the art of self-teaching. Appraisal of the student's knowledge in the approved area will be based on a written and/or oral examination. Arrangements with a department member are required by the student prior to registration in the course. For master's degree candidates. Please see departmental website for specific details.				

105063	Programming Languages	
	Subject:	Catalog Nbr:
	CS	0080
An overview of language design and implementation, plus programming techniques for particular types of languages. Compilers and interpreters, binding, scope rules, formal semantic models, structure hiding, object-oriented programming, functional programming, and logic programming. Examples and problems from among Pascal, Algol, C++, Java, Scheme, Lisp, Prolog, and others. CS 80 and CS 105 cannot both be taken for credit. Prerequisite: CS 15.		

105101	Object-oriented Programming For Graphical User Interfaces			
Subject: CS		Catalog Nbr: 0086		
2024 FALL		Primary	Robert Jacob	jacob@cs.tufts.edu
Object-oriented programming and design, including object-oriented encapsulation, inheritance, and subtype polymorphism. Foundational concepts of graphical user interfaces, including events, callbacks, and widgets. Connections between objects and user interfaces, e.g., interface widgets as objects. Design and programming projects.				

105142	Directed Study			
Subject: CS		Catalog Nbr: 0093		
2023 SPRG		Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
2023 SPRG		Primary	Samuel Guyer	Samuel.Guyer@tufts.edu
2023 SPRG		Primary	Norman Ramsey	Norman.Ramsey@tufts.edu
2023 SPRG		Primary	Kathleen Fisher	Kathleen.Fisher@tufts.edu
2023 SPRG		Primary	Bert Huang	No Email on file.
2023 SPRG		Primary	Antonella Di Lillo	No Email on file.
2024 FALL		Primary	Robert Jacob	jacob@cs.tufts.edu
2024 FALL		Primary	Alva Couch	alva.couch@tufts.edu
2024 FALL		Primary	Soha Hassoun	soha.hassoun@tufts.edu
2024 FALL		Primary	Diane Souvaine	Diane.Souvaine@tufts.edu

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2024 FALL	Primary	Megumi Ando	Megumi.Ando@tufts.edu
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2024 FALL	Primary	Megan Monroe	Megan.Monroe@tufts.edu
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 FALL	Primary	Liping Liu	Liping.Liu@tufts.edu
2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu
2024 FALL	Primary	Susan Landau	Susan.Landau@tufts.edu
2024 FALL	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu
2024 FALL	Primary	Michael Hughes	Michael.Hughes@tufts.edu
2024 FALL	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
2024 FALL	Primary	Elaine Short	Elaine.Short@tufts.edu
2024 FALL	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu
2024 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu
2024 FALL	Primary	Richard Townsend	Richard.Townsend@tufts.edu
2024 FALL	Primary	Abani Patra	Abani.Patra@tufts.edu
2024 FALL	Primary	Daniel Votipka	Daniel.Votipka@tufts.edu
2024 FALL	Primary	David Lillethun	David.Lillethun@tufts.edu
2024 FALL	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu
2024 FALL	Primary	Johes Bater	Johes.Bater@tufts.edu
2024 SPRG	Primary	Vladimir Podolskiy	Vladimir.Podolskii@tufts.edu
Guided study of an approved topic. Please see departmental website for specific details.			

105162	Mathematical Methods In Chemical Engineering		
Subject:	Catalog Nbr:		
CHBE	0201		
2024 FALL	Primary	Daniel Ryder	daniel.ryder@tufts.edu
Solution of algebraic equations, ordinary and partial differential equations, and sets of equations. Linear independence; basis vectors and functions; eigenvalues, eigenvector and eigenfunctions; initial and boundary value problems; generalized Fourier series; Sturm-Louisville problems; Green's function. Application examples in: chemical reaction engineering, and heat conduction and mass diffusion in one, two, or three dimensions at steady state or in transient mode. Emphasis is placed on linear problems but nonlinear ones are also discussed. Recommendations: Graduate Engineering Student and knowledge of MATLAB, or permission of instructor.			

105184	Advanced Kinetics and Reaction Engineering
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Course Bulletin

Subject:	Catalog Nbr:				
CHBE	0202				
2024 FALL	Primary	Nathaniel Eagan		Nathaniel.Eagan@tufts.edu	
Applied chemical kinetics, reaction rate theories, complex kinetics, reactor stability and sensitivity to operating parameters. The interplay of diffusion and reaction in non-catalytic and catalytic reaction systems. Case studies in reactor design. Recommendations: Graduate Engineering Student and CHBE 102 or equivalent.					

105207	Advanced Thermodynamics				
Subject:	Catalog Nbr:				
CHBE	0203				
2024 SPRG	Primary	Milo Koretsky		Milo.Koretsky@tufts.edu	
Thermodynamics as applied to chemical engineering. Attention is given to the derivation of thermodynamic functions from concepts of statistical mechanics, chemical equilibrium, availability, and computation of vapor-liquid equilibrium compositions. Recommendations: Graduate Engineering Student or Permission of Instructor					

105225	Directed Study				
Subject:	Catalog Nbr:				
CS	0094				
Guided study of an approved topic. Please see departmental website for specific details.					

105227	Advanced Transport Phenomena				
Subject:	Catalog Nbr:				
CHBE	0204				
2024 SPRG	Primary	Prashant Deshlahra		Prashant.Deshlahra@tufts.edu	
Formulation, solution, and analysis of problems in momentum, energy and mass transport phenomena that occur in chemical and biological processes. Recommendations: Graduate Engineering Student, and CHBE 21 and CHBE 22 or equivalents.					

105244	Senior Capstone Project I				
Subject:	Catalog Nbr:				
CS	0097				
2024 FALL	Primary	David Lillethun		David.Lillethun@tufts.edu	
Requirements analysis and design of a senior capstone project. Requirements analysis and elicitation methods, and prototyping. Design principles and methods, including designing for usability, security, testability, performance, and scaling. Project management and planning, including cost and effort estimation. Writing effective documentation. Recommendations: CS 40 and Senior Standing.					

Course Bulletin

105248	Graduate Seminar			
Subject: CHBE		Catalog Nbr: 0291		
2024 FALL		Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
Presentaion of individual reports on basic topics to a seminar for discussion and criticism. Please see departmental website for specific details.				

105261	Senior Capstone Project II			
Subject: CS		Catalog Nbr: 0098		
2024 SPRG		Primary	David Lillethun	David.Lillethun@tufts.edu
Implementation and testing of the project designed in CS 97. Implementation tools, strategies, and platforms. Testing and debugging methodologies. Maintenance and release management. Legal, ethical, and social impacts of computing. Recommendations: CS 97.				

105285	Graduate Seminar			
Subject: CHBE		Catalog Nbr: 0292		
2024 SPRG		Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
Presentaion of individual reports on basic topics to a seminar for discussion and criticism. Please see departmental website for specific details.				

105303	Disc Grp/do Not Register	
Subject:	Catalog Nbr:	
CS	0100	

105305	Special Topics
Subject: CHBE	Catalog Nbr: 0293
Guided individual study of an approved topic. Designed to develop the art of self-teaching. Appraisal of the student's knowledge in the approved area based on a written and/or oral examination. Arrangemnts with a department memeber required prior to registration for the course. For doctoral degree candidates. Please see departmental website for specific details.	

105327	Special Topics
Subject:	Catalog Nbr:

Course Bulletin

CHBE	0294
Guided individual study of an approved topic. Designed to develop the art of self-teaching. Appraisal of the student's knowledge in the approved area based on a written and/or oral examination. Arrangements with a department member required prior to registration for the course. For doctoral degree candidates. Please see departmental website for specific details.	

105344	Programming Languages			
Subject: CS		Catalog Nbr: 0105		
2024 FALL		Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
2024 FALL		Primary	Richard Townsend	Richard.Townsend@tufts.edu
Principles and application of computer programming languages. Emphasizes ideas and techniques most relevant to practitioners, but includes foundations crucial for intellectual rigor: abstract syntax, lambda calculus, type systems, dynamic semantics. Case studies, reinforced by programming exercises. Grounding sufficient to read professional literature. CS 80 and CS 105 cannot both be taken for credit.				

105365	Master's Thesis Research			
Subject: CHBE		Catalog Nbr: 0295		
2024 FALL		Primary	Daniel Ryder	daniel.ryder@tufts.edu
2024 FALL		Primary	David Kaplan	david.kaplan@tufts.edu
2024 FALL		Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu
2024 FALL		Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu
2024 FALL		Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 FALL		Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 FALL		Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
2024 FALL		Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
2024 FALL		Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu
2024 FALL		Primary	James Van Deventer	James.Van_Deventer@tufts.edu
2024 FALL		Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu
2024 FALL		Primary	Milo Koretsky	Milo.Koretsky@tufts.edu
Guided research on a topic suitable for a master's thesis. Please see departmental website for specific details.				

105402	Master's Thesis Research			
Subject: CHBE		Catalog Nbr: 0296		
2024 SPRG		Primary	Daniel Ryder	daniel.ryder@tufts.edu
2024 SPRG		Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu
2024 SPRG		Primary	Christos Georgakis	Christos.Georgakis@tufts.edu
2024 SPRG		Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu

Course Bulletin

2024 SPRG	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 SPRG	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 SPRG	Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
2024 SPRG	Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
2024 SPRG	Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu
2024 SPRG	Primary	James Van Deventer	James.Van_Deventer@tufts.edu
2024 SPRG	Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu
2024 SPRG	Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
2024 SPRG	Primary	Milo Koretsky	Milo.Koretsky@tufts.edu
Guided research on a topic suitable for a master's thesis. Please see departmental website for specific details.			

105446	Doctoral Thesis Research			
Subject: CHBE		Catalog Nbr: 0297		
2024 FALL	Primary	Daniel Ryder	daniel.ryder@tufts.edu	
2024 FALL	Primary	David Kaplan	david.kaplan@tufts.edu	
2024 FALL	Primary	Maria Flytzani-Stephanopoulos	No Email on file.	
2024 FALL	Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu	
2024 FALL	Primary	Christos Georgakis	Christos.Georgakis@tufts.edu	
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 FALL	Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu	
2024 FALL	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu	
2024 FALL	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu	
2024 FALL	Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu	
2024 FALL	Primary	Nikhil Nair	Nikhil.Nair@tufts.edu	
2024 FALL	Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu	
2024 FALL	Primary	James Van Deventer	James.Van Deventer@tufts.edu	
2024 FALL	Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu	
2024 FALL	Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu	
Guided research on a topic suitable for a doctoral dissertation. Please see departmental website for specific details.				

105467	Doctoral Thesis Research			
Subject: CHBE		Catalog Nbr: 0298		
2024 SPRG	Primary	Daniel Ryder	daniel.ryder@tufts.edu	
2024 SPRG	Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu	
2024 SPRG	Primary	Christos Georgakis	Christos.Georgakis@tufts.edu	
2024 SPRG	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 SPRG	Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu	

Course Bulletin

2024 SPRG	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 SPRG	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 SPRG	Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
2024 SPRG	Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
2024 SPRG	Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu
2024 SPRG	Primary	James Van Deventer	James.Van_Deventer@tufts.edu
2024 SPRG	Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu
2024 SPRG	Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
2024 SPRG	Primary	Milo Koretsky	Milo.Koretsky@tufts.edu
Guided research on a topic suitable for a doctoral dissertation. Please see departmental website for specific details.			

105468	Operating Systems		
Subject:	Catalog Nbr:		
CS	0111		
2023 SUMR	Primary	Hifza Khalid	Hifza.Khalid@tufts.edu
2024 SPRG	Primary	David Lillethun	David.Lillethun@tufts.edu
(Cross-listed as EE 128). Fundamental issues in operating system design. Concurrent processes: synchronization, sharing, deadlock, scheduling. Relevant hardware properties of uniprocessor and multiprocessor computer systems.			

105487	Master's Project		
Subject:	Catalog Nbr:		
CHBE	0290		
2024 FALL	Primary	Daniel Ryder	daniel.ryder@tufts.edu
2024 FALL	Primary	David Kaplan	david.kaplan@tufts.edu
2024 FALL	Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu
2024 FALL	Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu
2024 FALL	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 FALL	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 FALL	Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
2024 FALL	Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
2024 FALL	Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu
2024 FALL	Primary	James Van Deventer	James.Van_Deventer@tufts.edu
2024 FALL	Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu
2024 FALL	Primary	Milo Koretsky	Milo.Koretsky@tufts.edu
2024 SPRG	Primary	Christos Georgakis	Christos.Georgakis@tufts.edu
Master of Engineering Project. Please see departmental website for specific details.			

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105488	Networks	
	Subject:	Catalog Nbr:
	CS	0112
Computer Networks and Protocols. Design and implementation of computer communication networks, protocols, and applications, with an emphasis on the Internet protocol suite. Network architectures and programming interfaces. Data link, transport, and routing protocols. Congestion sources and remedies. Addressing and naming in local area and wide area networks. Network security and network management.		

105507		Non Major Credit	
Subject:		Catalog Nbr:	
CHBE		0310	

105525	Lower Level Elective Crd	
Subject:	Catalog Nbr:	
CHBE	0320	

105547		Upper Level Elective Crd	
Subject:		Catalog Nbr:	
CHBE		0330	

105548	Database Systems			
	Subject:	Catalog Nbr:		
	CS	0115		
	2024 FALL	Primary	Johes Bater	Johes.Bater@tufts.edu
	2024 SUMR	Primary	Cody Doucette	Cody.Doucette@tufts.edu
Fundamental concepts of database systems, including conceptual design, relational and object-oriented data models, query languages (SQL, QBE), and implementation issues (indexing, transaction processing, concurrent control). The concepts and algorithms covered encompass many of those used in commercial and experimental database systems. Other topics include distributed databases and distributed query processing. Recommendations: CS 40				

105569	Introduction to Security			
	Subject:	Catalog Nbr:		
	CS	0116		
	2024 FALL	Primary	Ming Chow	ming.chow@tufts.edu
A holistic and broad perspective on cyber security. Attacking and defending networks, cryptography,				

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vulnerabilities, reverse engineering, web security, static and dynamic analysis, malware, forensics. Principles illustrated through hands-on labs and projects, including Capture The Flag (CTF) games.

105587	Web Programming and Engineering			
Subject: CS		Catalog Nbr: 0120		
2024 SUMR	Primary	Lisa Diorio	Lisa.Diorio@tufts.edu	
Web applications as complex systems that deliver functionality to a large number of users, and exhibit unique behaviors and demands in terms of performance, scalability, usability, and security. How the web works, limitations of client-side and server-side technologies including frameworks and APIs, content optimization, and data persistence and storage. Projects will involve search, using the cloud infrastructure, location-based services, mobile web development, and using tools to assess the security and privacy of web applications.				

105588	Master's Degree Continuation - Part Time		
Subject:		Catalog Nbr:	
CHBE		0401	
Part-time.Please see departmental website for specific details.			

105631	Numerical Analysis	
Subject:	Catalog Nbr:	
CS	0125	
(Cross-listed as MATH 125.) Analysis of algorithms involving computation with real numbers. Interpolation, methods for solving linear and nonlinear systems of equations, numerical integration, methods for ordinary differential equations. Recommendations: MATH 51 and programming ability in a language such as C, C++, Fortran, Pascal, or Matlab.		

105652	Numerical Linear Algebra		
Subject: CS		Catalog Nbr: 0126	
2024 FALL		Primary	Christoph Borgers
			christoph.borgers@tufts.edu
(Cross-listed as MATH 126.) The two basic computational problems of linear algebra: solution of linear systems and computation of eigenvalues and eigenvectors. Recommendations: MATH 70 or 72 and CS 11.			

105667	Master's Degree Continuation - Full Time		
Subject:		Catalog Nbr:	
CHBE		0402	
Full-time.Please see departmental website for specific details.			

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105668	Artificial Intelligence			
Subject: CS		Catalog Nbr: 0131		
2023 SPRG		Primary	Jeanne Fourneyron	Jeanne.Fourneyron@tufts.edu
2024 FALL		Primary	Fabrizio Santini	Fabrizio.Santini@tufts.edu
History, theory, and computational methods of artificial intelligence. Basic concepts include representation of knowledge and computational methods for reasoning. One or two application areas will be studied, to be selected from expert systems, robotics, computer vision, natural language understanding, and planning.				

105687	Grad Teaching Assistant			
Subject: CHBE		Catalog Nbr: 0405		
2024 FALL		Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 SPRG		Primary	Daniel Ryder	daniel.ryder@tufts.edu
2024 SPRG		Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu
2024 SPRG		Primary	Christos Georgakis	Christos.Georgakis@tufts.edu
2024 SPRG		Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu
2024 SPRG		Primary	Derek Mess	Derek.Mess@tufts.edu
2024 SPRG		Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
2024 SPRG		Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
2024 SPRG		Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu
2024 SPRG		Primary	James Van Deventer	James.Van Deventer@tufts.edu
2024 SPRG		Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
2024 SPRG		Primary	Milo Koretsky	Milo.Koretsky@tufts.edu

105711	Grad Research Assistant			
Subject: CHBE		Catalog Nbr: 0406		
2024 FALL		Primary	Daniel Ryder	daniel.ryder@tufts.edu
2024 FALL		Primary	David Kaplan	david.kaplan@tufts.edu
2024 FALL		Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu
2024 FALL		Primary	Sameer Sonkusale	sameer@ece.tufts.edu
2024 FALL		Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu
2024 FALL		Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 FALL		Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 FALL		Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
2024 FALL		Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
2024 FALL		Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu

Course Bulletin

2024 FALL	Primary	James Van Deventer	James.Van_Deventer@tufts.edu
2024 FALL	Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu
2024 FALL	Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
2024 FALL	Primary	Milo Koretsky	Milo.Koretsky@tufts.edu
2024 SPRG	Primary	Christos Georgakis	Christos.Georgakis@tufts.edu

105750	Doctoral Continuation - PT		
Subject:	Catalog Nbr:		
CHBE	0501		
Part-time. Please see departmental website for specific details.			

105772	Introduction To Machine Learning And Data Mining		
Subject:	Catalog Nbr:		
CS	0135		
2023 SPRG	Primary	Joseph Robinson	Joseph.Robinson@tufts.edu
2023 SUMR	Primary	Prasad Saripalli	Prasad.Saripalli@tufts.edu
2024 FALL	Primary	Michael Hughes	Michael.Hughes@tufts.edu
2024 SPRG	Primary	Liping Liu	Liping.Liu@tufts.edu
An overview of methods whereby computers can learn from data or experience and make decisions accordingly. Topics include supervised learning, unsupervised learning, reinforcement learning, and knowledge extraction from large databases with applications to science, engineering, and medicine. Recommendations: CS 160 is highly recommended.			

105795	Statistical Pattern Recognition		
Subject:	Catalog Nbr:		
CS	0136		
2024 SPRG	Primary	Michael Hughes	Michael.Hughes@tufts.edu
Statistical foundations and algorithms for machine learning with a focus on Bayesian modeling. Topics include: classification and regression problems, regularization, model selection, kernel methods, support vector machines, Gaussian processes, graphical models. Recommendations: MATH 70 or 72, EE 104 or MATH 165, and CS 40 or CS 105, or graduate standing			

105817	Doctoral Degree Continuation - Full Time		
Subject:	Catalog Nbr:		
CHBE	0502		
Full-time. Please see departmental website for specific details.			

105833	Advanced Topics In Computer Architecture		
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Subject:	Catalog Nbr:			
CS	0140			
2023 SPRG	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
(Cross-listed w/ EE 156) Modern computer architecture, starting from basic 5-stage pipelines and progressing to out-of-order superscalar processors, multicore processors, and heterogeneous processors. Techniques to maximize single-thread performance within the constraints of memory technology, power consumption, and the inherent instruction-level parallelism of applications. Current and future challenges faced by computer architects and computer-system designers. Discussion of research papers. Recommendation: EE126/COMP146 or COMP40				

105871	Special Topics			
Subject:	Catalog Nbr:			
CS	0150			
2023 SPRG	Primary	Richard Preston	Richard.Preston@tufts.edu	
2023 SPRG	Primary	Liping Liu	Liping.Liu@tufts.edu	
2023 SPRG	Primary	Theresa Law	No Email on file.	
2023 SPRG	Primary	David Wittenberg	David.Wittenberg@tufts.edu	
2023 SPRG	Primary	Elaine Short	Elaine.Short@tufts.edu	
2023 SPRG	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu	
2024 FALL	Primary	Nicholas Rabb	Nicholas.Rabb@tufts.edu	
2024 FALL	Primary	Meredith Hyde	Meredith.Hyde@tufts.edu	
2024 FALL	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu	
2024 FALL	Primary	Roy Shilkrot	Roy.Shilkrot@tufts.edu	
2024 SPRG	Primary	Ming Chow	ming.chow@tufts.edu	
2024 SPRG	Primary	Gavin Finn	Gavin.Finn@tufts.edu	
2024 SPRG	Primary	Michael Jahn	Michael.Jahn@tufts.edu	
2024 SPRG	Primary	Vladimir Podolskiy	Vladimir.Podolskii@tufts.edu	
Content and prerequisites to be announced. Over the past three years, special topics courses have been offered in parallel computing, graph drawing, computational geometry, multimedia data compression, cryptography and security, digital network communication, spoken language systems, system and network administration, and machine learning. Please see departmental website for specific details.				

105893	Algorithms			
Subject:	Catalog Nbr:			
CS	0160			
2023 SUMR	Primary	Ambrose Laing	No Email on file.	
2024 FALL	Primary	Karen Edwards	Karen.Edwards@tufts.edu	
2024 FALL	Primary	Vladimir Podolskiy	Vladimir.Podolskii@tufts.edu	
2024 SPRG	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu	
Introduction to the study of algorithms. Strategies such as divide-and-conquer, greedy methods, and dynamic programming. Graph algorithms, sorting, searching, integer arithmetic, hashing, and NP-complete problems. High demand (see "course notes" for signup procedure).				

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105952	Computational Geometry			
Subject:	Catalog Nbr:			
CS	0163			
2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu	
(Cross-listed as MATH 181.) Design and analysis of algorithms for geometric problems. Topics include proof of lower bounds, convex hulls, searching and point location, plane sweep and arrangements of lines, Voronoi diagrams, intersection problems, decomposition and partitioning, farthest-pairs and closest-pairs, rectilinear computational geometry.				
Recommendations: CS 160				

105973	Cryptography	
Subject:	Catalog Nbr:	
CS	0165	
A mathematical approach to how codes and ciphers work, and how they can be broken. Private key (symmetric) and public key (asymmetric) cryptography. Block and stream ciphers, protocols for key exchange, hashing, message authentication, digital signatures, secret sharing, and digital cash. Recommendations: CS 15 and (CS/Math 61 or Math 65).		

105995	Computational Biology			
Subject:	Catalog Nbr:			
CS	0167			
2024 SPRG	Primary	Donna Slonim	Donna.Slonim@tufts.edu	
(Cross listed as BME 167) Computational challenges in molecular biology, including sequence alignment and comparison, genomic annotation, transcriptomic data analysis, and proteomics. Underlying computational techniques such as dynamic programming, hidden Markov models, statistical analyses, and search and optimization procedures.				

106079	Computation Theory				
	Subject:	Catalog Nbr:			
	CS	0170			
	2023 SPRG	Primary	Antonella Di Lillo	No Email on file.	
	2023 SUMR	Primary	Ambrose Laing	No Email on file.	
	2024 FALL	Primary	Megumi Ando	Megumi.Ando@tufts.edu	
	2024 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu	
	2024 SPRG	Primary	Megan Monroe	Megan.Monroe@tufts.edu	
(Cross-listed as MATH 191). Models of computation: Turing machines, pushdown automata, and finite automata. Grammars and formal languages, including context-free languages and regular sets. Important problems, including the halting problem and language equivalence theorems.					

Course Bulletin

106100	Human Computer Interaction				
Subject:		Catalog Nbr:			
CS		0171			
2024 SPRG		Primary	Robert Jacob	jacob@cs.tufts.edu	
Introduction to human-computer interaction, or how computers communicate with people. Methodology for designing and testing user interfaces, interaction styles (command line, menus, graphical user interfaces, virtual reality), interaction techniques (voice, gesture, eye movement), design guidelines, and user-interface management system software. Students will design a small user interface, program a prototype, and test the result for usability. Recommendations: CS 15 or graduate standing					

106119	Computer Graphics		
Subject:	Catalog Nbr:		
CS	0175		
The course provides the background to understand and build interactive graphics systems. Introduction to computer graphics from simple two-dimensional graphics through three-dimensional viewing and transforms. Interactive graphics programming, raster graphics, raster algorithms, geometrical transformations, viewing in three dimensions, modeling and hierarchical data structures, visual realism, virtual reality, interaction devices, tasks and techniques. Final project. Recommendations: MATH 42 or 44, and MATH 70 or 72, or graduate standing.			

106140	Software Engineering			
Subject:	Catalog Nbr:			
CS	0121			
2023 SUMR	Primary	Ronald Simmons	Ronald.Simmons@tufts.edu	
2024 FALL	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu	
Core principles and ideas that enable development of large-scale software systems, with a focus on programming. Abstraction, modularity, design patterns, specification, testing, verification, and debugging.				

106184	Compilers				
Subject:		Catalog Nbr:			
CS		0107			
2024 FALL		Primary	Richard Townsend	Richard.Townsend@tufts.edu	
Translation and implementation of programming languages. Parsing, code generation, and optimization. Compiler design projects for simple block-structured programming languages are used to illustrate the concepts and methods.					

106268	Directed Study			
Subject:	Catalog Nbr:			

Course Bulletin

CS	0193			
	2023 SPRG	Primary	Fabrizio Santini	Fabrizio.Santini@tufts.edu
	2023 SPRG	Primary	Antonella Di Lillo	No Email on file.
	2024 FALL	Primary	Ethan Danahy	ethan.danahy@tufts.edu
	2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu
	2024 FALL	Primary	Robert Jacob	jacob@cs.tufts.edu
	2024 FALL	Primary	Alva Couch	alva.couch@tufts.edu
	2024 FALL	Primary	Soha Hassoun	soha.hassoun@tufts.edu
	2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu
	2024 FALL	Primary	Megumi Ando	Megumi.Ando@tufts.edu
	2024 FALL	Primary	Ming Chow	ming.chow@tufts.edu
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	2024 FALL	Primary	Donna Slonim	Donna.Slonim@tufts.edu
	2024 FALL	Primary	Remco Chang	Remco.Chang@tufts.edu
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	2024 FALL	Primary	Mark Sheldon	Mark.Sheldon@tufts.edu
	2024 FALL	Primary	Fahad Dogar	Fahad.Dogar@tufts.edu
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	2024 SUMR	Primary	Samuel Guyer	Samuel.Guyer@tufts.edu
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	2024 SUMR	Primary	Bert Huang	No Email on file.

Guided study of an approved topic. Please see departmental website for specific details.

Course Bulletin

106309		Honors Thesis-computer Science A		
Subject: CS		Catalog Nbr: 0197		
2024 FALL	Primary	Robert Jacob	jacob@cs.tufts.edu	
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2024 FALL	Primary	Antonella Di Lillo	No Email on file.	
Honors Thesis Computer Science.Please see departmental website for specific details.				

106526		Computational Learning Theory		
Subject:		Catalog Nbr:		

Course Bulletin

CS	0236
Probabilistic and adversarial models of machine learning. Development and analysis of machine learning principles and algorithms, their computational complexity, data complexity and convergence properties. Computational and cryptographic limitations on algorithms for machine learning. Recommendations: CS 160, EE 104 or MATH 162, or permission of instructor.	

107336	Advanced Special Topics
Subject: CS	Catalog Nbr: 0250
Content and prerequisites to be announced. Please see departmental website for specific details.	

107376	Advanced Algorithms
Subject: CS	Catalog Nbr: 0260
2023 SPRG	Primary Lenore Cowen lenore.cowen@tufts.edu
(Cross-listed as MATH 221) Design and analysis of sequential, parallel, probabilistic, and approximation algorithms. Graph algorithms, sorting, searching, geometric algorithms, mathematical programming, lower bounds, and intractable problems. Recommendations: CS 160	

107398	Advanced Computational Geometry
Subject: CS	Catalog Nbr: 0263
2023 SPRG	Primary Diane Souvaine Diane.Souvaine@tufts.edu
(Cross-listed as MATH 281.) Design and analysis of sequential, parallel, probabilistic, and approximation algorithms for geometry problems. Geometric data structures, complexity, searching, computation, and applications. Selected advanced topics. Recommendations: CS 163 or permission of instructor.	

107416	Parallel Computation
Subject: CS	Catalog Nbr: 0265
Existing and proposed architectures for parallel computation. Fundamental synchronization and communication protocols. Algorithm development for distributed memory multicomputers. Recommendations: CS 15 and 160.	

107435	Theory Of Computation
Subject: CS	Catalog Nbr: 0270

Course Bulletin

Computability, undecidability, computational complexity.
Recommendations: CS 170.

107460	User-interface Software
Subject: CS	Catalog Nbr: 0272
Emerging new non-WIMP (window icon menu pointer) user interface styles, such as virtual reality, lightweight, non-command, tangible, natural, continuous, and parallel interfaces. Techniques, languages, abstractions, and tools for building current and future user-computer interfaces. Project in designing, prototyping, and building a non-WIMP user interface, with class discussions and critiques. Recommendations: CS 15, plus a course related to human-computer interaction.	

107474	Advanced Computer Graphics
Subject: CS	Catalog Nbr: 0275
Advanced Topics in Computer Graphics. Emphasis will change from year to year and may include physics-based modeling (including particle systems, animation kinematics, deformation, fluid modeling), advanced rendering techniques, shape representation and modeling, and computer animation. Recommendations: CS 175 and a good working knowledge of the C programming language.	

107496	Data Visualization
Subject: CS	Catalog Nbr: 0277
Selected advanced topics on the visualization of abstract structures, user-interface design, scientific visualization, visual languages, and graph drawing. The course includes the study and design of applications to software visualization, digital libraries, and multimedia. The class format is seminar style with presentation of research papers. Final projects will use advanced visualization tools. Recommendations: CS 160 or permission of instructor.	

107687	Programming Project
Subject: CS	Catalog Nbr: 0290
Independent development of a complete computer program for an approved task, including design, implementation, and documentation. Please see departmental website for specific details.	

107993	Hydraulics
Subject: CEE	Catalog Nbr: 0012
2023 SPRG	Primary Robert Viesca
	Robert.Viesca@tufts.edu

Course Bulletin

2024 SPRG	Primary	Greses Perez	Greses.Perez@tufts.edu
The application of principles of fluid mechanics to problems of engineering design and practice. The equations of continuity, momentum, and energy are applied to problems in river engineering, dam design, hydromachinery, floodplain delineation, water-distribution systems, culverts, turbines, and other hydraulic structures. With laboratory.			

108013	Structural Analysis		
Subject: CEE	Catalog Nbr: 0022		
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu
A first course in the application of mechanics to the analysis of structures, with the major emphasis on structural forms important to civil engineering. Deflections calculations of beams and frames using differential equations and moment-area theorems. Deflection of trusses and frames using virtual work. Indeterminate structural analysis using flexibility and stiffness methods. Moving loads calculations using influence lines. Introduction to computer analysis of structures. With laboratory.			

108055	Steel Design		
Subject: CEE	Catalog Nbr: 0024		
2024 SPRG	Primary	Brian Brenner	brian.brenner@tufts.edu
Design of steel structural members. Determination of stresses and strains in structural members, the proportioning of members, and the design of connections for beams, girders, trusses, and frames. Work in structural representation.			

108061	Masters In Bioengineering Seminar I		
Subject: BIOE	Catalog Nbr: 0291		
2024 FALL	Primary	James Van Deventer	James.Van_Deventer@tufts.edu
A weekly seminar and discussion session led by members of the Bioengineering faculty and invited speakers to present topics in biotechnology research, bioethics, and biotechnology finance and entrepreneurship.			

108075	Reinforced Concrete Design		
Subject: CEE	Catalog Nbr: 0025		
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu
Analysis and design of reinforced concrete members. Working stress and ultimate strength theories are applied to beams, girders, slabs, columns, walls, and footings. Use of these elements in various structures is studied.			

Course Bulletin

108087	Masters In Bioengineering Seminar II			
Subject: BIOE		Catalog Nbr: 0292		
2024 SPRG		Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
A weekly journal club seminar series where the current technical literature is reviewed and discussed. Student presentations of ongoing research activities.				

108096	Pollutant Fate and Transport			
Subject:		Catalog Nbr:		
CEE		0034		
2024 FALL	Primary	John Durant	john.durant@tufts.edu	
Basic principles of fate and transport related to environmental engineering. Thermodynamics, equilibrium, kinetics, mass balance, chemical partitioning, advection, dispersion and reactions for predicting behavior of pollutants in air, water, and soil. Techniques for measuring dissolved oxygen, biochemical oxygen demand, nutrients, sewage indicator bacteria, airborne particles and hydrocarbons, and other pollutants. Applications to environmental processes. With laboratory.				

108121	Engineering for a Sustainable and Resilient Society			
Subject:	Catalog Nbr:			
CEE	0032			
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu	
Quantitative description of natural and engineered processes affecting environmental sustainability at local, regional, and global scales. Principles of ecology, material and energy flows, environmental quality, climate change, and resiliency in a civil and environmental engineering context.				

108135		Master's Project			
Subject:		Catalog Nbr:			
CS		0293			
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu		
2024 FALL	Primary	Robert Jacob	jacob@cs.tufts.edu		
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Course Bulletin

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2024 FALL	Primary	Bert Huang	No Email on file.
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2024 SPRG	Primary	Karen Edwards	Karen.Edwards@tufts.edu
2024 SPRG	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
Guided individual study of an approved topic suitable for a master's design project. Please see departmental website for specific details.			
Faculty consent required. Students sign up for a section that corresponds to a faculty member.			

108143	Introduction To Geotechnical Engineering		
Subject: CEE	Catalog Nbr: 0042		
2024 SPRG	Primary	Lucy Jen	Lucy.Jen@tufts.edu
2024 SPRG	Primary	John Germaine	John.Germaine@tufts.edu
The engineering properties of soils and the behavior of soil masses subjected to loads and fluid flow. Flow of water through and stress in soil. Investigation of permeability, compressibility, and strength of soil. With laboratory.			

108232	Masters Thesis		
Subject: CS	Catalog Nbr: 0295		
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu
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2024 SUMR	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu

Guided individual study of an approved topic suitable for a master's design project. Please see departmental website for specific details.

Faculty consent required. Students sign up for a section that corresponds to a faculty member.

108235
Introduction To Hazardous Materials Management

Subject: Catalog Nbr:

Course Bulletin

CEE 0039

(Cross-listed as ENV 70.) A survey of technology, health, and policy issues in hazardous materials and hazardous waste management. Topics will be examined from a scientific and technological perspective and will include characteristics of hazardous materials; health effects; hazard, exposure, and risk assessment; regulatory framework; distribution of contaminants in the environment; and an overview of remedial technologies used to clean up hazardous waste.

Recommendations: CHEM 1 or 16, ES 11 or BIO 13, and CEE 1 or CEE 32

108250		Masters Thesis		
Subject: CS		Catalog Nbr: 0296		
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2023 SPRG	Primary	Antonella Di Lillo	No Email on file.	
2024 SPRG	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
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Guided individual study of an approved topic suitable for a master's design project. Please see departmental website for specific details.			

108269	Dissertation Research		
Subject:	Catalog Nbr:		
CS	0297		
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2024 SUMR	Primary	Ming Chow	ming.chow@tufts.edu
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Course Bulletin

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2024 SUMR	Primary	Martin Allen	Martin.Allen@tufts.edu
2024 SUMR	Primary	Richard Townsend	Richard.Townsend@tufts.edu
2024 SUMR	Primary	David Lillethun	David.Lillethun@tufts.edu
Guided research on a topic suitable for a doctoral dissertation. Please see departmental website for specific details.			
Prerequisites: Ph.D. student standing in Computer Science			

108280	Capstone Design		
Subject:	Catalog Nbr:		
CEE	0081		
2024 SPRG	Primary	Eric Hines	Eric.Hines@tufts.edu
2024 SPRG	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu
Integrated design and project management methods used in conceiving and developing one-of-a-kind civil and environmental engineering design projects. Teamwork; project planning and scheduling; conceptual and detail design elements; comparison of design alternatives based on tradeoffs in performance, life cycle costs, sustainability, and resiliency; considerations of risk and uncertainty; emphasis on visual, oral, and written communication.			

108304	Non Major Credit		
Subject:	Catalog Nbr:		
CS	0310		

108316	Scientific Reading, Writing, and Presentations		
Subject:	Catalog Nbr:		
BME	0006		
2024 SPRG	Primary	Nisha Iyer	Nisha.Iyer@tufts.edu
2024 SPRG	Primary	Angela Lai	Angela.Lai@tufts.edu
Technical and scientific literature databases, review of scientific manuscripts and proposals, professional preparation and delivery of technical/scientific presentations, and preparation of technical proposals based on proper technical writing.			

108330	Lower Level Elective Crd		
Subject:	Catalog Nbr:		
CS	0320		

Course Bulletin

108346	Special Topics In Civil And Environmental Engineering A		
Subject:	Catalog Nbr:		
CEE	0093		
Topical courses offered within civil and environmental engineering.			

108350		Upper Level Elective Crd	
Subject:		Catalog Nbr:	
CS		0330	

108359	Biomedical Engineering Senior Design I				
	Subject:	Catalog Nbr:			
	BME	0007			
	2023 SPRG	Primary	David Kaplan	david.kaplan@tufts.edu	
	2023 SPRG	Primary	Joseph Brown	No Email on file.	
	2024 FALL	Primary	Angela Lai	Angela.Lai@tufts.edu	
Critical thinking approaches in design and research. Planning, initiation, and evaluation of design and research projects, goals, and processes. Students will be required to regularly report on the status and progress of their design/research activities, and to formally and critically evaluate their projects.					
Enrollment Restriction: BME first major and senior standing					
Recommendation: BME 6					

108363	Independent Study			
Subject:	Catalog Nbr:			
CEE	0094			
2023 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu	
2023 SPRG	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu	
Supervised, independent study of topics related to civil and environmental engineering. Departmental consent required.				

108393	Research Thesis A			
Subject:	Catalog Nbr:			
CEE	0095			
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu	
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu	
A course that permits the student to perform supervised research in a specialized field of civil and environmental engineering. Recommendations: Consent of instructor.				

Course Bulletin

108400	Biomedical Engineering Senior Design II			
Subject: BME		Catalog Nbr: 0008		
2023 SPRG		Primary	David Kaplan	david.kaplan@tufts.edu
2023 SPRG		Primary	Joseph Brown	No Email on file.
2024 FALL		Primary	Angela Lai	Angela.Lai@tufts.edu
Continuation of the design/research activities planned, initiated, and evaluated in BME 7. Students will be required to submit regular progress reports, a final written report, and make a course-end oral presentation. Prerequisites: BME 7, BME first major, and senior standing				

108412	Research Thesis B			
Subject: CEE		Catalog Nbr: 0096		
2023 SPRG		Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu
2024 SPRG		Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu
A course that permits the student to perform supervised research in a specialized field of civil and environmental engineering. Recommendations: Consent of instructor.				

108430	Biophysics			
Subject: BME		Catalog Nbr: 0025		
2024 SPRG		Primary	Peggy Cebe	peggy.cebe@tufts.edu
(Cross-listed as BIO 119, PHY 25.) Presentation at an introductory level of selected topics in physics relevant to modern medicine and biology. Development of topics to the point of application to biomedical problems. Topics drawn from acoustics, physics of fluids, diffusion, laser physics, and other subjects varying from year to year. Offered alternate years. (Also offered as 100-level.) Recommendations: PHY 1, 2, or 11, 12 or permission of instructor. Corequisite: MATH 42 (formerly MATH 13).				

108431	Internship In Civil And Environmental Engineering			
Subject: CEE		Catalog Nbr: 0199		
2024 FALL		Primary	Babak Moaveni	Babak.Moaveni@tufts.edu
2024 SUMR		Primary	Lucy Jen	Lucy.Jen@tufts.edu
2024 SUMR		Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu
2024 SUMR		Primary	John Germaine	John.Germaine@tufts.edu
Internship in a field related to Civil and Environmental Engineering practice. Application of knowledge and skills developed in the classroom in a professional situation having practical significance				

Course Bulletin

108451	Introduction To Biomedical Engineering
Subject: BME	Catalog Nbr: 0050
(Cross-listed as EE 50.) An introduction to the interdisciplinary nature of biomedical engineering. The biological, chemical, electrical, and mechanical principles involved in the design and operation of medical devices. Biopotentials, electrodes, transducers, biocompatibility of materials, and patient safety. Recommendations: PHY 2 or PHY 12, or permission of instructor.	

108473	Introduction To Biophotonics
Subject: BME	Catalog Nbr: 0151
2024 SPRG	Primary Irene Georgakoudi Irene.Georgakoudi@tufts.edu
(cross-listed as EE151 and MSE151) Basic concepts in electromagnetism and light matter interactions, including optical properties, absorption, near-infrared, light scattering and fluorescence spectroscopy, microscopy, optical coherence tomography and photodynamic therapy and their relevance to human disease diagnostic and therapeutic applications.	

108475	Finite Element Analysis
Subject: CEE	Catalog Nbr: 0105
2024 SPRG	Primary Masoud Sanayei masoud.sanayei@tufts.edu
(Cross-listed as ME 177 & MSE 161). Finite element analysis of problems important in structural engineering. Overview of direct stiffness method. Discretization of continuum to finite elements for approximate solution of complex engineering problems. Development of governing equations, stiffness and load matrices for deformation and stress analysis. Work and energy theorems. Hands-on experience with industry-standard software and practical applications in structural engineering. Recommendations: CEE 22 or ME 41 or consent of instructor	

108507	Structural Dynamics
Subject: CEE	Catalog Nbr: 0106
(Cross-listed as ME 0178) Fundamentals of vibration theory with applications important in structural engineering. Free, forced, and transient vibration analysis. Time and frequency domain analysis of single and multi-degree of freedom systems. Natural frequencies and normal modes of vibration. Vibration mitigation and base isolation. Understanding behavior of structures subjected to various dynamic loads such as wind, earthquake, machine vibration, and ambient vibration. Hands-on experience with industry-standard software and practical applications in structural engineering.	

108523	Biophotonics Laboratory
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Course Bulletin

Subject: BME	Catalog Nbr: 0156	2024 FALL	Primary	Matthew Lindley	Matthew.Lindley@tufts.edu
(Cross-listed as BME 156) Biophotonic approaches used to characterize biological specimens including standard microscopy (brightfield, phase contrast, fluorescence), depth-resolved microscopy (confocal fluorescence and reflectance, two-photon excited fluorescence and second harmonic generation), near infrared spectroscopy, and photoacoustic imaging.					

108529	Hydrology of the Built Environment				
Subject: CEE	Catalog Nbr: 0111	2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu
(Cross-listed as ENV 112) Processes and land surface characteristics that affect stormwater flows, including land-use intensification influence on flooding, geomorphic stability, and nonpoint source pollution. Design of mitigation measures based on drainage and detention, as well as land-use planning, low impact development, best management practices, and green infrastructure.					

108544	Tufts Abroad Program				
Subject: CS	Catalog Nbr: 0340	2023 FALL	Primary	Susan Sanchez-Casal	susan.sanchez_casal@tufts.edu
		2023 FALL	Primary	Meredith Hyde	Meredith.Hyde@tufts.edu
		2023 FALL	Primary	Isabela Secanechia	Isabela.Secanechia@tufts.edu
		2023 SPRG	Primary	Jeanne Fourneyron	Jeanne.Fourneyron@tufts.edu
Subject: CS	Catalog Nbr: 0340				

108547	Quantitative Biomaterials Characterization Laboratory	
Subject:	Catalog Nbr:	
BME	0157	
(cross-listed as MSE 157) Methods used to characterize biomaterials including mass spectrometry, scanning electron microscopy, optical spectroscopy and flow cytometry.		

108548	Groundwater	
Subject:	Catalog Nbr:	
CEE	0113	
(Cross-listed as ENV 113 and ECS 131). he geology and hydrology of groundwater. Topics include: hydraulic properties of soils, sediments, and rocks; physics of groundwater flow; flow nets, modeling groundwater systems; geology of regional flow; aquifer exploration and water well construction methods; well hydraulics		

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and aquifer testing; applications in the geosciences and in civil /geotechnical/environmental engineering.
Recommendations: EOS 1 or 2, PHY 1 or 11, and MATH 32.

108564	Masters Degree Continuation
Subject: CS	Catalog Nbr: 0401
Part-time.Please see departmental website for specific details.	

108569	Field Methods In Hydrogeology
Subject: CEE	Catalog Nbr: 0114
(Cross-listed as EOS 133). Field aspects of hydrogeology, groundwater mapping and sampling, aquifer testing, well drilling, monitoring, and instrumentation of boreholes. Lecture and basic field methods to understand how monitoring and production wells are planned and drilled, and what types of geologic, geophysical, and geochemical data can be gathered for subsurface flow systems. A network of boreholes on the Tufts campus will be used as field sites to characterize subsurface parameters in the unsaturated and saturated zones, and study regional flow in an urban watershed. Field trips, quantitative analysis of hydrogeologic data. Recommendations: EOS 002 (formerly GEO 002) and PHY 011 or equivalent.	

108571	Introduction To Human Factors And Ergonomics
Subject: BME	Catalog Nbr: 0061
(Cross-listed as ENP 61.) A practical introduction to human performance and to designing for human use. Studies include human factors, ergonomics, work stations, and environmental and legal concerns that impact on design. Examples of good and bad designs illustrate course principles.	

108584	Masters Degree Continuation
Subject: CS	Catalog Nbr: 0402
2024 SUMR	Primary Diane Souvaine Diane.Souvaine@tufts.edu
Full-time.Please see departmental website for specific details.	

108591	Molecular Biotechnology
Subject: BME	Catalog Nbr: 0162
2024 FALL	Primary Monir Ejemel Monir.Ejemel@tufts.edu
2024 SPRG	Primary Lorin Polidora Lorin.Polidora@tufts.edu
2024 SPRG	Primary Niall Lennon Niall.Lennon@tufts.edu
(Cross-listed as CHBE 162 and BIO 162) Overview of key aspects of molecular biology and engineering aspects	

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of biotechnology. Lecture topics include molecular biology, recombinant DNA techniques, immunology, cell biology, protein purification, fermentation, cell culture, combinatorial methods, bioethics, and bioinformatics with review and discussion of primary literature. Comprehensive technical paper on an emerging topic. Students may not receive credit for both BME/CHBE/BIO 162 and BME 33. Recommendations: CHEM 1, BIO 13 or permission of instructor.

108606		Grad Teaching Assistant		
Subject: CS		Catalog Nbr: 0405		
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 FALL	Primary	Robert Jacob	jacob@cs.tufts.edu	
2024 FALL	Primary	Alva Couch	alva.couch@tufts.edu	
2024 FALL	Primary	Soha Hassoun	soha.hassoun@tufts.edu	
2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu	
2024 FALL	Primary	Ming Chow	ming.chow@tufts.edu	
2024 FALL	Primary	Lenore Cowen	lenore.cowen@tufts.edu	
2024 FALL	Primary	Peter Love	Peter.Love@tufts.edu	
2024 FALL	Primary	Donna Slonim	Donna.Slonim@tufts.edu	
2024 FALL	Primary	Norman Ramsey	Norman.Ramsey@tufts.edu	
2024 FALL	Primary	Andrew Winslow	Andrew.Winslow@tufts.edu	
2024 FALL	Primary	Remco Chang	Remco.Chang@tufts.edu	
2024 FALL	Primary	Matthias Scheutz	Matthias.Scheutz@tufts.edu	
2024 FALL	Primary	Noah Mendelsohn	Noah.Mendelsohn@tufts.edu	
2024 FALL	Primary	Mark Sheldon	Mark.Sheldon@tufts.edu	
2024 FALL	Primary	Partha Biswas	Partha.Biswas@tufts.edu	
2024 FALL	Primary	Fahad Dogar	Fahad.Dogar@tufts.edu	
2024 FALL	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu	
2024 FALL	Primary	Megan Monroe	Megan.Monroe@tufts.edu	
2024 FALL	Primary	Fabrizio Santini	Fabrizio.Santini@tufts.edu	
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu	
2024 FALL	Primary	Liping Liu	Liping.Liu@tufts.edu	
2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu	
2024 FALL	Primary	Susan Landau	Susan.Landau@tufts.edu	
2024 FALL	Primary	Karen Edwards	Karen.Edwards@tufts.edu	
2024 FALL	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu	
2024 FALL	Primary	Michael Hughes	Michael.Hughes@tufts.edu	
2024 FALL	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu	
2024 FALL	Primary	Elaine Short	Elaine.Short@tufts.edu	
2024 FALL	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu	
2024 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu	
2024 FALL	Primary	Richard Townsend	Richard.Townsend@tufts.edu	
2024 FALL	Primary	Abani Patra	Abani.Patra@tufts.edu	
2024 FALL	Primary	Daniel Votipka	Daniel.Votipka@tufts.edu	
2024 FALL	Primary	Bert Huang	No Email on file.	

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2024 FALL	Primary	David Lillethun	David.Lillethun@tufts.edu
2024 FALL	Primary	Ronald Simmons	Ronald.Simmons@tufts.edu
2024 FALL	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu
2024 FALL	Primary	Johes Bater	Johes.Bater@tufts.edu
2024 FALL	Primary	Antonella Di Lillo	No Email on file.
2024 FALL	Primary	Michael Jahn	Michael.Jahn@tufts.edu
2024 SPRG	Primary	Megumi Ando	Megumi.Ando@tufts.edu
2024 SPRG	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu
2024 SPRG	Primary	Jitendra Singh	Jitendra.Singh@tufts.edu
2024 SPRG	Primary	Cody Doucette	Cody.Doucette@tufts.edu
2024 SPRG	Primary	Roy Shilkrot	Roy.Shilkrot@tufts.edu
2024 SUMR	Primary	Jennifer Mooney	No Email on file.

108622	Solid Mechanics
Subject: CEE	Catalog Nbr: 0122
(Cross-listed as ME 120). Strain tensor, stress tensor, elastic stress analysis, isotropic and anisotropic materials, torsion problem, inelastic behavior of materials, elements of plasticity and creep. Recommendations: ES 9 Strength of Materials or equivalent.	

108627	Grad Research Assistant			
Subject:	Catalog Nbr:			
CS	0406			
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 FALL	Primary	Robert Jacob	jacob@cs.tufts.edu	
2024 FALL	Primary	Alva Couch	alva.couch@tufts.edu	
2024 FALL	Primary	Soha Hassoun	soha.hassoun@tufts.edu	
2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu	
2024 FALL	Primary	Ming Chow	ming.chow@tufts.edu	
2024 FALL	Primary	Lenore Cowen	lenore.cowen@tufts.edu	
2024 FALL	Primary	Peter Love	Peter.Love@tufts.edu	
2024 FALL	Primary	Donna Slonim	Donna.Slonim@tufts.edu	
2024 FALL	Primary	Norman Ramsey	Norman.Ramsey@tufts.edu	
2024 FALL	Primary	Remco Chang	Remco.Chang@tufts.edu	
2024 FALL	Primary	Matthias Scheutz	Matthias.Scheutz@tufts.edu	
2024 FALL	Primary	Noah Mendelsohn	Noah.Mendelsohn@tufts.edu	
2024 FALL	Primary	Mark Sheldon	Mark.Sheldon@tufts.edu	
2024 FALL	Primary	Fahad Dogar	Fahad.Dogar@tufts.edu	
2024 FALL	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu	
2024 FALL	Primary	Megan Monroe	Megan.Monroe@tufts.edu	
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu	
2024 FALL	Primary	Liping Liu	Liping.Liu@tufts.edu	

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2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu
2024 FALL	Primary	Susan Landau	Susan.Landau@tufts.edu
2024 FALL	Primary	Karen Edwards	Karen.Edwards@tufts.edu
2024 FALL	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu
2024 FALL	Primary	Michael Hughes	Michael.Hughes@tufts.edu
2024 FALL	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
2024 FALL	Primary	Elaine Short	Elaine.Short@tufts.edu
2024 FALL	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu
2024 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu
2024 FALL	Primary	Richard Townsend	Richard.Townsend@tufts.edu
2024 FALL	Primary	Abani Patra	Abani.Patra@tufts.edu
2024 FALL	Primary	Daniel Votipka	Daniel.Votipka@tufts.edu
2024 FALL	Primary	Bert Huang	No Email on file.
2024 FALL	Primary	David Lillethun	David.Lillethun@tufts.edu
2024 FALL	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu
2024 FALL	Primary	Johes Bater	Johes.Bater@tufts.edu
2024 FALL	Primary	Antonella Di Lillo	No Email on file.
2024 SPRG	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu
2024 SUMR	Primary	Jennifer Mooney	No Email on file.

108640	Advanced Structural Systems Analysis		
Subject:	Catalog Nbr:		
CEE	0123		
2024 FALL	Primary	Po-Shang Chen	Po-Shang.Chen@tufts.edu
The application of mechanics to the analysis of indeterminate structural forms important to civil and aeronautical engineering, with emphasis on modern structural types. The analysis of fundamental structural forms, including curved beams, arches, rings, thin-walled cell-type structures, and members with variable inertia, for stress and deflection by the classical methods. Influence lines for indeterminate structures. Introduction to matrix analysis and vibration of structures. Recommendations: CEE 22.			

108650	Internship		
Subject:	Catalog Nbr:		
BME	0087		
2024 FALL	Primary	Lorin Polidora	Lorin.Polidora@tufts.edu
Supervised internships at suitable locations in industry and government. Internships are offered on basis of availability. Term paper required. Credit not given retroactively. Prior arrangements necessary.			

108651	Doctoral Degree Continuation		
Subject:	Catalog Nbr:		
CS	0501		

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Part-time. Please see departmental website for specific details.

108662	Advanced Steel Design			
Subject:	Catalog Nbr:			
CEE	0124			
2024 FALL	Primary	Brian Brenner		brian.brenner@tufts.edu
An advanced course in steel design using the Load Resistance Factor Design (LRFD). Component design, connections, composite and built-up sections are covered. Design problems involve braced and rigid structures subjected to gravity, wind, and seismic loads. Recommendations: CEE 24 and consent of instructor				

108667	Doctoral Degree Continuation			
Subject:	Catalog Nbr:			
CS	0502			
2024 SUMR	Primary	Diane Souvaine		Diane.Souvaine@tufts.edu
Full-time. Please see departmental website for specific details.				

108673	Internship			
Subject:	Catalog Nbr:			
BME	0088			
2024 SUMR	Primary	Lorin Polidora		Lorin.Polidora@tufts.edu
Internships at suitable locations in industry and government. Internships are offered on basis of availability. Term paper required. Credit not given retroactively. Prior arrangements necessary.				

108679	Advanced Reinforced Concrete			
Subject:	Catalog Nbr:			
CEE	0125			
2024 SPRG	Primary	Daniel Kuchma		Dan.Kuchma@tufts.edu
Further study of concrete design with emphasis on columns with biaxial bending, flat slab theory and design, torsion, and the analysis and design of prestressed concrete structural members. Recommendations: CEE 25				

108692	Honors Thesis A			
Subject:	Catalog Nbr:			
BME	0089			
2024 FALL	Primary	David Kaplan		david.kaplan@tufts.edu
2024 FALL	Primary	Sergio Fantini		sergio.fantini@tufts.edu
2024 FALL	Primary	Irene Georgakoudi		Irene.Georgakoudi@tufts.edu
2024 FALL	Primary	Fiorenzo Omenetto		Fiorenzo.Omenetto@tufts.edu

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2024 FALL	Primary	Lauren Black III	Lauren.Black@tufts.edu
2024 FALL	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 FALL	Primary	Brian Timko	Brian.Timko@tufts.edu
2024 FALL	Primary	Madeleine Oudin	Madeleine.Oudin@tufts.edu
2024 FALL	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu
2024 FALL	Primary	Juan Gnecco	Juan.Gnecco@tufts.edu
2024 FALL	Primary	Nisha Iyer	Nisha.Iyer@tufts.edu
Supervised research on a topic that has been approved as a suitable subject for an honors thesis. The work is performed over the fall and spring semesters of the senior year. Please see departmental website for specific details. Recommendations: Senior standing or permission of instructor.			

108699	Structural Stability
Subject: CEE	Catalog Nbr: 0126
Elastic buckling of columns, including the effects of initial crookedness and eccentricity. Large deflections of the Euler column. Tangent modulus and double modulus theory. Beam columns and the stability of frameworks and trusses. Torsional buckling of columns and lateral buckling of beams. Plate buckling with applications to flange buckling and web crippling of plate girders. Recommendations: ES 9 and CEE 22, or consent of instructor	

108712	Honors Thesis B			
Subject:	Catalog Nbr:			
BME	0090			
2024 SPRG	Primary	David Kaplan	david.kaplan@tufts.edu	
2024 SPRG	Primary	Sergio Fantini	sergio.fantini@tufts.edu	
2024 SPRG	Primary	Irene Georgakoudi	Irene.Georgakoudi@tufts.edu	
2024 SPRG	Primary	Fiorenzo Omenetto	Fiorenzo.Omenetto@tufts.edu	
2024 SPRG	Primary	Lauren Black III	Lauren.Black@tufts.edu	
2024 SPRG	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu	
2024 SPRG	Primary	Brian Timko	Brian.Timko@tufts.edu	
2024 SPRG	Primary	Madeleine Oudin	Madeleine.Oudin@tufts.edu	
2024 SPRG	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu	
2024 SPRG	Primary	Juan Gnecco	Juan.Gnecco@tufts.edu	
2024 SPRG	Primary	Nisha Iyer	Nisha.Iyer@tufts.edu	
Supervised research on a topic that has been approved as a suitable subject for an honors thesis. The work is performed over the fall and spring semesters of the senior year. Please see departmental website for specific details.				
Recommendations: Senior standing or permission of instructor.				

108721	Nonlinear Analysis of Materials and Structures
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Subject: CEE	Catalog Nbr: 0128	2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu
(Cross-listed as ME 175.) Nonlinear solid mechanics, nonlinear constitutive models and variational principles as essential prerequisites for nonlinear finite element formulations. Recommendations: ES 9.					

108734	Special Topics
Subject: BME	Catalog Nbr: 0093
Guided study of an approved topic in biomedical engineering.	

108745	Bridge Design And Rehabilitation			
Subject:	Catalog Nbr:			
CEE	0129			
2023 SPRG	Primary	Brian Brenner	brian.brenner@tufts.edu	
A practical introduction to bridge engineering, exploring the design, behavior, maintenance and rehabilitation of bridges. Bridge systems, loadings, superstructures, substructures, details, and inspections will be discussed. The theory behind development of certain provisions in AASHTO code will be reviewed, with the purpose of developing an understanding of the code and its related commentary, and the objective of preparing students to use the criteria not as a "black box." Approximate analysis methods will be discussed. Design of elements including steel and pre-stressed concrete beams, abutments, piers, joints, and bearings using AASHTO code (LRFD) will be covered.				

108762	Special Topics
Subject: BME	Catalog Nbr: 0094
Guided study of an approved topic in biomedical engineering.	

108768	River Hydraulics and Stream Restoration			
Subject:		Catalog Nbr:		
CEE		0112		
2024 SPRG		Primary	James Limbrunner	James.Limbrunner@tufts.edu
Design of rivers and stream channels including lined aqueducts, stilling basins, water surface elevation control, and sediment stability. Influence of engineered works on natural processes such as sediment transport, wildlife migration, and flood attenuation. Stream restoration methods including nature-like riverbed and riverbank design, and aquatic organism passage design.				

108812	Environmental Engineering Processes
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Subject: CEE	Catalog Nbr: 0036	2024 SPRG	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu
Fundamental environmental engineering processes with applications in all environmental media. Particle interaction and settling, filtration, disinfection, diffusion and dispersion, sorption, mass transfer, biotic and abiotic reactions, and kinetics. Extensions to engineering design. With laboratory.					

108840	Sustainable Water Engineering
Subject: CEE	Catalog Nbr: 0133
(Cross-listed with CHBE 133) Means of providing safe, reliable, and cost-effective potable water, sanitation, and water quality protection through municipal infrastructure. Methods of ensuring resilience and adaptation to changes in source quality and climate. Treatment and process design integrating considerations of cost and sustainability. Design projects using mandated standards.	

108855	Design Of Medical Instrumentation			
Subject:	Catalog Nbr:			
BME	0100			
2024 SPRG	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu	
(Cross-listed as EE 100.) An introduction to the design principles of medical instrumentation and simple biomedical signal analysis. Topics include analysis of the instrument and subject as a linear system, characteristics of various biological signals, design of transducers, modern implementation of A/D conversion, analog and digital filters, instrumentation amplifiers, patient isolation, and battery powered equipment. Associated laboratory work. Prerequisite: ES 3				
Prerequisite: ES 3				

108886	Air Pollution and Control			
Subject:		Catalog Nbr:		
CEE		0136		
2024 SPRG		Primary	John Durant	john.durant@tufts.edu
(Cross-listed as CHBE 136) A study of health and environmental effects from air pollution, dispersion modeling, air pollution laws and regulations, fate and transport of air pollution, and design of pollution control equipment and processes.				

108908	Public Health			
Subject: CEE		Catalog Nbr: 0057		
2024 FALL		Primary	David Gute	david.gute@tufts.edu
An introduction to the public health approach is provided. The epidemiological model of the disease process is used to study a variety of infectious and noninfectious diseases. The wide variety of nonmedical approaches				

Course Bulletin

to disease control is emphasized. The public health aspects of vital statistics, evaluation, and administrative decision making are introduced and applied to current problems in public health.
Recommendations: Consent of instructor.

108931	Hazardous Waste Treatment Technologies
Subject: CEE	Catalog Nbr: 0138
(Cross-listed as CHBE138.) Hazardous waste treatment options based on physical, chemical, biological, and thermal processing technologies. Brief review of definitions and appropriate hazardous waste legislation. Introduction to pollution prevention. Traditional end-of-pipe treatment technologies. Applications to include solvent recovery, chemical fixation, land disposal, biodegradation, and special wastes. Incineration and associated environmental discharges constitute a major portion of course. Emerging technologies and evaluation of technical/economic process viability. Recommendations: Senior standing or consent of instructor.	

108951	Bioremediation: Natural And Enhanced
Subject: CEE	Catalog Nbr: 0139
(Cross-listed as ENV 139). Biodegradation of organic contaminants is evaluated in natural settings and in treatment processes. Aerobic and anaerobic pathways, their prediction and control are examined. Water, soil, and vapor phase transformations are evaluated. Subject areas include kinetics, equilibria, sorption, gas transfer, and transformation products. Process design for treatment plants and in-situ applications applied to case studies. Recommendations: CEE 132.	

108982	Geomechanics
Subject: CEE	Catalog Nbr: 0245
Introduction to the mechanics of solids focused on earth materials as porous, deformable media. Strain, stress, and equations of motion. Elasticity and seismic wave propagation. Failure, inelastic deformation, and plasticity. Role of pore fluid in deformation and failure. Consolidation. Fluid flow and Darcy's law; seepage forces and design considerations. Recommendations: ES-9, CEE-42	

109003	Site Remediation
Subject: CEE	Catalog Nbr: 0143
2024 FALL	Primary Paul Dombrowski Paul.Dombrowski@tufts.edu
(Cross-listed w/ CHBE 143). Conventional and innovative remediation technologies are examined under the remedial investigation/feasibility study (RI/FS) process. Knowledge of fundamental processes governing remedy implementation is integrated with an understanding of site characterization and applicable	

Course Bulletin

regulations to enable design of site-specific treatment systems for clean-up of the contaminated subsurface environment.

109024	Computer Methods In Geotechnical Engineering		
Subject:	Catalog Nbr:		
CEE	0145		
Computer methods for processing subsurface information and for analyzing geotechnical/geoenvironmental engineering problems. Applications to be selected from settlement, deformation, bearing capacity, slope stability, pile driving, seepage, and soil amplification analyses. Finite element and finite difference applications.			
Recommendations: CEE 42			

109049	Foundation Engineering			
Subject:	Catalog Nbr:			
CEE	0146			
2024 FALL	Primary	Lucy Jen	Lucy.Jen@tufts.edu	
Foundation engineering design, with emphasis on bearing capacity and settlement for shallow (footings) and deep (pile) foundations. Design of footings, rafts, piles, and piers subjected to axial and lateral loads; building code requirements for design; and evaluation and selection of foundation types and alternatives. Case studies.				

109068	Geotechnical Earthquake Engineering			
Subject:	Catalog Nbr:			
CEE	0247			
2024 SPRG	Primary	Laurie Baise	laurie.baise@tufts.edu	
2024 SPRG	Primary	Juan Pestana	Juan.Pestana@tufts.edu	
Review of seismicity, fault-rupture mechanisms, vibration and wave propagation theory. Deterministic and probabilistic seismic hazard analysis including ground motion prediction equations. Dynamic behavior of soils, including soil amplification concepts, liquefaction, and ground response analysis. Application of soil dynamics in terms of design codes and design ground motions. Recommendations: CEE 42 and ES56.				

109086	Earth Support Systems			
Subject:	Catalog Nbr:			
CEE	0149			
2024 SPRG	Primary	Lucy Jen	Lucy.Jen@tufts.edu	
Examination of earth pressure theories and design problems related to earth-retaining structures and tunnels. Analysis and design of braced and unbraced excavations; code requirements; strut-waler systems; tie backs; ground movement control; reinforced earth and slurry wall methods. Slope stability analysis related to excavations and retaining structures.				

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109111	Principles Epidemiology			
Subject:		Catalog Nbr:		
CEE		0154		
2024 FALL	Primary	Mark Woodin	mark.woodin@tufts.edu	
2024 FALL	Primary	Shayesteh Jahanfar	Shayesteh.Jahanfar@tufts.edu	
(Cross-listed as CH 0034.) Methods that quantify disease processes in human populations. Topics include study design, sources of inaccuracy in experimental and observational studies, the methodology of data collection, and an introduction to the statistical evaluation of epidemiological data.				
Cannot receive credit for both CEE 154 and CEE 54				

109134	Occupational And Environmental Health			
Subject:		Catalog Nbr:		
CEE		0158		
2024 SPRG		Primary	David Gute	david.gute@tufts.edu
(Cross-listed as ENV 158.) An examination of current topics in the area of occupational and environmental health, with particular emphasis on the types of materials that produce human health effects. Both clinical and epidemiologic data will be used to assess the public health importance of environmental pollutants and to evaluate the effectiveness of control strategies				
Recommendations: Senior standing or consent of instructor.				

109187	Epidemiological Methods	
Subject:	Catalog Nbr:	
CEE	0155	
(Continuation of CEE154.) Topics include the principles of data analysis, including hypothesis testing and estimation, options in study design, internal validity, screening programs, registries, and genetics. Both theoretical and practical aspects of each topic will be discussed. Recommendations: CEE 154 or CEE 54		

109213	Environmental Toxicology				
Subject: CEE		Catalog Nbr: 0157			
2024 SPRG		Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu	
(Cross-listed as ENV 167.) This course is designed to present the basic scientific principles of toxicology and the relationship of toxicology to health-based risk assessment and hazardous materials management. The toxic effects of hazardous substances on specific organ systems are described, as well as the mechanisms of action of some frequently encountered environmental contaminants. Specialized topics related to the field of toxicology are also discussed, including animal to human extrapolation of data, mutagenicity/carcinogenicity, and teratogenesis. Recommendations: Senior standing or consent of instructor.					

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109266	Quantitative Physiology II
Subject: BME	Catalog Nbr: 0122
(Cross-listed as EE 122). A laboratory course designed for students interested in advanced work in biomedical engineering. The course will involve labs covering nerve physiology, skeletal muscle physiology, and cardiopulmonary physiology, through the study of vital biological signals and their measurement. The course will be structured in modules, with labs in each module focused on 1) measurement and acquisition of the physiological data of interest and 2) computational modeling of acquired physiological data. Recommendations: BME/EE/ES 121 or BIO 115, BME/EE/ES 50, BIO 13 or ES 11, or Permission of instructor.	

109277	Health Effects And Risk Assessment
Subject: CEE	Catalog Nbr: 0153
A study of chronic and acute human health effects of exposure to hazardous materials. Principles of toxicology and pharmacokinetics of toxic substances. Standards for environmental quality, risk assessment methodologies, and risk communication strategies. Recommendations: CHEM 1 or 16, senior standing and consent of instructor	

109287	Biophysics
Subject: BME	Catalog Nbr: 0125
2024 SPRG	Primary Peggy Cebe peggy.cebe@tufts.edu
(Cross-listed as BIO 119, PHY 25 .) Presentation at an introductory level of selected topics in physics relevant to modern medicine and biology. Development of topics to the point of application to biomedical problems. Topics drawn from acoustics, physics of fluids, diffusion, laser physics, and other subjects varying from year to year. Offered alternate years. (Also offered as lower-level.) Recommendations: PHY 1, 2, or 11, 12 or permission of instructor. Corequisite: MATH 42 (formerly MATH 13).	

109305	Principles Of Medical Imaging
Subject: BME	Catalog Nbr: 0131
2024 SPRG	Primary Sergio Fantini sergio.fantini@tufts.edu
(Cross-listed as EE 131 and BIO 131.) This interdisciplinary course presents the principles of medical imaging techniques such as diagnostic ultrasound, radiography, X-ray computed tomography (CT), and magnetic resonance imaging (MRI). For each imaging modality, topics include the physical principles, key aspects of instrumentation design, mathematical methods, and the anatomical/physiological information content of the images. Representative medical images will be discussed and interpreted. This course cannot be taken for basic science requirement for engineering students. Recommendations: MATH 32 (formerly MATH 11), PHY 2 or 12, or permission of instructor.	

Course Bulletin

109326	Analytical Tools For Biomedical Engineering			
Subject:	Catalog Nbr:			
BME	0141			
2024 FALL	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu	
Statistical methods of data analysis with emphasis upon biomedical applications. Topics include Fourier analysis, probability, Bayes' theorem, interpretation of diagnostic tests (sensitivity, specificity, predictive values), random variables, covariance and correlation, normal distribution, samples, statistical tests, linear systems, spectral analysis, correlation, coherence, phase analysis, independent component analysis and principal component analysis. Data analysis will be performed with MATLAB.				
Recommendations: MATH 42, experience with MATLAB, or permission of instructor.				

109329	Legal Issues Of Engineering	
Subject:	Catalog Nbr:	
CEE	0185	
This course examines the legal principles applicable to engineering design, construction, and manufacturing. Topics covered include introduction to the legal system, sources of law, contract law principles, professional liability risks, risk management practices, contract administration, differing site conditions claims, professional registration, and ethical issues. Recommendations: Junior standing or consent of instructor		

109349	Geographical Information Systems			
Subject: CEE		Catalog Nbr: 0187		
2024 FALL		Primary	Laurie Baise	laurie.baise@tufts.edu
Spatial analysis with Geographic Information Systems (GIS), including their use for engineering applications. GIS data structure and management, techniques for spatial analysis. Applications including seismic hazard, water resources, and environmental health. Laboratory exercises in GIS.				

109370	Building Information Modeling	
Subject:	Catalog Nbr:	
CEE	0188	
Storage and organization of technical building information using Building Information Modeling (BIM). Use of geometric visualization, rendering, animation, walkthrough, and construction sequencing to gain efficiencies in 3D design review and construction management. Applications in constructability and coordination of civil structures. Laboratory experiences using industry standard software.		

109378	Biomechanics		
Subject:	Catalog Nbr:		
BME	0149		

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(Cross-listed with MSE 150) Graduate-level seminar course designed for students who are interested in getting a broad overview of different research methods and analytical techniques in human factors/ergonomics research. Topics to be covered are related to the acquiring, recording, and analyzing of empirical data. Theory underlying these methods in human factors/ergonomics research is also studied.

109421	Special Topics			
Subject:	Catalog Nbr:			
CEE	0193			
2024 SPRG	Primary	Greses Perez		Greses.Perez@tufts.edu
2024 SPRG	Primary	Farshid Vahedifard		Farshid.Vahedifard@tufts.edu
Topical courses offered within civil and environmental engineering.				

109444	Embedded Systems			
Subject:	Catalog Nbr:			
EE	0014			
2024 SPRG	Primary	Chorng Chang		chorng.chang@tufts.edu
Embedded system hardware, basic concepts of embedded software, and interfacing concepts of an embedded microprocessor; embedded programming, memory management, memory allocation, efficient hardware-aware algorithms; registers and memory; mixing assembly and high level language; real-time deadlines and timers; interrupt hardware and software systems; input/output in an embedded system; embedded application software design and analysis Prerequisites: ES4 and COMP11, or permission of instructor				

109495	Environmental Law			
Subject:	Catalog Nbr:			
CEE	0207			
2024 SPRG	Primary	Earl Phillips		Earl.Phillips@tufts.edu
(Cross-listed as UEP 207 and ENV 109) This survey course explores the evolution of environmental and natural resource law and examines if, where, and how it addresses climate change among several other pressing environmental threats. The course also reveals the challenges presented by the intersection of environmental issues and our political process and the critical role played by planners and policy makers. The course is designed for those considering careers in environmental science or engineering, environmental management, and those looking to participate (professionally or personally) in the political or regulatory process related to environment and climate issues.				

109516	Electromagnetic Fields And Waves W/lab			
Subject:	Catalog Nbr:			
EE	0018			
2024 FALL	Primary	Aseema Mohanty		Aseema.Mohanty@tufts.edu
Coordinate systems and transformations, base vectors, scalar and vector point functions, gradient,				

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divergence, curl, Laplacian, divergence theorem, Stokes theorem, source-point and field-point notation, electrostatic and magnetostatic fields and laws, scalar and vector potential functions, continuity equation, Maxwell's equations in differential and integral form, boundary conditions, wave equation, time-harmonic fields, plane waves, electromagnetic radiation, dipole antenna, Poynting theorem, distributed circuits and transmission lines. Associated laboratory work.

Recommendations: ES 3, PHYS 12, MATH 51 (formerly MATH 38).

109523	Chemical Principles In Environmental & Water Resources Engineering				
Subject:		Catalog Nbr:			
CEE		0212			
2024 FALL		Primary	Wayne Chudyk	wayne.chudyk@tufts.edu	
Basic principles of water chemistry related to environmental and water resources engineering. Thermodynamics, chemical equilibrium, acid-base reactions, alkalinity, complexation, precipitation, dissolution, sorption, and reduction-oxidation reactions. Quantitative problem solving. Fall. Recommendations: CHEM 1 or equivalent.					

109537	Introduction To Human Factors And Ergonomics	
Subject:	Catalog Nbr:	
BME	0160	
Same as BME 61, with additional requirements for graduate students. A practical introduction to human performance and to designing for human use. Studies include human factors, ergonomics, work stations, and environmental and legal concerns that impact on design. Examples of good and bad designs illustrate course principles. Includes a semester-long technical project and paper. (Also offered as lower-level.)		

109542	Transport Principles In Environmental & Water Resources Engineering	
Subject:	Catalog Nbr:	
CEE	0213	
An examination of transport phenomena in the natural or engineered environment. Topics include: momentum transport, energy transport, mass transport, interphase mass transfer, and environmental applications of ideal and non-ideal reactor models. Students will enhance their ability to apply a first principles approach for analysis of complex environmental systems. Fall. Recommendations: MATH 51 (formerly MATH 38) and ES 8, or equivalents		

109562	Environmental And Water Resource Systems				
Subject: CEE		Catalog Nbr: 0214			
2024 FALL		Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	
Mathematical models of water resource and environmental systems are presented in combination with optimization procedures, decision theory, and environmental applied statistics to generate an integrated approach to the planning, design, and management of complex water resources systems. Water resources					

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systems applications are formulated as decision problems where an optimal solution is sought, yet cost, safety, environment, and technology appear as competing constraints. Applications include regional water quality management; siting treatment plants; reservoir system operations; and design, irrigation, flood control, and watershed planning.

109563	Electronics I W/lab			
Subject:	Catalog Nbr:			
EE	0021			
2024 SPRG	Primary	Marco Donato	Marco.Donato@tufts.edu	
Complex numbers; sinusoidal steady-state circuits and phasors; impedances; frequency response of linear circuits and Bode plots; characteristics of the non-ideal operational amplifier; amplifiers and active filters using the operational amplifier; advanced topics in junction diodes; junction capacitance; diode small signal models; photodetectors and LEDs; analysis and design of diode circuits; MOSFET device operation and small-signal models; analysis and design of transistor amplifiers; basic MOS amplifier configurations. Associated laboratory work.				
Prerequisites: ES-0003 or EE-0020				

109571	Electronics II W/lab			
Subject: EE		Catalog Nbr: 0022		
2024 SPRG		Primary	Sameer Sonkusale	sameer@ece.tufts.edu
Integrated circuit realizations of MOS transistor circuits, current mirrors, active loads; Bipolar Junction Transistors, (BJT), device operation, small signal model and analysis, elementary BJT amplifier configuration; differential amplifiers, multi-stage amplifiers; frequency response of amplifiers; feedback and stability in analog circuits, nyquist stability criteria, frequency compensation; RC oscillators, LC oscillators, and waveform generators; output structures; power amplifiers; AM/FM circuits. Associated laboratory work. Students may not take both EE 22 and EE 12 for credit.				
Recommendations: EE 21.				

109581	Advanced Solid Mechanics		
Subject:	Catalog Nbr:		
CEE	0221		
(Cross-listed as ME 221). Mechanics of deformable bodies based on equilibrium, geometry of strain, and properties of materials. Theory of elasticity, plasticity, viscoelasticity and creep.			

109588		Linear Systems		
Subject:		Catalog Nbr:		
EE		0023		
2023 SPRG		Primary	Eric Miller	Eric.Miller@tufts.edu

Course Bulletin

2024 SPRG	Primary	Brian Aull	Brian.Aull@tufts.edu
Continuous and discrete signals including phasors; continuous and discrete systems and their realizations using differential and difference equations; continuous and discrete convolution and correlation; unilateral and bilateral Laplace transforms; continuous time Fourier transform; continuous time Fourier series; discrete time Fourier transform; sampling theory; unilateral and bilateral Z transform. Computational exercises focusing on problems in control and signal processing. Recommendations: EE 21, MATH 70, and MATH 51.			

109635	Recombinant DNA Techniques		
Subject: BME	Catalog Nbr: 0163		
2023 SUMR	Primary	Onur Hasturk	Onur.Hasturk@tufts.edu
2023 SUMR	Primary	Xiaoli Zhang	Xiaoli.Zhang@tufts.edu
2024 SUMR	Primary	Laura Place	Laura.Place@tufts.edu
(Cross-listed as BIO 163 and CHBE 163.) This lecture and laboratory course is designed to familiarize the student with methods employed to produce recombinant products. The lectures cover fundamental aspects of the recombinant DNA methodologies used in the laboratory as well as some commercial applications of the techniques. The laboratory provides hands-on experience with the key skills used in genetic engineering including DNA isolation, restriction enzyme mapping, cloning and selection, protein expression, gel electrophoresis, polymerase chain reaction, DNA sequencing, and related techniques. Students may not receive credit for both BME 163 and BME 33 Recommendations: CHEM 1, BIO 13, or permission of instructor.			

109650	Advanced Structural Dynamics		
Subject: CEE	Catalog Nbr: 0225		
The design of structures and structural elements to resist dynamic loads. Applications of classical, numerical, and shock spectrum methods to problems in engineering seismology, blast resistance, shock and vibration isolation, and impact, including linear and nonlinear effects. Recommendations: CEE 105 and 106.			

109681	Advanced Structural Design		
Subject: CEE	Catalog Nbr: 0228		
Please see departmental website for detailed course description. Recommendations: Consent of instructor			

109688	Principles Of Controlled Release And Drug Delivery		
Subject: BME	Catalog Nbr: 0165		
2023 SPRG	Primary	Adam Mullis	Adam.Mullis@tufts.edu

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2024 FALL	Primary	Anthony Barry	Anthony.Barry@tufts.edu
Fundamentals of drug product development and formulation with particular emphasis on novel and developing technologies for controlled release and drug delivery for biopharmaceuticals. Course includes coverage of formulation principles and discussion of the interplay between physiology, pathophysiology and dosage form development, pharmacokinetics, and novel materials used in controlled release. Recommendations: CHEM 1 or 16, BIO 13 or ES 11, ES 2, and MATH 34 (formerly MATH 12), or permission.			

109702	Digital Logic Systems W/lab		
Subject: EE	Catalog Nbr: 0026	2024 FALL	Primary
		Chorng Chang	chorng.chang@tufts.edu
Integrated circuit logic families and their characteristics. Review of combinatorial and sequential design using SSI devices. Arithmetic circuits, shift registers, and counters. Random access and read only memories. Design of memory systems. Waveshaping devices and display devices. Programmable logic arrays and their applications. Asynchronous and synchronous system design using MSI and LSI devices. Finite state machines and the specification of system controllers. Systematic approaches to controller realization. Associated laboratory work. Spring. Recommendations: ES 4 and EE 14, or permission.			

109704	Reactive Transport In Porous Media		
Subject: CEE	Catalog Nbr: 0230		
The fundamental processes governing component transported in porous media. Volume averaging, dispersion, reactive transport, non-linear and non-equilibrium sorption, anomalous transport, mass transfer, multiphase flow and transport. Theoretical foundation on which to base critical assessments of component transport in complex porous media. Spring (alternating years). Recommendations: CEE 213 or consent of instructor.			

109717	Junior Design Project		
Subject: EE	Catalog Nbr: 0031		
2023 SPRG	Primary	Ronald Lasser	Ron.Lasser@tufts.edu
2023 SPRG	Primary	Jeanne Fourneyron	Jeanne.Fourneyron@tufts.edu
2024 SPRG	Primary	Brian Aull	Brian.Aull@tufts.edu
2024 SPRG	Primary	Emily Carlson	Emily.Carlson@tufts.edu
Junior level team project with ECE faculty direction and guidance. Introduction of the engineering method: concept, planning and analysis, design, test. Integration of theoretical concepts from circuit theory, digital and analog electronics, signal processing, engineering economics, and engineering design practices to deliver a working prototype. Use of microcontroller and peripherals, analog-to-digital converters, digital signal-processors, memory and computer aided design tools. Students are expected to provide schedules, schematics and specifications; build prototypes; present their projects orally; and deliver a working system. Pre-reqs: EE or Comp-Eng Majors. EE 14, EE 21, and EE 23 or permission of instructor			

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109730	Biology of Water & Health			
Subject:	Catalog Nbr:			
CEE	0251			
2024 FALL	Primary	David Gute		david.gute@tufts.edu
(Cross-listed as CH 191)				

109743	Computer Interface Design			
Subject:	Catalog Nbr:			
BME	0166			
2024 SPRG	Primary	Dave Miller		Dave.Miller@tufts.edu
2024 SPRG	Primary	Ken Tango		Ken.Tango@tufts.edu
(Cross-listed as ENP 166.) This hands-on course challenges students to design computer-based products and systems that are easy to learn and use. Lectures cover the user interface-design process, basic design principles, and design evaluation methods. In-class exercises and projects reinforce the students' understanding of the lecture material and provide practical design experience. Students use computer-based prototyping tools to model and demonstrate their design solutions. Frequent guest lectures by user-interface design specialists from industry. Recommendations: EN 1, 2, and junior standing, or permission of instructor.				

109751	Laboratory And In-situ Measurement Of Soil Property			
Subject:	Catalog Nbr:			
CEE	0244			
2024 FALL	Primary	John Germaine		John.Germaine@tufts.edu
In-depth study of various laboratory and in-situ tests used to measure the shear strength, compressibility, and permeability of soils. Laboratory work includes index, consolidation, and triaxial tests. Field tests discussed include SPT, cone, vane, pressuremeter, and dilatometer. Discussion of methods used to process laboratory and field data. Report writing and hands-on laboratory testing. Recommendations: CEE 42.				

109757	Introduction To Biomedical Engineering			
Subject:	Catalog Nbr:			
EE	0050			
(Cross-listed as BME 50.) An introduction to the interdisciplinary nature of biomedical engineering. The biological, chemical, electrical, and mechanical principles involved in the design and operation of medical devices. Biopotentials, electrodes, transducers, biocompatibility of materials, and patient safety. Fall. Recommendations: PHY 2 or PHY 12, or permission of instructor.				

109782	Corporate Management Of Environmental Issues			
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Subject: CEE	Catalog Nbr: 0265	2024 SPRG	Primary	Ariel Kraten	Ariel.Kraten@tufts.edu
(Cross-listed as UEP 265 & ENV 265) Students in this course will explore the ways corporations interact with the environment, with the goal of understanding the processes, pitfalls, and tools for preventing/addressing environmental issues or disasters. Using case studies, students will critique the ways corporations have managed real environmental challenges, and discuss the alternatives that may have been available. Students will also be introduced to approaches used by companies to envision and prepare for environmental problems. They will also focus on the perspectives of various stakeholders who have an interest in corporate environmental management, including shareholders, boards, corporate leaders, community members, governments, and activists/NGOs, and unravel the tensions that often exist among these groups.					

109786	Seminar
Subject: EE	Catalog Nbr: 0092
An undergraduate course devoted to the study of the special problems in electrical engineering. Please see departmental website for specific details.	

109799	Special Topics			
Subject:	Catalog Nbr:			
EE	0093			
2023 SPRG	Primary	Jeanne Fourneyron	Jeanne.Fourneyron@tufts.edu	
Content and prerequisites to be announced. Please see departmental website for specific details.				

109812	Directed Study			
Subject: EE	Catalog Nbr: 0094			
2023 SPRG	Primary	Chorng Chang	chorng.chang@tufts.edu	
2023 SPRG	Primary	Marco Donato	Marco.Donato@tufts.edu	
2023 SUMR	Primary	Joel Grodstein	Joel.Grodstein@tufts.edu	
Guided independent study of an approved topic. Please see departmental website for specific details.				

109825	Tissue Engineering Research Laboratory			
Subject:	Catalog Nbr:			
BME	0175			
2024 FALL	Primary	Ying Chen	Ying.Chen@tufts.edu	
To gain hands-on experience in the field of tissue engineering by preparing and characterizing scaffold biomaterials, expansion and handling human adult stem cell, preparation and use of bioreactors and assembling a functional system to grow a tissue. In addition, safety, ethical, and general laboratory protocol issues are covered.				

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Students may not receive credit for both BME 175 and BME 34.

109827	Subsurface Fluid Dynamics
Subject: CEE	Catalog Nbr: 0287
(Cross-listed as EOS 287). Advanced theory in groundwater hydrology. Topics include: hydrodynamics of groundwater flow; Darcy's Law in porous sediments and fractured rocks; fluid potential; flow nets and hodographs; vorticity of inhomogeneous fluids; physics of the unsaturated zone; two-phase flow in petroleum reservoirs and carbon sequestration; flow in deforming media; aqueous mass transport in reactive formations; fluid and heat transport in geothermal reservoirs. Recommendations: MATH 51 (formerly MATH 38) and ES 8, or equivalents	

109848	Introduction Biomedical Devices
Subject: BME	Catalog Nbr: 0180
An introduction to the principles and applications of biomedical microdevices, with emphasis on miniaturization and the integration of diverse, leading-edge technologies to produce devices and systems for medical diagnosis and therapy. Basic principles of optics, electronics, mechanics, and microfluidics are explored as they apply to the development of new bioMEMS, fiberoptic, and electronic devices for sensing, data acquisition, and analysis. Discussions are to include micro-devices for hearing, endoscopy, imaging, and various clinical and diagnostic applications.	

109857	Master's Seminar
Subject: CEE	Catalog Nbr: 0291
2023 SPRG	Primary Luis Dorfmann Luis.Dorfmann@tufts.edu
2024 FALL	Primary Robert Viesca Robert.Viesca@tufts.edu
Weekly seminar series covering contemporary topics in civil and environmental engineering. Participation in the seminar discussions and preparation of individual reports. Please see departmental website for specifics. May not be used to satisfy doctoral degree requirements.	

109875	Drug Product Formulation
Subject: BME	Catalog Nbr: 0185
2024 SPRG	Primary Bernardo Perez-Ramirez Bernardo.Perez_Ramirez@tufts.edu
(Cross-listed as CHBE 185). Drug Product Formulation.	

109879	Graduate Seminar
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Subject:	Catalog Nbr:			
CEE	0292			
2023 SPRG	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu	
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu	
Weekly seminar series covering contemporary topics in civil and environmental engineering.				

109909	Senior Design Project			
Subject:	Catalog Nbr:			
EE	0097			
2024 FALL	Primary	Brian Aull	Brian.Aull@tufts.edu	
2024 FALL	Primary	Emily Carlson	Emily.Carlson@tufts.edu	
A comprehensive design project undertaken during the senior year, individually or as a team, under the guidance of a faculty supervisor. The work is spread over two terms. Please see departmental website for specific details.				
Pre Requisites: EE 31 or equivalent or permission of instructor.				

109926	Special Topics			
Subject:	Catalog Nbr:			
CEE	0293			
2023 FALL	Primary	Jay Borkland	Jay.Borkland@tufts.edu	
2023 SPRG	Primary	Lucy Jen	Lucy.Jen@tufts.edu	
2023 SPRG	Primary	Juan Pestana	Juan.Pestana@tufts.edu	
2024 SPRG	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu	
2024 SPRG	Primary	Magaly Koch	Magaly.Koch@tufts.edu	
Topical courses offered within civil and environmental engineering.				

109965	Senior Design Project			
Subject:	Catalog Nbr:			
EE	0098			
2023 SPRG	Primary	Ronald Lasser	Ron.Lasser@tufts.edu	
2023 SPRG	Primary	Jeanne Fourneyron	Jeanne.Fourneyron@tufts.edu	
2024 SPRG	Primary	Brian Aull	Brian.Aull@tufts.edu	
2024 SPRG	Primary	Emily Carlson	Emily.Carlson@tufts.edu	
A comprehensive design project undertaken during the senior year, individually or as a team, under the guidance of a faculty supervisor. The work is spread over two terms. Please see departmental website for specific details.				
Recommendations: Senior standing and permission of instructor and EE 97.				

109970	Master's Thesis			
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Subject: Catalog Nbr:
CEE 0295

2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu
2024 FALL	Primary	David Gute	david.gute@tufts.edu
2024 FALL	Primary	John Durant	john.durant@tufts.edu
2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu
2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu
2024 FALL	Primary	Eric Hines	Eric.Hines@tufts.edu
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu
2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu
2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu
2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu
2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu
2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu
2024 SPRG	Primary	Mark Woodin	mark.woodin@tufts.edu
2024 SPRG	Primary	Lucy Jen	Lucy.Jen@tufts.edu

Guided research on a topic that has been approved as a suitable subject for a master's thesis. Required: Consent of instructor.

109987
Master's Thesis II

Subject: Catalog Nbr:
CEE 0296

2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu
2024 FALL	Primary	Mark Woodin	mark.woodin@tufts.edu
2024 FALL	Primary	David Gute	david.gute@tufts.edu
2024 FALL	Primary	John Durant	john.durant@tufts.edu
2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu
2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu

Course Bulletin

2024 FALL	Primary	Eric Hines	Eric.Hines@tufts.edu
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu
2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu
2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu
2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu
2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu
2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu
2024 SPRG	Primary	Lucy Jen	Lucy.Jen@tufts.edu

Guided research on a topic that has been approved as a suitable subject for a master's thesis. Required: CEE 295 and consent of instructor.

110024		Doctoral Thesis II		
Subject:	Catalog Nbr:			
CEE	0298			
2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu	
2024 FALL	Primary	Mark Woodin	mark.woodin@tufts.edu	
2024 FALL	Primary	David Gute	david.gute@tufts.edu	
2024 FALL	Primary	John Durant	john.durant@tufts.edu	
2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu	
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu	
2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu	
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu	
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu	
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu	
2024 FALL	Primary	Eric Hines	Eric.Hines@tufts.edu	
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu	
2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu	
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu	
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu	
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu	
2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu	
2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu	
2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu	
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu	
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu	
2024 SPRG	Primary	Lucy Jen	Lucy.Jen@tufts.edu	

Course Bulletin

2024 SPRG	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu
Guided research on a topic suitable for a doctoral dissertation. Required: CEE 297 and consent of instructor.			

110039		Undergraduate Internship In Electrical Engineering		
Subject: EE		Catalog Nbr: 0099		
2023 FALL	Primary	Mohammed Afsar	No Email on file.	
2023 SUMR	Primary	Ronald Lasser	Ron.Lasser@tufts.edu	
2023 SUMR	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu	
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu	
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu	
2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu	
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu	
2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu	
2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu	
2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu	
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu	
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu	
2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu	
2024 FALL	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu	
2024 SUMR	Primary	Brian Aull	Brian.Aull@tufts.edu	
2024 SUMR	Primary	Joel Grodstein	Joel.Grodstein@tufts.edu	
2024 SUMR	Primary	Steven Bell	Steven.Bell@tufts.edu	
Supervised internships at suitable locations in industry and government. Jobs offered on basis of availability. Term paper required. Credit not given retroactively. Prior arrangements necessary.				

110042	Doctoral Thesis III			
Subject: CEE		Catalog Nbr: 0299		
2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu	
2024 FALL	Primary	David Gute	david.gute@tufts.edu	
2024 FALL	Primary	John Durant	john.durant@tufts.edu	
2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu	
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu	
2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu	
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu	
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu	
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu	

Course Bulletin

2024 FALL	Primary	Eric Hines	Eric.Hines@tufts.edu
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu
2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu
2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu
2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu
2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu
2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu
2024 SPRG	Primary	Mark Woodin	mark.woodin@tufts.edu
2024 SPRG	Primary	Lucy Jen	Lucy.Jen@tufts.edu
Guided research on a topic suitable for a doctoral dissertation. Required: CEE 298 and consent of instructor.			

110067	Non Major Credit		
Subject:	Catalog Nbr:		
CEE	0310		

110073	Design Of Medical Instrumentation		
Subject:	Catalog Nbr:		
EE	0100		
2024 SPRG	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu
(Cross-listed as BME 100.) An introduction to the design principles of medical instrumentation and simple biomedical signal analysis. Topics include analysis of the instrument and subject as a linear system, characteristics of various biological signals, design of transducers, modern implementation of A/D conversion, analog and digital filters, instrumentation amplifiers, patient isolation, and battery powered equipment. Associated laboratory work. Prerequisite: ES 3			

110097	Lower Level Elective Crd		
Subject:	Catalog Nbr:		
CEE	0320		

110117	Special Topics		
Subject:	Catalog Nbr:		

Course Bulletin

BME	0193			
	2023 FALL	Primary	David Kaplan	david.kaplan@tufts.edu
	2023 FALL	Primary	Sergio Fantini	sergio.fantini@tufts.edu
	2023 FALL	Primary	Irene Georgakoudi	Irene.Georgakoudi@tufts.edu
	2023 FALL	Primary	Fiorenzo Omenetto	Fiorenzo.Omenetto@tufts.edu
	2023 FALL	Primary	Lauren Black III	Lauren.Black@tufts.edu
	2023 FALL	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
	2023 FALL	Primary	Yu-Ting Dingle	Yu-ting.Dingle@tufts.edu
	2023 FALL	Primary	Janet Krevolin	Janet.Krevolin@tufts.edu
	2023 FALL	Primary	Joel Grodstein	Joel.Grodstein@tufts.edu
	2023 FALL	Primary	Brian Timko	Brian.Timko@tufts.edu
	2023 FALL	Primary	Madeleine Oudin	Madeleine.Oudin@tufts.edu
	2023 FALL	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu
	2023 FALL	Primary	Jake Marko	Jake.Marko@tufts.edu
	2023 FALL	Primary	Juan Gnecco	Juan.Gnecco@tufts.edu
	2023 FALL	Primary	Nisha Iyer	Nisha.Iyer@tufts.edu
	2024 SUMR	Primary	Lorin Polidora	Lorin.Polidora@tufts.edu
	2024 SUMR	Primary	Vincent Fitzpatrick	Vincent.Fitzpatrick@tufts.edu
Guided study of an approved topic.				

110120	Upper Level Crd
Subject: CEE	Catalog Nbr: 0330

110137		Special Topics		
Subject: BME		Catalog Nbr: 0194		
2024 SPRG	Primary	David Kaplan	david.kaplan@tufts.edu	
2024 SPRG	Primary	Sergio Fantini	sergio.fantini@tufts.edu	
2024 SPRG	Primary	Irene Georgakoudi	Irene.Georgakoudi@tufts.edu	
2024 SPRG	Primary	Lorin Polidora	Lorin.Polidora@tufts.edu	
2024 SPRG	Primary	Fiorenzo Omenetto	Fiorenzo.Omenetto@tufts.edu	
2024 SPRG	Primary	Amanda Baryshyan	Amanda.Baryshyan@tufts.edu	
2024 SPRG	Primary	Lauren Black III	Lauren.Black@tufts.edu	
2024 SPRG	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu	
2024 SPRG	Primary	Brian Timko	Brian.Timko@tufts.edu	
2024 SPRG	Primary	Madeleine Oudin	Madeleine.Oudin@tufts.edu	
2024 SPRG	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu	
2024 SPRG	Primary	Juan Gnecco	Juan.Gnecco@tufts.edu	
2024 SPRG	Primary	Nisha Iyer	Nisha.Iyer@tufts.edu	

Course Bulletin

2024 SPRG	Primary	Ugochukwu Ugwu	Ugochukwu.Ugwu@tufts.edu
Guided study of an approved topic. Please see departmental website for details.			

110141	Master's Degree Continuation-pt			
Subject:	Catalog Nbr:			
CEE	0401			
2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu	
2024 FALL	Primary	David Gute	david.gute@tufts.edu	
2024 FALL	Primary	John Durant	john.durant@tufts.edu	
2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu	
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu	
2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu	
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu	
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu	
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu	
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu	
2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu	
2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu	
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu	
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu	
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu	
2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu	
2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu	
2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu	
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu	
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu	
Part-time.Please see departmental website for specific details.				

110161	Optics And Wave Motion			
Subject:		Catalog Nbr:		
BME		0215		
2024 FALL	Primary	Cristian Staii	Cristian.Staii@tufts.edu	
(Cross-listed as PHY 31). Propagation of electromagnetic waves; geometrical optics; polarization; optical properties of metals, insulators, and semiconductors; Fraunhofer and Fresnel diffraction; interference; Fourier optics. Lectures and laboratories. Recommendations: PHY 2 or 2N or 12 or 12N. Corequisite: MATH 42 (formerly MATH 13)				

110187	Master's Degree Continuation-ft			
Subject: CEE		Catalog Nbr: 0402		

Course Bulletin

2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu
2024 FALL	Primary	David Gute	david.gute@tufts.edu
2024 FALL	Primary	John Durant	john.durant@tufts.edu
2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu
2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu
2024 FALL	Primary	Eric Hines	Eric.Hines@tufts.edu
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu
2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu
2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu
2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu
2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu
2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu
Full-time.Please see departmental website for specific details.			

110203	Principles Of Biomedical Engineering		
Subject: BME	Catalog Nbr: 0250		
2024 FALL	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
(Cross-listed as EE 250). The role of biomedical engineering in the diagnosis and treatment of various pathologies such as cardiovascular disease, cancer, diabetes, and neurological disorders. For each disease model, biomedical engineering principles are used to examine the function of the organ, mechanisms of the disease, diagnostic tools, and treatment approaches. Covered biomedical engineering areas include biomaterials, implantable devices, bioimaging techniques, gene therapy, and biosensors. Recommendations: ES 121 or equivalent, or permission of instructor.			

110221	Graduate Teaching Assistant		
Subject: CEE	Catalog Nbr: 0405		
2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu
2024 FALL	Primary	John Durant	john.durant@tufts.edu
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu

Course Bulletin

2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu
2024 FALL	Primary	Ryan Marshall	Ryan.Marshall@tufts.edu
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu
2024 SPRG	Primary	Lucy Jen	Lucy.Jen@tufts.edu
2024 SPRG	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu
2024 SPRG	Primary	Helen Suh	Helen.Suh@tufts.edu
2024 SPRG	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu
2024 SPRG	Primary	Greses Perez	Greses.Perez@tufts.edu
2024 SPRG	Primary	Farshid Vahedifard	Farshid.Vahedifard@tufts.edu

Please see departmental website for specific details.

110242		Graduate Research Assistant		
Subject: CEE		Catalog Nbr: 0406		
2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu	
2024 FALL	Primary	David Gute	david.gute@tufts.edu	
2024 FALL	Primary	John Durant	john.durant@tufts.edu	
2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu	
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu	
2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu	
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu	
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu	
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu	
2024 FALL	Primary	Eric Hines	Eric.Hines@tufts.edu	
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu	
2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu	
2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu	
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu	
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu	
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu	
2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu	
2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu	
2024 FALL	Primary	Amy Pickering	No Email on file.	
2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu	
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu	
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu	
2024 SPRG	Primary	Mark Woodin	mark.woodin@tufts.edu	
2024 SPRG	Primary	Neelakshi Hudda	Neelakshi.Hudda@tufts.edu	
2024 SPRG	Primary	Farshid Vahedifard	Farshid.Vahedifard@tufts.edu	

Course Bulletin

Please see departmental website for specific details.

110292	Doctoral Degree Continuation-pt			
Subject:	Catalog Nbr:			
CEE	0501			
2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu	
2024 FALL	Primary	David Gute	david.gute@tufts.edu	
2024 FALL	Primary	John Durant	john.durant@tufts.edu	
2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu	
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu	
2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu	
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu	
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu	
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu	
2024 FALL	Primary	Eric Hines	Eric.Hines@tufts.edu	
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu	
2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu	
2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu	
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu	
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu	
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu	
2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu	
2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu	
2024 FALL	Primary	Amy Pickering	No Email on file.	
2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu	
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu	
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu	
Part-time.Please see departmental website for specific details.				

110334	Introduction To Vlsi Design			
Subject: EE		Catalog Nbr: 0103		
2024 FALL		Primary	Valencia Koomson	Valencia.Koomson@tufts.edu
An introduction to CMOS VLSI design. Topics include the structure of the MOS transistor, theory of operation, fabrication methods, CMOS circuit design, subsystem design, the PLA and finite state machines, introduction to memory design, system timing techniques. Students will design a circuit of modest complexity. Recommendations: Senior standing or permission of instructor.				

110348	Doctoral Degree Continuation-ft			
Subject:		Catalog Nbr:		

Course Bulletin

CEE	0502			
	2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu
	2024 FALL	Primary	David Gute	david.gute@tufts.edu
	2024 FALL	Primary	John Durant	john.durant@tufts.edu
	2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu
	2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu
	2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu
	2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu
	2024 FALL	Primary	Steven Chapra	steven.chapra@tufts.edu
	2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu
	2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu
	2024 FALL	Primary	Eric Hines	Eric.Hines@tufts.edu
	2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu
	2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu
	2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu
	2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu
	2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu
	2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu
	2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu
	2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu
	2024 FALL	Primary	Amy Pickering	No Email on file.
	2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu
	2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
	2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu
	2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu
Full-time.Please see departmental website for specific details.				

110360	Graduate Seminar			
Subject:		Catalog Nbr:		
BME		0291		
2024 FALL		Primary	Lorin Polidora	Lorin.Polidora@tufts.edu
Biomedical engineering seminar series and presentation of individual reports to a seminar group for discussion.				

110369	Probabilistic Systems Analysis			
Subject:	Catalog Nbr:			
EE	0104			
2023 SPRG	Primary	Mohammad Tajdini	No Email on file.	
2024 FALL	Primary	Brian Aull	Brian.Aull@tufts.edu	
2024 SUMR	Primary	Khaled ElMahgoub	Khaled.ElMahgoub@tufts.edu	
Advanced analysis in probabilistic systems with strong emphasis on theoretical methods. Development of analytical tools for the modeling and analysis of random phenomena with application to problems across a				

Course Bulletin

range of engineering and applied science disciplines. Probability theory, sample and event spaces, discrete and continuous random variables, conditional probability, expectations and conditional expectations, and derived distributions. Sums of random variables, moment generating functions, central limit theorem, laws of large numbers. Statistical analysis methods including hypothesis testing, confidence intervals and nonparametric methods. Undergraduates may not take both EE 0024 and EE 0104 for degree credit.

Prerequisite: Math 0042 or equivalent.

Recommendation: Senior or graduate standing or consent of instructor.

110409	Graduate Seminar			
Subject: BME		Catalog Nbr: 0292		
2024 SPRG		Primary	Lorin Polidora	Lorin.Polidora@tufts.edu
Biomedical engineering seminar series and presentation of individual reports to a seminar group for discussion.				

110437	Special Topics	
Subject:	Catalog Nbr:	
BME	0293	
Guided individual study of an approved topic.		

110444	Feedback-control Systems			
Subject:	Catalog Nbr:			
EE	0105			
2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu	
Modern control and fundamentals of state-feedback including matrix differential equations, controllability, state transformations, canonical forms, and control matrix design. Classical control and output-feedback with topics including transfer functions, s-plane analysis, stability criteria, PID controllers, root locus, controller design using op-amps, and compensation networks. Prerequisite: EE23 and Math 70; OR graduate standing				

110453	Special Topics			
Subject: BME		Catalog Nbr: 0294		
2024 SPRG		Primary	Lorin Polidora	Lorin.Polidora@tufts.edu
Guided individual study of an approved topic.				

110472		Master's Thesis		
Subject:		Catalog Nbr:		
BME		0295		
2024 FALL		Primary	Lorin Polidora	Lorin.Polidora@tufts.edu

Course Bulletin

Guided research on an approved topic suitable for a master's thesis.

110493	Advanced Feedback-control Systems
Subject: EE	Catalog Nbr: 0106
A continuation of EE 105. Topics include an introduction to digital control systems, difference equations, the Z-transform, implementation of the discrete filter, the W-transform, stability of sample-data systems, an introduction to state-space concepts and the control of multivariable systems. Spring. Recommendations: EE 105.	

110513	Master's Thesis
Subject: BME	Catalog Nbr: 0296
2024 SPRG	Primary Lorin Polidora
	Lorin.Polidora@tufts.edu
Guided research on an approved topic suitable for a master's thesis.	

110537	Doctoral Thesis
Subject: BME	Catalog Nbr: 0297
2024 FALL	Primary Lorin Polidora
	Lorin.Polidora@tufts.edu
Guided research on a topic suitable for a doctoral dissertation.	

110573	Doctoral Thesis
Subject: BME	Catalog Nbr: 0298
2024 SPRG	Primary Lorin Polidora
	Lorin.Polidora@tufts.edu
Guided research on a topic suitable for a doctoral dissertation.	

110627	BME Original Research Proposal
Subject: BME	Catalog Nbr: 0299
2024 FALL	Primary Lorin Polidora
2024 SPRG	Primary Srivalleesha Mallidi
	Lorin.Polidora@tufts.edu
	Srivalleesha.Mallidi@tufts.edu
Execution of an original research proposal under the guidance of a faculty adviser. Proposals must address a substantive engineering analysis or design problem. Students are required to submit a written report and make an oral presentation Recommendations: Enrollment is limited to and required for matriculated students in the master of engineering program.	

Course Bulletin

110652	Communications Systems			
	Subject:	Catalog Nbr:		
	EE	0107		
	2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu
Fundamentals of analog and digital communication systems. Analog and digital modulations, including AM, FM, pulse code modulation, PAM, PSK, QAM techniques. Effects of noise and transmission medium on communication performance via the signal-to-noise ratio, bit error rate and inter-symbol interference. Concept of channel capacity. Associated laboratory work and design project. Prerequisites: EE23, EE24				

110660	Non Major Credit			
	Subject:	Catalog Nbr:		
	BME	0310		

110688	Wireless Communications			
	Subject:	Catalog Nbr:		
	EE	0108		
Wireless propagation characteristics, path loss, shadowing and fading; statistical channel models; wireless channel capacity; fading and diversity techniques, multiple antenna and MIMO techniques, multicarrier and OFDMA techniques; multiuser systems, cellular and ad hoc wireless networks. Prerequisites: EE107 or equivalent, EE104 or equivalent				

110710	Lower Level Elective Crd			
	Subject:	Catalog Nbr:		
	BME	0320		

110747	Upper Level Elective Crd			
	Subject:	Catalog Nbr:		
	BME	0330		

110815	Master's Continuation			
	Subject:	Catalog Nbr:		
	BME	0401		
	2024 FALL	Primary	Lorin Polidora	Lorin.Polidora@tufts.edu

Course Bulletin

Master's Continuation - Part Time

110867	Master's Continuation			
Subject:	Catalog Nbr:			
BME	0402			
2024 FALL	Primary	Lorin Polidora		Lorin.Polidora@tufts.edu
Full-time.				

110902	Grad Teaching Assistant			
Subject:	Catalog Nbr:			
BME	0405			
2024 FALL	Primary	Lorin Polidora		Lorin.Polidora@tufts.edu

110929	Grad Research Assistant			
Subject:	Catalog Nbr:			
BME	0406			
2024 FALL	Primary	Lorin Polidora		Lorin.Polidora@tufts.edu

110955	Doctoral Continuation - Part Time			
Subject:	Catalog Nbr:			
BME	0501			
2024 FALL	Primary	Lorin Polidora		Lorin.Polidora@tufts.edu
Doctoral Continuation - Part Time				

110988	Doctoral Continuation - Full Time			
Subject:	Catalog Nbr:			
BME	0502			
2024 FALL	Primary	Lorin Polidora		Lorin.Polidora@tufts.edu
Full-time doctoral continuation.				

111244	Semiconduct Device W/lab			
Subject:	Catalog Nbr:			
EE	0113			
2024 FALL	Primary	Dante DeMeo		Dante.DeMeo@tufts.edu
(Cross-listed w/ MSE 110) Introduction to semiconductor physics; quantum mechanics, equilibrium distribution; charge transport; P-N junction theory; diodes; bipolar junction transistors; field-effect devices;				

Course Bulletin

heterojunction devices; novel semiconductor devices such as carbon nanotubes.

Recommendations: EE 21 and MATH 51 (formerly MATH 38).

111296		Entrepreneurship And Business Planning			
Subject:		Catalog Nbr:			
ENT		0101			
2024 FALL		Primary	Tina Weber	Tina.Weber@tufts.edu	
2024 FALL		Primary	Timothy Buntel	Timothy.Buntel@tufts.edu	
2024 FALL		Primary	Elaine Chen	Elaine.Chen@tufts.edu	
2024 FALL		Primary	Moneer Azzam	Moneer.Azzam@tufts.edu	
This course focuses on investigating, understanding, and implementing the process of founding a start-up firm. Elements of searching out new venture opportunities, matching skills with a new venture, financing, competitive strategy, intellectual property, and operating a new venture will be explored. The focus of the course will be the development and presentation of a business plan created by teams of students with various academic backgrounds.					

111335	Entrepreneurial Finance			
Subject:	Catalog Nbr:			
ENT	0103			
2024 FALL	Primary	Frank Apeseche	Frank.Apeseche@tufts.edu	
2024 FALL	Primary	Richard O'brien	andrew.obrien@tufts.edu	
Financial statement construction and analysis for new ventures. Financial business plan development; evaluation of disparate commercial enterprises; business valuation. Utilization of modern financial tools to support investment decisions. Skills development to define and create pathways to fund and grow a business to optimize results and minimize risks.				

111371	Entrepreneurial Marketing			
Subject:	Catalog Nbr:			
ENT	0105			
2024 FALL	Primary	John Derby	Jack.Derby@tufts.edu	
2024 FALL	Primary	Gavin Finn	Gavin.Finn@tufts.edu	
This course focuses on institutional and product marketing methods used by start-up to medium-sized companies. After an overview of basic marketing principles, the course will cover the spectrum from day-to-day marketing activities of the entrepreneurial business to positioning and strategy. Students will learn to analyze, formulate, and implement marketing strategies, explore concepts for understanding customer behavior and creating entrepreneurial marketing strategy, and learn the fundamentals of market research, pricing, and reaching and selling to customers.				

111394	Entrepreneurial Leadership			
Subject:	Catalog Nbr:			

Course Bulletin

ENT	0107			
	2024 FALL	Primary	Elizabeth McCarthy	Elizabeth.McCarthy@tufts.edu
This course is designed to help students develop the knowledge, confidence, skills, and self-image necessary to pursue entrepreneurial ventures in such domains as business, government, and public service. It provides a foundation in the fundamentals of entrepreneurial leadership, as well as a source of inspiration and energy in the art and science of taking visions and bringing them to reality.				

111412	Introduction Microwaves	
Subject:	Catalog Nbr:	
EE	0117	
(Cross-listed w/ MSE 112) Transmission and reflection of guided waves. The Smith chart and matching. Scattering parameters and flow graphs. Biological effects. Laboratory measurement of power, frequency, attenuation, Q-factor, and time-domain reflectometry. Fall. Recommendations: EE 18, or 13 and permission of instructor.		

111425	Innovative Social Enterprises				
	Subject:	Catalog Nbr:			
	ENT	0141			
	2024 SPRG	Primary	Julianne Zimmerman	Julianne.Zimmerman@tufts.edu	
	2024 SPRG	Primary	Amir Hasson	Amir.Hasson@tufts.edu	
(Cross-listed as AMER 141, TCS 141, and CVS 187) Social entrepreneurs bring innovative, practical solutions to social problems. Entrepreneurs are opportunity oriented, resourceful, value-creating change agents. Social entrepreneurs are similar, but they focus on public problems. Students will consider the role of social enterprises in improving society, and learn to develop a business plan to create enduring social impact: Identify social impact model, plan needed activities and resources, conduct market research and create a marketing plan, build a team, prepare a financial model, and create a plan to attract the support the mission requires. Recommendations: Sophomore standing.					

111441	Special Topics			
Subject:	Catalog Nbr:			
ENT	0193			
2023 FALL	Primary	Alexander Ocampo	Alexander.Ocampo@tufts.edu	
2023 FALL	Primary	Philip Ellison	Phillip.Ellison@tufts.edu	
2023 FALL	Primary	Katrin Kaeufer	Katrin.Kaeufer@tufts.edu	
2023 SPRG	Primary	Jane Seminara	Jane.Seminara@tufts.edu	
2023 SPRG	Primary	Matthew McMahan	No Email on file.	
2023 SPRG	Primary	George Blount	George.Blount@tufts.edu	
2023 SPRG	Primary	Michelle Tempesta	Michelle.Tempesta@tufts.edu	
2023 SPRG	Primary	Suzanne Hamill	No Email on file.	
2023 SPRG	Primary	Lucia Kamm	No Email on file.	

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2024 SPRG	Primary	Stacy Lennon	Stacy.Lennon@tufts.edu
2024 SPRG	Primary	James Edgerton	Jimmy.Edgerton@tufts.edu
2024 SPRG	Primary	Joshua Wiesman	Joshua.Wiesman@tufts.edu
2024 SPRG	Primary	Kathryn Weiler	Kathryn.Weiler@tufts.edu
Special Topics. Please see departmental website for specific details. Recommended: at least one core ENT class or accounting elective			

111448	Microwave Semiconductor Devices And Circuits		
Subject:	Catalog Nbr:		
EE	0118		
(Cross-listed with MSE 113) Varistor and varactor diodes, PIN diodes, microwave transistors, negative resistance devices. Gallium arsenide properties and technology. Receiving mixers, transmitting modulators, amplifiers, oscillators, switches, limiters, duplexers, phase shifters, and harmonic generators. Laboratory characterization of devices and circuits, including noise measurements. Spring. Recommendations: EE 117 or permission of instructor.			

111461	Special Topics		
Subject: ENT	Catalog Nbr: 0194		
2024 FALL	Primary	Carol Denning	Carol.Denning@tufts.edu
2024 FALL	Primary	Jill Parlee	Jill.Parlee@tufts.edu
2024 SPRG	Primary	Elaine Chen	Elaine.Chen@tufts.edu
Special Topics. Please see departmental website for specific details.			

111478	Entrepreneurial Fieldstudy		
Subject: ENT	Catalog Nbr: 0199		
2024 FALL	Primary	Carol Denning	Carol.Denning@tufts.edu
2024 FALL	Primary	Jill Parlee	Jill.Parlee@tufts.edu
2024 FALL	Primary	Elaine Chen	Elaine.Chen@tufts.edu
This course enables students to apply the learning and skills acquired by other courses on entrepreneurship. Students have the option of starting a new business based on an actual business plan or consulting in an actual start-up operation. Students who select the new business option will be expected to submit a project-scope paper that outlines the elements of the launch that could be accomplished within the term limits.			

111499	Non Major Credit	
Subject:	Catalog Nbr:	
ENT	0310	

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111514	Lower Level Elective Crd			
Subject:	ENT	Catalog Nbr:	0320	

111531	Upper Level Elective Crd			
Subject:	ENT	Catalog Nbr:	0330	

111575	Engineering Management			
	Subject:	Catalog Nbr:		
	EM	0051		
	2024 FALL	Primary	Monica Pheifer	Monica.Pheifer@tufts.edu
	2024 FALL	Primary	John Jacobsen	John.Jacobsen@tufts.edu
	2024 SPRG	Primary	Chimuanya Okoro	Chimuanya.Okoro@tufts.edu
Organization of companies and engineering groups. Financial fluency, including time value of money, return on investment, income and cash flow statements, and balance sheets. Management of people and organizations. Project and program management techniques and tools. Management of research, development, and design. Operations management, including manufacturing operations and supply chains.				

111589	Technical & Managerial Communication				
Subject:		Catalog Nbr:			
EM		0052			
2024 FALL		Primary	Amy Hirschfeld	amy.hirschfeld@tufts.edu	
Written and oral communications in the business setting. Written communications including technical reports and papers, memoranda, and electronic communications. Design and delivery of effective presentations. Informal communication styles and techniques. Communication across cultures.					

111606	Engineering Leadership			
Subject:	Catalog Nbr:			
EM	0054			
2024 FALL	Primary	Jennifer Braggin	Jennifer.Braggin@tufts.edu	
2024 FALL	Primary	David Medeiros	David.Medeiros@tufts.edu	
Development of knowledge, skills, and mindset essential for leading programs and teams in a business organization. Topics include understanding personalities of self and others, emotional intelligence, creating high performance teams, influencing without authority, managing conflict, fostering creativity, creating shared visions, and organizational change. Communicating to inspire. Cultural differences in leadership style.				

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Ethical considerations.

111626	Management Of Innovation			
Subject: EM		Catalog Nbr: 0153		
2024 FALL		Primary	Eli Cushner	Eli.Cushner@tufts.edu
Knowledge and skill development for students who aspire to lead and manage innovation initiatives in technology based companies. Technology strategy and its role in the overall business strategy of commercial firms. Role of innovation in entrepreneurial ventures and established firms. Skills to present new product development proposals to senior management and/or prospective investors.				

111692	Computer Animation For Technical Communications		
Subject:		Catalog Nbr:	
EE		0120	
Create 2-D and 3-D animations to present and analyze complex scientific topics. Examples include NASA visualizations of atmospheric data and aerospace design mathematics of 3-D space, rotation, and displacement. Rendering algorithms including Phong, Garoud, and Ray Tracing. Hands-on experience in animation and graphic development, including manipulation of scanned images, storyboarding, video production, and CD-ROM technology. Computer-based lectures augmented with major animation and CD-ROM projects. Fall. Recommendations: COMP 11.			

111783	Physiology For Engineers I		
	Subject:	Catalog Nbr:	
	EE	0121	
(Cross-listed as BME 121). Coursework designed for students interested in advanced work in biomedical engineering. A quantitative approach to cell physiology, nerve/muscle interaction, the cardiovascular system, and the respiratory system, through the study of vital biological signals and their measurement. Anatomy and physiology of each organ system. Current engineering efforts in instrumentation and basic science to further study each system's physiology. Recommendations: BME/EE/ES 50, BIO 1 or BIO 13 or ES 11, or permission of instructor.			

111855	Industry Consulting Project – Team Practicum		
Subject:	Catalog Nbr:		
EM	0270		
Team consulting project, conducted at a local business during summer intersession to provide students with opportunity to apply classroom learning.			

111898	Quantitative Physiology II		
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Course Bulletin

Subject: Catalog Nbr:
EE 0122

(Cross-listed as EE 122). A laboratory course designed for students interested in advanced work in biomedical engineering. The course will involve labs covering nerve physiology, skeletal muscle physiology, and cardiopulmonary physiology, through the study of vital biological signals and their measurement. The course will be structured in modules, with labs in each module focused on 1) measurement and acquisition of the physiological data of interest and 2) computational modeling of acquired physiological data.
Recommendations: BME/EE/ES 121 or BIO 115, BME/EE/ES 50, BIO 13 or ES 11, or Permission of instructor.

111911	Capstone Leadership Project			
Subject: Catalog Nbr:				
EM 0280				
2023 SUMR		Primary	Samuel Ligero	Samuel.Ligero@tufts.edu
2023 SUMR		Primary	Jill Parlee	Jill.Parlee@tufts.edu
2024 FALL		Primary	Abbott Weiss	Abbott.Weiss@tufts.edu
Student led 'real-life' engineering project to demonstrate business acumen and leadership skills. Project must be complex and involve risk with a 6-9 month duration, often done with the student's current employer.				

111932	Non Major Credit			
Subject: Catalog Nbr:				
EM 0310				

111951	Lower Level Elective Crd			
Subject: Catalog Nbr:				
EM 0320				

111969	Upper Level Elective Crd			
Subject: Catalog Nbr:				
EM 0330				

111990	Masters Continuation - Part Time			
Subject: Catalog Nbr:				
EM 0401				
2024 FALL		Primary	Samuel Ligero	Samuel.Ligero@tufts.edu
Part-time.Please see departmental website for specific details.				

Course Bulletin

112032	Digital Signal Processing			
Subject:	Catalog Nbr:			
EE	0125			
2024 FALL	Primary	Brian Tracey		brian.tracey@tufts.edu
2024 FALL	Primary	Jordan Rosenthal		Jordan.Rosenthal@tufts.edu
(Cross-listed as ME 136) Discrete signals and systems, digital simulation of analog systems. Z transforms, recursion equations, finite-order systems. Fourier transforms, line spectra and Fourier series, discrete Fourier series and Fast Fourier Transforms (FFT). Sampling and interpolation, mean-square approximations. Nonrecursive and recursive filters. Selected topics on algorithms, design and applications of digital signal processing. Fall.				

112034	Masters Degree Continuation			
Subject:	Catalog Nbr:			
EM	0402			
2024 FALL	Primary	Samuel Ligero		Samuel.Ligero@tufts.edu
Full-time. Please see departmental website for specific details.				

112076	Computer Engineering W/lab			
Subject:	Catalog Nbr:			
EE	0126			
2024 SPRG	Primary	Mark Hempstead		Mark.Hempstead@tufts.edu
(Cross-listed w/ CS 146) Topics covered include computer abstractions, performance measurements, instruction set architectures, designing processor datapath and control, pipelining, memory hierarchy, I/O, multiprocessors. The associated lab consists of designing, implementing, and validating a simplified MIOS processor using Verilog, a hardware description language. Fall. Recommendations: EE 14.				

112117	Information Theory			
Subject:	Catalog Nbr:			
EE	0127			
2024 FALL	Primary	Shuchin Aeron		Shuchin.Aeron@tufts.edu
(Cross-listed CS 149) as Information theory as a systematic framework to address fundamental laws and limits of data compression and digital communication. Source coding/data compression; information measures on discrete memory-less sources; practical schemes and algorithms for lossless data compression such as Huffman coding, arithmetic coding, Lempel-Ziv Coding; channel coding for reliable communication and rate distortion for lossy source compression. Advanced topics such as information theoretic cryptography. Recommendations: EE 104 or permission of instructor.				

112309	Operating Systems			
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Course Bulletin

Subject:	Catalog Nbr:
EE	0128
2024 SPRG	Primary
David Lillethun	David.Lillethun@tufts.edu
(Cross-listed as CS 111). Fundamental issues in operating system design. Concurrent processes: synchronization, sharing, deadlock, scheduling. Relevant hardware properties of uniprocessor and multiprocessor computer systems.	

112329	Introduction To Computing In Engineering			
Subject:	Catalog Nbr:			
ES	0002			
2024 SPRG	Primary	Ethan Danahy	ethan.danahy@tufts.edu	
2024 SPRG	Primary	Chelsea Andrews	Chelsea.Andrews@tufts.edu	
2024 SPRG	Primary	Emily Carlson	Emily.Carlson@tufts.edu	
2024 SPRG	Primary	Brian Timko	Brian.Timko@tufts.edu	
2024 SPRG	Primary	Jennifer Cross	Jennifer.Cross@tufts.edu	
2024 SPRG	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu	
An introduction to engineering problem-solving with the aid of computational software. Scientific computing concepts will be introduced including number representation, arrays, structured programming techniques, and good coding practices. Basic numerical and data analysis methods will be introduced including numerical differentiation and integration, matrix operations, descriptive statistics, curve fitting, and optimization. Examples drawn from a variety of engineering disciplines will give students extensive practice in coding solutions and applying them to data.				
Recommendation: MATH 32				

112452	Computer Communication Networks			
Subject:	Catalog Nbr:			
EE	0129			
2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu	
Data communications concepts. Communications networking techniques: switching and broadcast networks, access protocols, local networks. Design issues, overview of current products. Computer communications architecture: hardware/software issues, protocols and architecture, layered approach and hierarchical approach. Prerequisite: senior or graduate electrical engineering degree candidate, or consent. Recommendations: Senior or graduate electrical engineering degree candidate, or permission of instructor.				

112629	Principles Of Medical Imaging				
Subject:	Catalog Nbr:				
EE	0131				
2024 SPRG	Primary	Sergio Fantini	sergio.fantini@tufts.edu		
(Cross-listed as BIO 131 and BME 131.) This interdisciplinary course presents the principles of medical imaging techniques such as diagnostic ultrasound, radiography, X-ray computed tomography (CT), and magnetic					

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resonance imaging (MRI). For each imaging modality, topics include the physical principles, key aspects of instrumentation design, mathematical methods, and the anatomical/physiological information content of the images. Representative medical images will be discussed and interpreted. This course cannot be taken for basic science requirement for engineering students.

Recommendations: MATH 32 (formerly MATH 11), PHY 2 or 12, or permission of instructor.

112651	Digital Image Processing
Subject: EE	Catalog Nbr: 0133
Fundamentals and some practical applications of digital image processing. Topics include image formation, sampling, and quantization; distortions due to lens aberrations, image motion and detector noise; image enhancement and restoration by spatial filtering and maximum entropy; image coding for bandwidth compression by DPCM, transform coding, and entropy coding; and image understanding. Recommendations: EE 23 or permission of instructor.	

112656	Introduction To Electrical Systems W/ Lab
Subject: ES	Catalog Nbr: 0003
Definitions of circuit elements, fundamental laws, selected network theorems, controlled sources, introduction to the oscilloscope, energy and power, natural response and complete response of first order circuits, steady state sinusoidal behavior, algebra of complex numbers, phasors, impedance, average and reactive power, introduction to analog and digital systems, frequency response and filters, measurements and instrumentation, introduction to computer applications for circuit analysis and design. Associated laboratory project work. Recommendations: Must be preceded or accompanied by MATH 34 (formerly MATH 12).	

112675	Advanced Electromagnetics
Subject: EE	Catalog Nbr: 0135
2024 FALL	Primary Aseema Mohanty Aseema.Mohanty@tufts.edu
Stationary electric and magnetic fields. Differential and integral forms of Maxwell's equations. Time-harmonic fields and potential functions. Electromagnetics of circuits. Transmission line transients and coupling. Plane wave propagation. Guided wave propagation. Electromagnetic radiation. Electromagnetic properties of materials. Practical applications. Fall. Recommendations: EE 18 or equivalent.	

112721	Antennas For Radar, Avionics, And Communications
Subject: EE	Catalog Nbr: 0136
Definition of fields, radiation patterns, sources, linearity, and superposition. Antennae parameters: gain,	

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effective aperture, beamwidth, sidelobes, impedance, polarization, and bandwidth. Radiation: electric dipole, multiple sources. Transmission lines and waveguides. Radiation from discontinuities, slots, and horns. Techniques of antenna measurements. Theory of antenna arrays. Spring.
Recommendations: Senior or graduate standing in electrical engineering or physics.

112747	Radar Engineering			
Subject:	Catalog Nbr:			
EE	0137			
2024 SPRG	Primary	Khaled ElMahgoub	Khaled.ElMahgoub@tufts.edu	
Physical principles and basic equations. Pulsed, continuous-wave, and pulsed-Doppler radars. Antenna systems; transmitters; detection theory. Waveform considerations, including pulse compression. Principles of synthetic aperture radar. Miscellaneous topics: propagation, clutter, and airborne radar. Fall. Recommendations: EE 18 or equivalent.				

112767	Introduction To Digital Logic Circuits W/ Lab			
Subject:	Catalog Nbr:			
ES	0004			
2024 FALL	Primary	Steven Bell	Steven.Bell@tufts.edu	
An exploration of how microprocessors work. Topics include: Boolean algebra and logic gates; combinational logic; representing numbers and performing arithmetic with circuits; behavior and use of flip-flops; sequential circuits and state machines; instruction sets; and building blocks for constructing microprocessors. Associated lab exercises with FPGAs and modern design tools. Culminating design of a substantial digital system.				

112912	Advanced Digital Signal Processing	
Subject:	Catalog Nbr:	
EE	0145	
Discrete time signals in time and frequency domains. Advanced topics in digital processing of continuous-time signals. Digital filter structures, design, implementation, finite wordlength effects. Multirate signal processing. Applications. Associated laboratory work. Recommendations: EE 125 or permission of instructor.		

112960	Analog And Mixed Signal Mos Integrated Circuit Design			
Subject: EE	Catalog Nbr: 0147			
2024 SPRG	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
Practical and theoretical aspects of analog and mixed-signal MOS IC design. Basic building blocks including current sources, gain stages, and two-stage opamps. Opamp circuit feedback and noise modeling. Switched capacitor (SC) circuits from Z-transform, sample hold circuit, SC filters, and SC gain circuit. Noise and nonlinear effects in SC circuits. Component matching, layout of analog building blocks. Fundamentals of data converters.				

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112982	Silicon Radio Frequency Ic Design
Subject: EE	Catalog Nbr: 0148
An overview of Silicon Germanium BICMOS semiconductor process (SiGe) and technology. Bipolar and CMOS transistor models, resistor, capacitor and inductor models, process variation of devices, corner, statistical simulation techniques for the process, voltage and temperature variation, and device matching. Voltage gain, power gain and their conversions. Class A and B amplifiers, output power compression, and inter-modulation and IP3 from two tone analyses. Noise classification of bipolar transistor, noise figure definition and analysis. S-parameters and smith-charts. Applications including low-noise, cascade, differential, and various-gain amplifiers, as well as practical bias circuits for current and voltage reference (band-gap voltage). Associated laboratories utilizing Electronic Design Automation (EDA) tools.\ Recommendations: EE 11 and 12.	

113042	Introduction To Mechanics- Statics And Dynamics
Subject: ES	Catalog Nbr: 0005
2024 FALL	Primary Masoud Sanayei masoud.sanayei@tufts.edu
Introduction to analysis and problem solving in statics and dynamics. Equilibrium of particles and rigid bodies in two and three dimensions. Vector and matrix analysis. Force-moment balance equations. Applications include trusses, frames, machines, beams, and friction problems. Kinematics and kinetics of particles and rigid bodies. Newton's equation, impulse-momentum, work and energy, Centroids and moments of inertia.	

113161	Thermodynamics
Subject: ES	Catalog Nbr: 0007
2024 SPRG	Primary Robert Viesca Robert.Viesca@tufts.edu
A course stressing the concepts and the laws of classical thermodynamics. Thermodynamics functions, first law, second law, properties of pure substances, availability and irreversibility. Emphasis is placed on applying the thermodynamic mode of reasoning.	

113270	Fluid Mechanics
Subject: ES	Catalog Nbr: 0008
2024 FALL	Primary Robert Viesca Robert.Viesca@tufts.edu
An introduction to fluids at rest and in motion. Fluid properties. Pressure and velocity variations in flows. Mass, momentum, and energy conservation in a flowing fluid. Bernoulli's equation and inviscid flows. An introduction to viscous flows. Dimensional analysis. Drag and lift of moving objects. Fall.	

113357	Computer-aided Design Of Microwave Circuits
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Subject:	Catalog Nbr:			
EE	0160			
2023 SPRG	Primary	Mohammed Afsar	No Email on file.	
Microwave network representation, scattering matrix, constant gain circles, stability and gain concepts, microwave amplifier design. Modeling of circuit elements: coaxial lines, striplines, microstriplines, coplanar lines, coupled lines, lumped elements. Sensitivities and measurement techniques. Constant noise circles and low-noise broad-band amplifier design. Microwave circuit analysis and gradient techniques, multiband and multimode optimization of filters, phase shifters, and switches. Extensive laboratory and project work using state-of-the-art CAD software. Recommendations: EE 117				

113425	Microwave Integrated Circuits			
Subject:	Catalog Nbr:			
EE	0161			
(Cross-listed with MSE 114) Review of CAD techniques for microwave circuits. Substrate, conductor, dielectric, and resistive film materials for integrated circuits. Mask layout, mask layout tools, and mask fabrication. Hybrid microwave integrated circuits, monolithic integrated circuits, foundry requirements, hybrid versus monolithic circuits, performance and testing. Extensive laboratory work. Recommendations: EE 160.				

113468	Applied Mechanics (strength Of Materials)			
Subject:	Catalog Nbr:			
ES	0009			
2024 SPRG	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu	
Analysis of stress and strain. Behavior of isotropic materials, theories of failure. Behavior of members subjected to axial, torsional, and flexural loadings, combined stress, Mohr's circle, compression members and columns.				

113601	Introduction To Materials Science			
Subject:	Catalog Nbr:			
ES	0010			
2024 SPRG	Primary	Derek Mess	Derek.Mess@tufts.edu	
Structure of materials; chemical composition; phase transformations; properties of metals, ceramics, polymers, biopolymers, and related materials. Material selection in chemical and biological engineering applications. Recommendations: MATH 34 (formerly MATH 12), CHEM 1 or 16.				

113663	Fundamentals Of Biological Systems			
Subject:	Catalog Nbr:			
ES	0011			

Course Bulletin

2024 FALL	Primary	Gili Naveh	Gili.Naveh@tufts.edu
Fundamentals of biology in the context of engineering disciplines. Chemical and physical mechanisms underlying biological functions in complex environments. Case studies of relevance in various engineering disciplines, with a focus on cellular and physiological functions. May not be counted toward the Biology major.			

113762	Electrical Engineering Seminar		
Subject: EE	Catalog Nbr: 0191		
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu
A course devoted to the study of special problems in electrical engineering. Please see departmental website for specific details.			

113778	Electrical Engineering Seminar		
Subject: EE	Catalog Nbr: 0192		
2024 SPRG	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu
2024 SPRG	Primary	Marco Donato	Marco.Donato@tufts.edu
A course devoted to the study of special problems in electrical engineering. Please see departmental website for specific details.			

113810	Special Topics		
Subject: EE	Catalog Nbr: 0193		
2023 SPRG	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu
2023 SPRG	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu
2023 SPRG	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu
2024 FALL	Primary	Ronald Lasser	Ron.Lasser@tufts.edu
2024 FALL	Primary	Joel Grodstein	Joel.Grodstein@tufts.edu
2024 FALL	Primary	Emily Carlson	Emily.Carlson@tufts.edu
2024 FALL	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu
2024 SPRG	Primary	Chirag Sthalekar	Chirag.Sthalekar@tufts.edu
2024 SPRG	Primary	Richard Preston	Richard.Preston@tufts.edu
2024 SPRG	Primary	Khaled ElMahgoub	Khaled.ElMahgoub@tufts.edu
2024 SPRG	Primary	Steven Bell	Steven.Bell@tufts.edu
2024 SPRG	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu
2024 SPRG	Primary	Ugochukwu Ugwu	Ugochukwu.Ugwu@tufts.edu
Content and prerequisites to be announced. Please see departmental website for specific details.			

113825	Directed Study		
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Course Bulletin

Subject:	Catalog Nbr:			
EE	0194			
2023 SPRG	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2023 SPRG	Primary	Mai Vu	Mai.Vu@tufts.edu	
2023 SUMR	Primary	Eric Miller	Eric.Miller@tufts.edu	
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu	
2024 SPRG	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu	
Guided independent study of an approved topic at an intermediate level.				

113886	Honors Thesis			
Subject:	Catalog Nbr:			
EE	0197			
2023 SPRG	Primary	Marco Donato	Marco.Donato@tufts.edu	
Honors Thesis.Please see departmental website for specific details.				

113925	Internship			
Subject:	Catalog Nbr:			
EE	0199			
2023 FALL	Primary	Mohammed Afsar	No Email on file.	
2023 SUMR	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu	
2023 SUMR	Primary	Brian Tracey	brian.tracey@tufts.edu	
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu	
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu	
2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu	
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu	
2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu	
2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu	
2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu	
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu	
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu	
2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu	
2024 FALL	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu	
2024 SUMR	Primary	Brian Aull	Brian.Aull@tufts.edu	
2024 SUMR	Primary	Joel Grodstein	Joel.Grodstein@tufts.edu	
2024 SUMR	Primary	Steven Bell	Steven.Bell@tufts.edu	
Supervised internships at suitable locations in industry and government. Jobs offered on basis of availability. Term paper required. Credit not given retroactively. Prior arrangements necessary. Please see departmental				

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website for specific details.

113948	Digital Systems Design For Testability			
Subject:	EE	Catalog Nbr:	0202	
Fault modeling and simulation using VHDL. Test generation algorithms for combinational and sequential circuits. Testability techniques including ad hoc methods, scan design, and built-in self-test. Logic synthesis and testability, testability analysis and random pattern testability. Linear feedback shift registers, error-detecting codes, and self-checking codes. Requires a major design project and applications for industrial partners. Spring. Recommendations: EE 26.				

113998	Environment And Technology			
Subject:	ES	Catalog Nbr:	0025	
	2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu
(Cross-listed as ENV 25.) The impact and interaction of technology and the environment will be evaluated using historical examples. Environmental problems and their solutions will be evaluated from an engineering viewpoint. This course is a core requirement of the Environmental Studies program. Recommendations: CHEM 1 or 16 and sophomore standing				

114014	Advanced Topics In Computer Architecture			
Subject:	EE	Catalog Nbr:	0156	
	2023 SPRG	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
	2023 SPRG	Primary	Jeanne Fourneyron	Jeanne.Fourneyron@tufts.edu
(Cross-listed w/ CS 140) Modern computer architecture, starting from basic 5-stage pipelines and progressing to out-of-order superscalar processors, multicore processors, and heterogeneous processors. Techniques to maximize single-thread performance within the constraints of memory technology, power consumption, and the inherent instruction-level parallelism of applications. Current and future challenges faced by computer architects and computer-system designers. Discussion of research papers. Recommendation: EE126/COMP146 or COMP40				

114097	Detection And Estimation Theory			
Subject:	EE	Catalog Nbr:	0229	
A systematic development of optimal detection and estimation theory, including Bayesian, Maximum Likelihood (MLE), Maximum A Posteriori (MAP), and minimum mean squared error (MMSE) techniques. The Karhunen-Loeve expansion for non-white noise is studied. Applications to digital and analog communications,				

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and radar problems are included. Nonparametric approaches, spectral estimation, and spread spectrum systems are examined.

Recommendations: EE 108 or equivalent.

114115	Advanced Analog & Mixed Signal Ic Design			
Subject: EE		Catalog Nbr: 0247		
2023 SPRG		Primary	Sameer Sonkusale	sameer@ece.tufts.edu
Advanced topics in analog VLSI design, switched capacitor filters, continuous time filters, principles of nyquist rate analog to digital converters and digital to analog converters, oversampled delta sigma analog to digital converter design. Design and implementation of phase locked loops, frequency synthesizer and related building blocks for communication systems. Novel concepts in analog and mixed signal circuit design from current literature. Recommendations: EE 147.				

114138	Devices & Circuits For Optical Communications		
	Subject:	Catalog Nbr:	
	EE	0249	
Underlying principles and integrated circuit design techniques for optical communication systems (fiber-based and free-space). Optoelectronic device operation, receiver circuit fundamentals, noise analysis, transimpedance amplifiers, lasers and modulators, driver circuits, and clock/data recovery circuit blocks. Opto-electronic integration methods, modulation schemes, system-level simulation, and applications to problems in broadband communication and frequency-domain optical imaging are also presented. Projects employing VLSI CAD software. Recommendations: EE 103 or consent of instructor. Corequisite: EE 147.			

114161	Biomedical Engineering			
Subject: EE		Catalog Nbr: 0250		
2024 FALL		Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
An introduction to the interdisciplinary nature of biomedical engineering. The biological, chemical, electrical, and mechanical principles involved in the design and operation of medical devices. Biopotentials, electrodes, transducers, biocompatibility of materials, and patient safety.				

114174	Public Health Engineering			
Subject: CEE		Catalog Nbr: 0052		
2023 SPRG		Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu
2024 SPRG		Primary	Ana Fernandes	Ana.Fernandes@tufts.edu
(Cross-listed as ENV 27 and CH 10). An introduction to public health engineering. Elements of waterborne				

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disease control, hazardous materials management, occupational health and safety, and environmental interventions. Applications to environmental engineering and environmental engineering science.

114205	Plasma Engineering
Subject: EE	Catalog Nbr: 0251
Engineering applications and physics of gaseous plasmas. Plasma applications include integrated circuit fabrication; plasma displays; ion thrusters; plasma science coverage of Boltzmann equation; energy distribution functions; ion and electron transport; electromagnetic interaction with plasma; plasma sheath; collision statistics; mass and energy balance; analytical and numerical modeling. Recommendations: EE 117 or equivalent, EE 104 or equivalent.	

114449		Master's Project		
Subject: EE		Catalog Nbr: 0293		
2023 FALL	Primary	Mohammed Afsar	No Email on file.	
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu	
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu	
2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu	
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu	
2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu	
2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu	
2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu	
2024 FALL	Primary	Khaled ElMahgoub	Khaled.ElMahgoub@tufts.edu	
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu	
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu	
2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu	
2024 FALL	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu	
Guided individual study of an approved topic suitable for a master's design project. Please see departmental website for specific details.				

114505	Non Major Credit
Subject: EN	Catalog Nbr: 0310

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114523		Lower Level Elective Crd	
Subject:		Catalog Nbr:	
EN		0320	

114541		Upper Level Elective Crd	
Subject:		Catalog Nbr:	
EN		0330	

114553		Master's Project		
Subject: EE		Catalog Nbr: 0294		
2023 SPRG	Primary	Mohammed Afsar	No Email on file.	
2023 SPRG	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu	
2023 SPRG	Primary	Brian Tracey	brian.tracey@tufts.edu	
2024 SPRG	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 SPRG	Primary	Chorng Chang	chorng.chang@tufts.edu	
2024 SPRG	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
2024 SPRG	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 SPRG	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu	
2024 SPRG	Primary	Eric Miller	Eric.Miller@tufts.edu	
2024 SPRG	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu	
2024 SPRG	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu	
2024 SPRG	Primary	Usman Khan	Usman.Khan@tufts.edu	
2024 SPRG	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
2024 SPRG	Primary	Mai Vu	Mai.Vu@tufts.edu	
2024 SPRG	Primary	Khaled ElMahgoub	Khaled.ElMahgoub@tufts.edu	
2024 SPRG	Primary	Steven Bell	Steven.Bell@tufts.edu	
2024 SPRG	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu	
2024 SPRG	Primary	Marco Donato	Marco.Donato@tufts.edu	
2024 SPRG	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu	
Guided individual study of an approved topic suitable for a master's design project. Please see departmental website for specific details.				

114616	Numerical Methods			
Subject:	Catalog Nbr:			
ES	0055			
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu	
2024 SPRG	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu	
Introduction to using computers to solve engineering-oriented mathematical problems. Topics include				

Course Bulletin

mathematical modeling, round-off and truncation error, root location, linear algebraic equations, optimization, regression, interpolation, numerical differentiation and integration, ordinary and partial differential equations. Applications using software and programming languages.

114618		Master's Thesis		
Subject: EE		Catalog Nbr: 0295		
2023 FALL	Primary	Mohammed Afsar	No Email on file.	
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu	
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu	
2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu	
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu	
2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu	
2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu	
2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu	
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu	
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu	
2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu	
2024 FALL	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu	
Guided research on a topic that has been approved as a suitable subject for a master's thesis. Please see departmental website for specific details.				

114655		Probability And Statistics			
Subject: ES		Catalog Nbr: 0056			
2024 FALL		Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu	
2024 FALL		Primary	Wayne Chudyk	wayne.chudyk@tufts.edu	
Application of the concepts of probability and statistics to problem solving in engineering systems. Topics include data reduction techniques, probability, probability distribution functions, error propagation, sampling distributions, estimation, hypothesis testing, simple comparative experiments, and linear regression. Examples are drawn from a variety of disciplines, including the environment, materials, manufacturing, computing, and process design.					

114664		Master's Thesis		
Subject: EE		Catalog Nbr: 0296		
2023 SPRG	Primary	Mohammed Afsar	No Email on file.	

Course Bulletin

2023 SPRG	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu
2023 SPRG	Primary	Brian Tracey	brian.tracey@tufts.edu
2024 SPRG	Primary	Karen Panetta	Karen.Panetta@tufts.edu
2024 SPRG	Primary	Chorng Chang	chorng.chang@tufts.edu
2024 SPRG	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
2024 SPRG	Primary	Sameer Sonkusale	sameer@ece.tufts.edu
2024 SPRG	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu
2024 SPRG	Primary	Eric Miller	Eric.Miller@tufts.edu
2024 SPRG	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu
2024 SPRG	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu
2024 SPRG	Primary	Usman Khan	Usman.Khan@tufts.edu
2024 SPRG	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu
2024 SPRG	Primary	Mai Vu	Mai.Vu@tufts.edu
2024 SPRG	Primary	Steven Bell	Steven.Bell@tufts.edu
2024 SPRG	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu
2024 SPRG	Primary	Marco Donato	Marco.Donato@tufts.edu
2024 SPRG	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu
Guided research on a topic that has been approved as a suitable subject for a master's thesis. Please see departmental website for specific details.			

114719	Doctoral Thesis		
Subject: EE	Catalog Nbr: 0297		
2023 FALL	Primary	Mohammed Afsar	No Email on file.
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu
2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu
2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu
2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu
2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu
2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu
2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu
2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu
2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu
2024 FALL	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu
Guided research on a topic suitable for a doctoral dissertation. Please see departmental website for specific details.			

114755	Appropriate Technology In Sustainable Engineering
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Course Bulletin

Subject: Catalog Nbr:
ES 0060

Selection of culturally appropriate technology and attainment of economic sustainability. Topics include community needs assessment, green manufacturing, societal issues, and sustainable implementation strategies. Emphasis on interdisciplinary approach at the intersection of community resource allocation, engineering technology, and government policy.

114809		Doctoral Thesis		
Subject: EE		Catalog Nbr: 0298		
2023 SPRG	Primary	Mohammed Afsar	No Email on file.	
2023 SPRG	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu	
2023 SPRG	Primary	Brian Tracey	brian.tracey@tufts.edu	
2024 SPRG	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 SPRG	Primary	Chorng Chang	chorng.chang@tufts.edu	
2024 SPRG	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
2024 SPRG	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 SPRG	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu	
2024 SPRG	Primary	Eric Miller	Eric.Miller@tufts.edu	
2024 SPRG	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu	
2024 SPRG	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu	
2024 SPRG	Primary	Usman Khan	Usman.Khan@tufts.edu	
2024 SPRG	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
2024 SPRG	Primary	Mai Vu	Mai.Vu@tufts.edu	
2024 SPRG	Primary	Steven Bell	Steven.Bell@tufts.edu	
2024 SPRG	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu	
2024 SPRG	Primary	Marco Donato	Marco.Donato@tufts.edu	
2024 SPRG	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu	
2024 SPRG	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu	
Guided research on a topic suitable for a doctoral dissertation. Please see departmental website for specific details.				

114828		Non Major Credit	
Subject:		Catalog Nbr:	
EE		0310	

114862		Lower Level Elective Crd	
Subject:		Catalog Nbr:	
EE		0320	

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114869	Musical Instrument Design And Manufacture
Subject: ES	Catalog Nbr: 0073
(Cross-listed as ME 45) Review of the underlying engineering and the basic fabrication of musical instruments, including an introduction to musical acoustics, computer-based simulation tools, laboratory measurement, and manufacturing. The bulk of the class is dedicated to designing, simulating, building, and testing of an instrument.	

114874	Upper Level Elective Crd
Subject: EE	Catalog Nbr: 0330

114891		Masters Degree Continuation		
Subject: EE		Catalog Nbr: 0401		
2023 FALL	Primary	Mohammed Afsar	No Email on file.	
2023 SPRG	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu	
2023 SPRG	Primary	Brian Tracey	brian.tracey@tufts.edu	
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu	
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu	
2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu	
2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu	
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu	
2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu	
2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu	
2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu	
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu	
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu	
2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu	
2024 FALL	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu	
2024 SPRG	Primary	Steven Bell	Steven.Bell@tufts.edu	
Part-time.Please see departmental website for specific details.				

114927	Masters Degree Continuation
Subject:	Catalog Nbr:

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EE	0402			
	2023 FALL	Primary	Mohammed Afsar	No Email on file.
	2023 SPRG	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu
	2023 SPRG	Primary	Brian Tracey	brian.tracey@tufts.edu
	2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu
	2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu
	2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
	2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu
	2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu
	2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu
	2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu
	2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu
	2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu
	2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu
	2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu
	2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu
	2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu
	2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu
	2024 FALL	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu
	2024 SPRG	Primary	Steven Bell	Steven.Bell@tufts.edu
Full-time.Please see departmental website for specific details.				

114966	Grad Teaching Assistant			
Subject:	Catalog Nbr:			
EE	0405			
	2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu

114981	Grad Research Assistant			
Subject:	Catalog Nbr:			
EE	0406			
	2023 FALL	Primary	Mohammed Afsar	No Email on file.
	2023 SPRG	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu
	2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu
	2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu
	2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
	2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu
	2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu
	2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu
	2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu
	2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu
	2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu
	2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu

Course Bulletin

2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu
2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu
2024 SPRG	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu

114989	Special Topics In Engineering		
Subject:	Catalog Nbr:		
ES	0093		
Guided study of chosen topics in Engineering and Engineering Science. Please see the School of Engineering Website for further details. Recommendations: Permission of instructor.			

114999	Doctoral Degree Continuation		
Subject: EE	Catalog Nbr: 0501		
2023 FALL	Primary	Mohammed Afsar	No Email on file.
2023 SPRG	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu
2023 SPRG	Primary	Brian Tracey	brian.tracey@tufts.edu
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu
2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu
2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu
2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu
2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu
2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu
2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu
2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu
2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu
2024 SPRG	Primary	Steven Bell	Steven.Bell@tufts.edu
2024 SPRG	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu
Part-time.Please see departmental website for specific details.			

115032	Doctoral Degree Continuation		
Subject: EE	Catalog Nbr: 0502		
2023 FALL	Primary	Mohammed Afsar	No Email on file.

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2023 SPRG	Primary	Jeffrey Hopwood	Jeffrey.Hopwood@tufts.edu
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu
2024 FALL	Primary	Chorng Chang	chorng.chang@tufts.edu
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu
2024 FALL	Primary	Valencia Koomson	Valencia.Koomson@tufts.edu
2024 FALL	Primary	Eric Miller	Eric.Miller@tufts.edu
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu
2024 FALL	Primary	Aleksandar Stankovic	alex.stankovic@tufts.edu
2024 FALL	Primary	Usman Khan	Usman.Khan@tufts.edu
2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu
2024 FALL	Primary	Mai Vu	Mai.Vu@tufts.edu
2024 FALL	Primary	Aseema Mohanty	Aseema.Mohanty@tufts.edu
2024 FALL	Primary	Marco Donato	Marco.Donato@tufts.edu
2024 FALL	Primary	Yingjie Lao	Yingjie.Lao@tufts.edu
2024 FALL	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu

Full-time. Please see departmental website for specific details.

115273	Electronic Musical Instrument Design		
Subject:	Catalog Nbr:		
ES	0095		
2024 FALL	Primary	Paul Lehrman	paul.lehrman@tufts.edu
(Cross-listed as MUS 141). Non-standard electronic musical instruments or "controllers," incorporating sensors that respond to touch, position, movement, finger pressure, wind pressure, and other human factors, and their translation to Musical Instrument Digital Interface (MIDI) data. Designing and building original systems using common materials and object-oriented music-specific programming languages and software-based synthesis. Students will complete several creative projects using music hardware and software. Recommendations: Experience in one or more of the following--electronic music, electronic prototyping, mechanical engineering, computer programming.			

115411	Numerical Methods		
Subject:	Catalog Nbr:		
ES	0101		
2024 SPRG	Primary	Igor Sokolov	Igor.Sokolov@tufts.edu
Numerical methods are studied and applied to the solution of problems in applied science and engineering. Interpolation, approximation, numerical linear algebra, including system solution and eigenvalue problems, solution of nonlinear equations, numerical differentiation and integration, ordinary differential equation algorithms, and finite-difference solution of partial differential equations. Applications using calculative software. Recommendations: MATH 51 (formerly MATH 38) and the ability to implement computer solutions.			

Course Bulletin

115714	Engineering Systems: Stochastic Models
Subject: ES	Catalog Nbr: 0152
An introduction to network models in the study/design of engineering, economic, environmental, and social systems with an emphasis on systems exhibiting probabilistic behavior. Topics include network models, Markov chains, queuing theory, reliability analysis, and genetic algorithms (GAs). Practical treatment is stressed; applications and projects are chosen from several areas, including civil and environmental engineering. Recommendations: Junior Standing or consent of instructor	

115942	Engineering Psychology
Subject: ENP	Catalog Nbr: 0053
(Cross-listed as PSY 53). Survey of the applied areas of psychology that have proven useful in the design of equipment for human use and in the design of human-machine systems. Emphasis on how humans process information and how psychological science can further inform each stage of information processing.	

115987	Non Major Credit
Subject: ES	Catalog Nbr: 0310

115999	Lower Level Elective Crd
Subject: ES	Catalog Nbr: 0320

116016	Upper Level Elective Crd
Subject: ES	Catalog Nbr: 0330

116022	Introduction To Human Factors And Ergonomics
Subject: ENP	Catalog Nbr: 0061
(Cross-listed as BME 61.) A practical introduction to human performance and to designing for human use. Studies include human factors, ergonomics, work stations, and environmental and legal concerns that impact on design. Examples of good and bad designs illustrate course principles.	

Course Bulletin

116048		Internship In Engineering Psychology			
Subject:		Catalog Nbr:			
ENP		0099			
2024 FALL	Primary	Chris Rogers	chris.rogers@tufts.edu		
2024 FALL	Primary	Daniel Hannon	Dan.Hannon@tufts.edu		
2024 FALL	Primary	Gary Leisk	Gary.LEISK@tufts.edu		
2024 FALL	Primary	Jason Rife	Jason.Rife@tufts.edu		
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu		
2024 FALL	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu		
2024 FALL	Primary	Felix Huang	Felix.Huang@tufts.edu		
2024 SPRG	Primary	Dave Miller	Dave.Miller@tufts.edu		
A mentored preprofessional experience in engineering psychology at an off-site organization. The internship must conform to all the requirements of the School of Engineering internship programs. The engineering psychology program will grant course credit for internships if the following conditions are met: 1) The student has junior or senior standing and has declared a major in engineering psychology. 2) The student has submitted a written internship proposal that has been approved prior to the semester in which the internship will be performed. No internships with course credit will be approved once the semester of the internship has started. 3) A faculty mentor in engineering psychology holds supervisory and technical control of any work that receives credit. 4) The student submits a written report that is to be evaluated by the faculty adviser and the outside institutional supervisor. Work of a proprietary nature cannot be used as a basis for the granting of course credit. Recommendations: Junior or Senior standing or permission of instructor.					

116058		Tufts Program Abroad	
Subject:		Catalog Nbr:	
ES		0340	

116068		Assistive Technology Foundations			
Subject:		Catalog Nbr:			
ENP		0105			
2024 FALL		Primary	Jennifer Buxton	Jennifer.Buxton@tufts.edu	
2024 FALL		Primary	Loren McMahon	Loren.McMahon@tufts.edu	
(Cross-listed as OTS 105). Examination of problems in designing and providing assistive devices to individuals with disabilities, to assist mobility, communication, positioning, and environmental control and daily living. Processes discussed include needs assessment, search for available devices, resources available, and creative problem solving. Students work with materials commonly used to create individualized devices, in cross-disciplinary teams on a design for a specific user or group. Problems of funding and delivery of devices also explored. For students in occupational therapy and engineering, and for educators, speech/language pathologists, and rehabilitation personnel.					

Course Bulletin

116201	Seminar In Engineering Psychology		
Subject:	Catalog Nbr:		
ENP	0149		
Graduate-level seminar course designed for students who are interested in getting a broad overview of different research methods and analytical techniques in human factors/ergonomics research. Topics to be covered are related to the acquiring, recording, and analyzing of empirical data. Theory underlying these methods in human factors/ergonomics research also studied. Three term assignments. Fall.			

116409	Human Factor Product Design				
Subject:		Catalog Nbr:			
ENP		0161			
2024 FALL		Primary	James Intriligator	James.Intriligator@tufts.edu	
Material relevant in consumer product design, biomedical engineering, architectural design, and machine design. Topics include design methodologies, user feedback techniques, performance measurements, sensory evaluation techniques, creative design, and prototyping. Extensive individual and group project design work. Emphasis on designing and creativity.					
Recommendations: ENP 53, ENP 64 and junior standing					

116464	Human-machine System Design				
Subject:		Catalog Nbr:			
ENP		0162			
2023 SUMR	Primary	James Intriligator	James.Intriligator@tufts.edu		
2024 FALL	Primary	Daniel Hannon	Dan.Hannon@tufts.edu		
Techniques for man-machine system designs in which cognitive and dynamic aspects are of major importance. Applications to computer-interface design, auto/semiautomated systems, biomedical systems, and others. Topics include information processing, decision making, reaction times, and signal detection theory. Individual and group projects, laboratory demonstrations.					
Recommendations: ENP 64 and senior standing, or graduate standing.					

116481	Analytical Methods In Human Factors Engineering			
Subject:	Catalog Nbr:			
ENP	0163			
2023 SPRG	Primary	Jason Rife	Jason.Rife@tufts.edu	
2024 SPRG	Primary	Alexandria Trombley	Alexandria.Carlson@tufts.edu	
Quantitative and qualitative analysis methods applied in human factors engineering. Longitudinal data analysis, root cause analysis, inter-rater reliability analysis, utility analysis, usability analysis, heuristic review, and applications of machine learning to human factors.				
Recommendations: ENP 162 or graduate standing.				

Course Bulletin

116557	Computer Interface Design			
Subject: ENP		Catalog Nbr: 0166		
2023 SPRG		Primary	Cory Costantino	Cory.Costantino@tufts.edu
2024 FALL		Primary	Dave Miller	Dave.Miller@tufts.edu
2024 FALL		Primary	Chaiwoo Lee	Chaiwoo.Lee@tufts.edu
2024 SPRG		Primary	Ken Tango	Ken.Tango@tufts.edu
(Cross-listed as BME 166.) This hands-on course challenges students to design computer-based products and systems that are easy to learn and use. Lectures cover the user interface-design process, basic design principles, and design evaluation methods. In-class exercises and projects reinforce the students' understanding of the lecture material and provide practical design experience. Students use computer-based prototyping tools to model and demonstrate their design solutions. Frequent guest lectures by user-interface design specialists from industry. Recommendations: EN 1, 2, and junior standing, or permission of instructor.				

116608	Special Topics			
Subject: ENP		Catalog Nbr: 0193		
2023 SPRG		Primary	Gary Leisk	Gary.LEISK@tufts.edu
2023 SPRG		Primary	Dave Miller	Dave.Miller@tufts.edu
2024 SPRG		Primary	James Intriligator	James.Intriligator@tufts.edu
2024 SUMR		Primary	Daniel Hannon	Dan.Hannon@tufts.edu
2024 SUMR		Secondary	Katherine Darveau	Katherine.Darveau@tufts.edu
Guided individual study of an approved topic. Please see departmental website for specific details.				

116631	Special Topics	
Subject:	Catalog Nbr:	
ENP	0194	
Guided individual study of an approved topic. Please see departmental website for specific details.		

116649	Human Factors In Medical Systems	
	Subject: ENP	Catalog Nbr: 0210
Advanced topics in medical error analysis, user-centered medical technology design, product development and testing, FDA requirements, patenting, simulation, displays and controls, computerization, system implementation and maintenance, and product usability and accessibility. Recommendations: ENP 163		

116670	Interface Design In Complex Systems			
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Subject:	Catalog Nbr:
ENP	0215
Computer-based interfaces, complex human-machine systems (e.g., power plant control room and emergency response dispatch centers), ecological approach, work environment analysis, information representation. Recommendations: ENP 161 or equivalent.	

116694	Special Topics
Subject:	Catalog Nbr:
ENP	0293
Guided individual study on an approved topic. Please see departmental website for specific details.	

116734	Thesis			
Subject:	Catalog Nbr:			
ENP	0296			
2024 FALL	Primary	Michael Wiklund	michael.wiklund@tufts.edu	
2024 FALL	Primary	Chris Rogers	chris.rogers@tufts.edu	
2024 FALL	Primary	Daniel Hannon	Dan.Hannon@tufts.edu	
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu	
2024 SPRG	Primary	Jason Rife	Jason.Rife@tufts.edu	
2024 SPRG	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu	
2024 SPRG	Primary	Felix Huang	Felix.Huang@tufts.edu	
2024 SPRG	Primary	Dave Miller	Dave.Miller@tufts.edu	
Guided research on a topic that has been approved as a suitable subject for a master's thesis.Please see departmental website for specific details.				

116762	Graduate Research
Subject:	Catalog Nbr:
ENP	0298
Guided research on a topic suitable for a doctoral dissertation. Please see departmental website for specific details.	

116782	Non Major Credit
Subject:	Catalog Nbr:
ENP	0310

116801	Lower Level Elective Crd
Subject:	Catalog Nbr:
ENP	0320

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116819	Upper Level Elective Crd
Subject: ENP	Catalog Nbr: 0330

121501	Applied Mathematics For Engineers
Subject: ME	Catalog Nbr: 0100
2024 FALL	Primary Mark Kachanov mark.kachanov@tufts.edu
Review of ordinary differential equations and oscillatory phenomena. Fourier series and applications. Orthogonal functions, Bessel functions. Partial differential equations and their applications to fluid mechanics, heat transfer, vibration and wave propagation. In no case may both ME 100 and MATH 151 be taken for credit. Recommendations: MATH 51 (formerly MATH 38) or equivalent.	

121513	Biomechanics
Subject: ME	Catalog Nbr: 0123
2024 FALL	Primary Hoda Koushyar Hoda.Koushyar@tufts.edu
(Cross-listed as BME 152) Mechanical properties of muscle and bone, activation of muscles, kinematics and dynamics of joints, forces and energy in movement, movement data recording and analysis. Classroom presentations and research projects. Recommendations: ME 21 or graduate standing	

121726	Wind Engineering
Subject: ME	Catalog Nbr: 0179
Structure interaction with atmospheric boundary layers. Characterization of wind data, wind variation with height, and variation with local topography. Boundary layer turbulence and connection to meteorological events. Wind forces on basic shapes, mean loading, and wind tunnel techniques. Dynamic effects including vortex oscillations, response of rigid and flexible structures and suppression. Building geometries and special cases such as masts, towers, bridges, and special structures. Wind turbine aerodynamics and wind turbine design. Recommendations: ES 8 or ME 51.	

122006	Digital Control Of Dynamic Systems
Subject:	Catalog Nbr:

Course Bulletin

ME	0130			
	2024 FALL	Primary	Felix Huang	Felix.Huang@tufts.edu
Fundamental concepts and modern techniques for the modeling and control of dynamic systems with multiple inputs and outputs . Formal modeling methods and linear closed-loop control principles. State-space techniques for continuous and discrete time controller design.. Analysis of system properties and performance. Related mathematical methods, computational software tools, and controller hardware. Recommendations: ME 31 or graduate standing.				

122016	Advanced Dynamics			
Subject:	Catalog Nbr:			
ME	0121			
	2024 SPRG	Primary	Steven Langel	Steven.Langel@tufts.edu
Kinematics and dynamics of rigid bodies in three dimensions. Lagrange's equations for the derivation of system equations of motion. Numerical solution of nonlinear ordinary differential equations. Computer tools. Recommendations: ME 31, ME 130 or consent.				

122068	Robotics			
Subject:	Catalog Nbr:			
ME	0134			
	2024 FALL	Primary	Matthew Woodward	Matthew.Woodward@tufts.edu
Broad review of theoretical and applied aspects of robotic manipulators and mobile robots. Statics, kinematics, dynamics, actuation, sensing, sensor fusion, trajectory planning and control with hands-on applications. Pre-requisites: ME 0035 or graduate standing or permission of instructor.				

122154	Special Topics			
Subject:	Catalog Nbr:			
ME	0193			
	2023 SPRG	Primary	Daniel Hannon	Dan.Hannon@tufts.edu
	2023 SPRG	Primary	Gary Leisk	Gary.LEISK@tufts.edu
	2023 SPRG	Primary	Pratap Misra	Pratap.Misra@tufts.edu
	2023 SPRG	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu
	2023 SPRG	Primary	Bryony DuPont	No Email on file.
	2024 FALL	Primary	Igor Sokolov	Igor.Sokolov@tufts.edu
	2024 FALL	Primary	Joel Grodstein	Joel.Grodstein@tufts.edu
	2024 FALL	Primary	Bradley Duncan	Bradley.Duncan@tufts.edu
	2024 FALL	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu
	2024 SPRG	Primary	Mark Kachanov	mark.kachanov@tufts.edu
	2024 SPRG	Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu
	2024 SPRG	Primary	Greses Perez	Greses.Perez@tufts.edu
Guided study of an approved topic. Please see departmental website for specific details.				

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122720	Flow-real Viscous Fluids		
Subject:	Catalog Nbr:		
ME	0253		
Stress tensor in viscous fluids, incompressible boundary-layer equations, Blasius equation, Karman-Polhausen method, semiempirical and statistical theories of turbulence.			

122817		Graduate Seminar			
Subject:		Catalog Nbr:			
ME		0291			
2024 FALL		Primary	Daniel Hannon	Dan.Hannon@tufts.edu	
2024 FALL		Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu	
2024 FALL		Primary	Trevion Henderson	Trevion.Henderson@tufts.edu	
Presentation of individual reports on basic topics to a seminar group for discussion and criticism. Please see departmental website for specific details.					

122869	Graduate Seminar			
Subject:	Catalog Nbr:			
ME	0292			
2024 SPRG	Primary	Daniel Hannon	Dan.Hannon@tufts.edu	
2024 SPRG	Primary	Elaine Short	Elaine.Short@tufts.edu	
2024 SPRG	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu	
Presentation of individual reports on basic topics to a seminar group for discussion and criticism. Please see departmental website for specific details.				

122898	Special Topics	
Subject:	Catalog Nbr:	
ME	0293	
Guided individual study of an approved topic. Please see departmental website for specific details.		

122996	Master's Thesis			
Subject:	Catalog Nbr:			
ME	0296			
2024 FALL	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu	
2024 FALL	Primary	Michael Wiklund	michael.wiklund@tufts.edu	
2024 FALL	Primary	Behrouz Abedian	behrouz.abedian@tufts.edu	
2024 FALL	Primary	Mark Kachanov	mark.kachanov@tufts.edu	
2024 FALL	Primary	Anil Saigal	anil.saigal@tufts.edu	
2024 FALL	Primary	Chris Rogers	chris.rogers@tufts.edu	
2024 FALL	Primary	Daniel Hannon	Dan.Hannon@tufts.edu	

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2024 FALL	Primary	Douglas Matson	Douglas.Matson@tufts.edu
2024 FALL	Primary	Gary Leisk	Gary.LEISK@tufts.edu
2024 FALL	Primary	Robert White	R.White@tufts.edu
2024 FALL	Primary	Kristen Wendell	Kristen.Wendell@tufts.edu
2024 FALL	Primary	Jason Rife	Jason.Rife@tufts.edu
2024 FALL	Primary	Marc Hodes	Marc.Hodes@tufts.edu
2024 FALL	Primary	Luisa Chiesa	Luisa.Chiesa@tufts.edu
2024 FALL	Primary	Pratap Misra	Pratap.Misra@tufts.edu
2024 FALL	Primary	Igor Sokolov	Igor.Sokolov@tufts.edu
2024 FALL	Primary	Jeffrey Guasto	Jeffrey.Guasto@tufts.edu
2024 FALL	Primary	Jianmin Qu	Jianmin.Qu@tufts.edu
2024 FALL	Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 FALL	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu
2024 FALL	Primary	Matthew Woodward	Matthew.Woodward@tufts.edu
2024 FALL	Primary	Felix Huang	Felix.Huang@tufts.edu
2024 FALL	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu
2024 SPRG	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu

Guided research on an approved topic suitable for a master's thesis. Please see departmental website for specific details.

123035	Doctoral Thesis		
Subject: ME	Catalog Nbr: 0298		
2024 FALL	Primary	Behrouz Abedian	behrouz.abedian@tufts.edu
2024 FALL	Primary	Mark Kachanov	mark.kachanov@tufts.edu
2024 FALL	Primary	Anil Saigal	anil.saigal@tufts.edu
2024 FALL	Primary	Chris Rogers	chris.rogers@tufts.edu
2024 FALL	Primary	Daniel Hannon	Dan.Hannon@tufts.edu
2024 FALL	Primary	Douglas Matson	Douglas.Matson@tufts.edu
2024 FALL	Primary	Gary Leisk	Gary.LEISK@tufts.edu
2024 FALL	Primary	Robert White	R.White@tufts.edu
2024 FALL	Primary	Kristen Wendell	Kristen.Wendell@tufts.edu
2024 FALL	Primary	Jason Rife	Jason.Rife@tufts.edu
2024 FALL	Primary	Marc Hodes	Marc.Hodes@tufts.edu
2024 FALL	Primary	Luisa Chiesa	Luisa.Chiesa@tufts.edu
2024 FALL	Primary	Igor Sokolov	Igor.Sokolov@tufts.edu
2024 FALL	Primary	Jeffrey Guasto	Jeffrey.Guasto@tufts.edu
2024 FALL	Primary	Jianmin Qu	Jianmin.Qu@tufts.edu
2024 FALL	Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu

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2024 FALL	Primary	Matthew Woodward	Matthew.Woodward@tufts.edu
2024 FALL	Primary	Elaine Short	Elaine.Short@tufts.edu
2024 FALL	Primary	Abani Patra	Abani.Patra@tufts.edu
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu
2024 FALL	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu
2024 SPRG	Primary	Karen Panetta	Karen.Panetta@tufts.edu
Guided research on a topic suitable for a doctoral dissertation. Please see departmental website for specific details.			

123213		Master's Project		
Subject: ME		Catalog Nbr: 0294		
2024 FALL	Primary	Mark Kachanov	mark.kachanov@tufts.edu	
2024 FALL	Primary	Anil Saigal	anil.saigal@tufts.edu	
2024 FALL	Primary	Chris Rogers	chris.rogers@tufts.edu	
2024 FALL	Primary	Daniel Hannon	Dan.Hannon@tufts.edu	
2024 FALL	Primary	Douglas Matson	Douglas.Matson@tufts.edu	
2024 FALL	Primary	Gary Leisk	Gary.LEISK@tufts.edu	
2024 FALL	Primary	Robert White	R.White@tufts.edu	
2024 FALL	Primary	Kristen Wendell	Kristen.Wendell@tufts.edu	
2024 FALL	Primary	Jason Rife	Jason.Rife@tufts.edu	
2024 FALL	Primary	Marc Hodes	Marc.Hodes@tufts.edu	
2024 FALL	Primary	Luisa Chiesa	Luisa.Chiesa@tufts.edu	
2024 FALL	Primary	Igor Sokolov	Igor.Sokolov@tufts.edu	
2024 FALL	Primary	Jeffrey Guasto	Jeffrey.Guasto@tufts.edu	
2024 FALL	Primary	Jianmin Qu	Jianmin.Qu@tufts.edu	
2024 FALL	Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu	
2024 FALL	Primary	Iryna Zenyuk	No Email on file.	
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu	
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu	
2024 FALL	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu	
2024 FALL	Primary	Matthew Woodward	Matthew.Woodward@tufts.edu	
2024 FALL	Primary	Felix Huang	Felix.Huang@tufts.edu	
2024 FALL	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu	
2024 SPRG	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu	
2024 SPRG	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 SPRG	Primary	Michael Wiklund	michael.wiklund@tufts.edu	
2024 SPRG	Primary	Pratap Misra	Pratap.Misra@tufts.edu	
2024 SPRG	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu	
2024 SPRG	Primary	Elaine Short	Elaine.Short@tufts.edu	
2024 SPRG	Primary	Dave Miller	Dave.Miller@tufts.edu	
Execution of a project under the guidance of a faculty advisor. Proposal must be approved by faculty advisor				

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and graduate director. Each project must address a substantive engineering problem. Students are required to make an oral presentation of their project work. Enrollment is limited to matriculated students in the Master of Science program.

123233		Non Major Credit	
Subject:		Catalog Nbr:	
ME		0310	

123260	Lower Level Elective Crd	
Subject:	Catalog Nbr:	
ME	0320	

123283	Upper Level Elective Crd	
Subject:	Catalog Nbr:	
ME	0330	

123330	Tufts Abroad Program			
	Subject:	Catalog Nbr:		
	ME	0340		
	2023 FALL	Primary	Meredith Hyde	Meredith.Hyde@tufts.edu
	2023 FALL	Primary	Isabela Secanechia	Isabela.Secanechia@tufts.edu

123490	Master's Degree Continuation			
	Subject:	Catalog Nbr:		
	ME	0401		
	2024 FALL	Primary	Marc Hodes	Marc.Hodes@tufts.edu
Part-time. Please see departmental website for specific details.				

123543	Master's Degree Continuation			
	Subject:	Catalog Nbr:		
	ME	0402		
	2024 FALL	Primary	Marc Hodes	Marc.Hodes@tufts.edu
Full-time. Please see departmental website for specific details.				

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123584	Grad Teaching Assistant			
Subject:	Catalog Nbr:			
ME	0405			
2024 FALL	Primary	Marc Hodes		Marc.Hodes@tufts.edu

123607	Grad Research Assistant			
Subject:	Catalog Nbr:			
ME	0406			
2024 FALL	Primary	Marc Hodes		Marc.Hodes@tufts.edu
2024 SPRG	Primary	Chris Rogers		chris.rogers@tufts.edu

123772	Doctoral Degree Continuation			
Subject:	Catalog Nbr:			
ME	0501			
2024 FALL	Primary	Marc Hodes		Marc.Hodes@tufts.edu
Part-time.Please see departmental website for specific details.				

123827	Doctoral Degree Continuation			
Subject:	Catalog Nbr:			
ME	0502			
2024 FALL	Primary	Marc Hodes		Marc.Hodes@tufts.edu
Full-time. Please see departmental website for specific details.				

127097	Mechanical Design And Fabrication			
Subject:	Catalog Nbr:			
ME	0001			
Fabrication techniques focusing on manual and CNC machines. Engineering drawings. Fundamentals of machine design. Elastic and plastic deformation, theories of failure, impact, and fatigue of machine elements. The design of machines is approached through selected design problems that are integrated throughout the course. Recommendations: ES 5 (Statics and Dynamics)				

127281	Heat Transfer			
Subject:	Catalog Nbr:			
ME	0016			

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A first course in thermal analysis. Steady-state and transient conduction in solids; numerical solution of conduction problems; radiative heat transfer; forced and natural convection. Introduction to boiling and condensation heat transfer. Heat exchanger analysis. A mandatory weekly lab session designated as ME 16L (no credit) must be taken concurrently. These scheduled laboratory periods involve either experiments from ME 16 or 37, demonstrations both experimental and computational, and problem-solving recitations. Recommendations: ES 7 and 8, MATH 51 (formerly MATH 38).

127439	Instruments And Experiments			
Subject: ME		Catalog Nbr: 0070		
2023 SPRG		Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu
2024 SPRG		Primary	Felix Huang	Felix.Huang@tufts.edu
Design, execution, and analysis of experiments in different fields of mechanical engineering, such as fluid mechanics, heat transfer, dynamics, and materials. Specific topics include sensors, software-based data acquisition, instrument control, data reduction, report writing, and statistical analysis.				

127673	Materials Science and Engineering		
Subject: ME		Catalog Nbr: 0025	
A study of the structure-property relationships of engineering materials. It covers the internal structure of both perfect and imperfect materials and the principles and techniques by which this structure can be controlled. The relationship of mechanical properties to structure is studied, and the influence of these properties on actual production processes is covered.			

127791	Dynamics And Vibration	
Subject:	Catalog Nbr:	
ME	0037	
Kinematics and kinetics of particles and of rigid bodies in plane motion. Free and forced vibration of damped and undamped single-degree of freedom systems. Recommendations: ES 9 and MATH 51 (formerly MATH 38).		

128033	Machine Design	
Subject:	Catalog Nbr:	
ME	0042	
Design and selection of individual machine elements, including gears, bearings, springs, fasteners, brakes, motors, fluid actuators etc. Design projects that relate to these topics are assigned with emphasis placed on the application of fundamental engineering concepts as well as establishing the validity and practicality of the solution. Recommendations: ME 1 (Mechanical Design and Fabrication) and ES 9 (Strength of Materials)		

Course Bulletin

128322	Senior Design Project			
Subject:	Catalog Nbr:			
ME	0074			
2024 FALL	Primary	Jason Rife	Jason.Rife@tufts.edu	
2024 FALL	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu	
Team-based mechanical engineering design projects under the supervision of a department faculty member. The design must be open-ended and make use of the elements of design, as well as use the student's knowledge of engineering science. Recommendations: ME 40 and senior standing				

128706	System Dynamics & Controls			
Subject: ME	Catalog Nbr: 0080			
Fundamental design concepts in modeling and control of dynamic electromechanical systems. Differential mathematical models of continuous system physics. Behavior in the time and frequency domains. Performance tuning using feedback control, proportional-integral-derivative controllers, sensors, actuators, root locus methods, and frequency response methods. Computer tools for design and measurement. Recommendations: ME 37.				

128724	Introductory Robotics And Mechatronics			
Subject:	Catalog Nbr:			
ME	0035			
2024 FALL	Primary	Chris Rogers	chris.rogers@tufts.edu	
2024 SPRG	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu	
Introduction to controls, image processing, sensor development, filtering, and state machines through weekly robotic projects culminating in a final project. Basic concepts from circuit theory, artificial intelligence, microprocessor control and physical design used to solve practical problems.				

128830	Special Topics			
Subject:	Catalog Nbr:			
ME	0093			
2023 SPRG	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu	
2023 SPRG	Primary	Brandon Stafford	Brandon.Stafford@tufts.edu	
2024 FALL	Primary	Daniel Fox	Daniel.Fox@tufts.edu	
2024 SPRG	Primary	Daniela Faas	Daniela.Faas@tufts.edu	
Supervised study in some specialized field of mechanical engineering. Please see departmental website for specific details.				
Recommendations: Permission of instructor and department chair.				

Course Bulletin

128868		Undergraduate Research			
Subject: ME		Catalog Nbr: 0094			
2024 FALL	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu		
2024 FALL	Primary	Michael Wiklund	michael.wiklund@tufts.edu		
2024 FALL	Primary	Mark Kachanov	mark.kachanov@tufts.edu		
2024 FALL	Primary	Anil Saigal	anil.saigal@tufts.edu		
2024 FALL	Primary	Chris Rogers	chris.rogers@tufts.edu		
2024 FALL	Primary	Daniel Hannon	Dan.Hannon@tufts.edu		
2024 FALL	Primary	Douglas Matson	Douglas.Matson@tufts.edu		
2024 FALL	Primary	Gary Leisk	Gary.LEISK@tufts.edu		
2024 FALL	Primary	Robert White	R.White@tufts.edu		
2024 FALL	Primary	Kristen Wendell	Kristen.Wendell@tufts.edu		
2024 FALL	Primary	Jason Rife	Jason.Rife@tufts.edu		
2024 FALL	Primary	Marc Hodes	Marc.Hodes@tufts.edu		
2024 FALL	Primary	Luisa Chiesa	Luisa.Chiesa@tufts.edu		
2024 FALL	Primary	Pratap Misra	Pratap.Misra@tufts.edu		
2024 FALL	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu		
2024 FALL	Primary	Igor Sokolov	Igor.Sokolov@tufts.edu		
2024 FALL	Primary	Jeffrey Guasto	Jeffrey.Guasto@tufts.edu		
2024 FALL	Primary	Jianmin Qu	Jianmin.Qu@tufts.edu		
2024 FALL	Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu		
2024 FALL	Primary	Brandon Stafford	Brandon.Stafford@tufts.edu		
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu		
2024 FALL	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu		
2024 FALL	Primary	Matthew Woodward	Matthew.Woodward@tufts.edu		
2024 FALL	Primary	Felix Huang	Felix.Huang@tufts.edu		
2024 FALL	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu		
2024 SPRG	Primary	Paul Lehrman	paul.lehrman@tufts.edu		
2024 SPRG	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu		
2024 SPRG	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu		
2024 SPRG	Primary	Dave Miller	Dave.Miller@tufts.edu		
Independent undergraduate research in the field of mechanical engineering. Please see departmental website for specific details. Course may not be repeated for credit.					
Recommendations: Permission of instructor and Department Chair.					

128897		Thesis			
Subject: ME		Catalog Nbr: 0096			
2024 FALL	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu		
2024 FALL	Primary	Michael Wiklund	michael.wiklund@tufts.edu		

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2024 FALL	Primary	Mark Kachanov	mark.kachanov@tufts.edu
2024 FALL	Primary	Anil Saigal	anil.saigal@tufts.edu
2024 FALL	Primary	Chris Rogers	chris.rogers@tufts.edu
2024 FALL	Primary	Daniel Hannon	Dan.Hannon@tufts.edu
2024 FALL	Primary	Douglas Matson	Douglas.Matson@tufts.edu
2024 FALL	Primary	Gary Leisk	Gary.LEISK@tufts.edu
2024 FALL	Primary	Robert White	R.White@tufts.edu
2024 FALL	Primary	Kristen Wendell	Kristen.Wendell@tufts.edu
2024 FALL	Primary	Jason Rife	Jason.Rife@tufts.edu
2024 FALL	Primary	Marc Hodes	Marc.Hodes@tufts.edu
2024 FALL	Primary	Luisa Chiesa	Luisa.Chiesa@tufts.edu
2024 FALL	Primary	Pratap Misra	Pratap.Misra@tufts.edu
2024 FALL	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu
2024 FALL	Primary	Igor Sokolov	Igor.Sokolov@tufts.edu
2024 FALL	Primary	Jeffrey Guasto	Jeffrey.Guasto@tufts.edu
2024 FALL	Primary	Jianmin Qu	Jianmin.Qu@tufts.edu
2024 FALL	Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu
2024 FALL	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu
2024 FALL	Primary	Matthew Woodward	Matthew.Woodward@tufts.edu
2024 FALL	Primary	Felix Huang	Felix.Huang@tufts.edu
2024 FALL	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu
2024 SPRG	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 SPRG	Primary	Dave Miller	Dave.Miller@tufts.edu

Supervised research in some specialized field of mechanical engineering. Please see departmental website for specific details.

Recommendations: Permission of instructor and Department Chair.

128929		Internship In Mechanical Engineering		
Subject: ME		Catalog Nbr: 0099		
2024 FALL	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu	
2024 FALL	Primary	Michael Wiklund	michael.wiklund@tufts.edu	
2024 FALL	Primary	Mark Kachanov	mark.kachanov@tufts.edu	
2024 FALL	Primary	Anil Saigal	anil.saigal@tufts.edu	
2024 FALL	Primary	Chris Rogers	chris.rogers@tufts.edu	
2024 FALL	Primary	Daniel Hannon	Dan.Hannon@tufts.edu	
2024 FALL	Primary	Douglas Matson	Douglas.Matson@tufts.edu	
2024 FALL	Primary	Gary Leisk	Gary.LEISK@tufts.edu	
2024 FALL	Primary	Robert White	R.White@tufts.edu	
2024 FALL	Primary	Kristen Wendell	Kristen.Wendell@tufts.edu	
2024 FALL	Primary	Jason Rife	Jason.Rife@tufts.edu	
2024 FALL	Primary	Marc Hodes	Marc.Hodes@tufts.edu	

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2024 FALL	Primary	Luisa Chiesa	Luisa.Chiesa@tufts.edu
2024 FALL	Primary	Pratap Misra	Pratap.Misra@tufts.edu
2024 FALL	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu
2024 FALL	Primary	Igor Sokolov	Igor.Sokolov@tufts.edu
2024 FALL	Primary	Jeffrey Guasto	Jeffrey.Guasto@tufts.edu
2024 FALL	Primary	Jianmin Qu	Jianmin.Qu@tufts.edu
2024 FALL	Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu
2024 FALL	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu
2024 FALL	Primary	Matthew Woodward	Matthew.Woodward@tufts.edu
2024 FALL	Primary	Felix Huang	Felix.Huang@tufts.edu
2024 FALL	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu
2024 SPRG	Primary	William Messner	No Email on file.
2024 SPRG	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
A mentored preprofessional experience in mechanical engineering at an off-site organization. The internship must conform to all the requirements of the School of Engineering Internship Program. The department will grant course credit for internships if the following conditions are met: 1) The student submits a written internship proposal that is approved by the department prior to the semester in which the internship will be performed (no internships with course credit will be approved once the semester of the internship has started), 2) a faculty mentor has supervisory control of any work that receives credit, and 3) a written report is submitted that will be evaluated by the faculty adviser and the outside institutional supervisor. Recommendations: Junior or senior standing. Permission of Instructor.			

128952	Inventive Design		
Subject: ME	Catalog Nbr: 0140		
2024 FALL	Primary	Ryan Wexler	Ryan.Wexler@tufts.edu
2024 FALL	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu
2024 SUMR	Primary	Gary Leisk	Gary.LEISK@tufts.edu
The invention, design, and development of new products. The identification of product opportunities from marketing, manufacturing, and consumers' viewpoints. The organization of new product effort within a corporation. Primary assignments are design projects that are presented before a jury of professionals in the field. Recommendations: Senior Standing.			

128969	Micro-fabrication And Design		
Subject: ME	Catalog Nbr: 0146		
(Cross-listed as MSE 178) An introduction to Micro-Electro-Mechanical Systems (MEMS). Topics include fabrication, design, and applications of MEMS devices. Introduction to computer-aided design techniques and tools. Recommendations: Senior Standing.			

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129074	Statistical Quality Control			
Subject:	Catalog Nbr:			
ME	0102			
2024 FALL	Primary	Anil Saigal		anil.saigal@tufts.edu
This course deals with principle, role, management, and history of quality control in modern manufacturing and servicing organizations. Topics covered include statistical process control, probability and statistics, Pareto diagrams, statistical design of experiments, Taguchi methods, acceptance sampling, and cost of quality. Recommendations: Senior standing or permission of instructor.				

129137	Thermal Management Of Electronics			
Subject:	Catalog Nbr:			
ME	0158			
2024 SPRG	Primary	Marc Hodes		Marc.Hodes@tufts.edu
Design of hardware to control temperature of electronic and photonic components. Thermal management challenges from component-to-data center scales and dependence of reliability on temperature. Fundamentals of heat transfer review. Design and analysis of key technologies: thermal interface materials, heat pipes, heat sinks, thermoelectric modules. Selected emerging technologies. Energy efficient solutions. Recommendations: ME 51 or permission of instructor.				

129155	Thermal-fluid Transport I			
Subject:	Catalog Nbr:			
ME	0150			
2024 FALL	Primary	Marc Hodes		Marc.Hodes@tufts.edu
(Cross-listed as CHBE 111). Advanced topics in fluid mechanics. Viscous and inviscid flows. Strain rate, vorticity and streamline coordinates. Differential conservation laws for mass, momentum and energy. Dimensional analysis. Lubrication flows. Momentum and thermal laminar boundary layers. Laminar-turbulent transition. Reynolds stress and turbulence modeling. Turbulent boundary layers. Flow modeling. Recommendations: ES 8 or ME 51 or graduate standing.				

129219	Thermal-fluid Transport II			
Subject:	Catalog Nbr:			
ME	0151			
2023 SPRG	Primary	Marc Hodes		Marc.Hodes@tufts.edu
2024 SPRG	Primary	Erica Kemmerling		Erica.Kemmerling@tufts.edu
(Cross-listed as CHBE 112). Multi-dimensional conduction. Transient conduction including moving boundary problems. External forced and natural convection. Internal forced and natural convection. Developing flows and transition to turbulence. Condensation and boiling heat transfer. Radiation and conjugate heat transfer involving radiation. Temperature and heat flux measurements. Numerical techniques.				

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Recommendations: ME 150 Thermal-Fluid Transport I or equivalent.

129270	Advanced Thermodynamics			
Subject: ME		Catalog Nbr: 0156		
2024 FALL		Primary	Douglas Matson	Douglas.Matson@tufts.edu
Classical thermodynamics; chemical thermodynamics and statistical thermodynamics. Applications to materials engineering and processes. Recommendations: MATH 51.				

129309	Mass Transfer And Phase Transformations In Materials Processing		
Subject:	Catalog Nbr:		
ME	0157		
(Cross-listed as MSE 179) The course is designed for students interested in thermal, fluid, and mass transport aspects of materials processing. Topics include heat treatment, continuum diffusion, atomistics of diffusion, oxidation, evaporation, and solidification. A wide range of practical examples and applications is drawn on, and class work and readings are supplemented by in-class presentations, guest lectures, and small projects. Recommendations: ME 51 or permission of instructor.			

129432	Advanced Experimentation	
Subject:	Catalog Nbr:	
ME	0171	
Laboratory techniques relevant to mechanical engineering experimentation with a focus on data processing. Overview of experimentation hardware, experimental design and construction, 1D signals and signal processing in the time/space and frequency domains, image processing, uncertainty analysis, and data visualization and presentation. Prerequisite: ME70, graduate standing, or consent of instructor.		

129549	Biomaterials			
Subject: ME		Catalog Nbr: 0117		
2024 FALL		Primary	Kenneth James	ken.james@tufts.edu
(Cross-listed with MSE 173) This course presents the following topics: elementary solid mechanics; aspects of material science applied to metals, polymers, ceramics, and biological tissues; tissue reactions to artificial materials; pathohistology; and inflammatory and immune responses. The course is completed by a survey of artificial materials and devices in clinical use, emphasizing vascular and orthopedic prostheses. A literature review and oral presentation covering a current device is assigned. Recommendations: ME 11 or senior standing or permission of instructor				

Course Bulletin

129642	Solid Mechanics			
Subject:	Catalog Nbr:			
ME	0120			
2024 SPRG	Primary	Mark Kachanov	mark.kachanov@tufts.edu	
(Cross-listed as CEE 122 and MSE 174). Strain tensor, stress tensor, elastic stress analysis, isotropic and anisotropic materials, torsion problem, inelastic behavior of materials, elements of plasticity and creep. Recommendations: ES 9 or ME 20 or equivalent.				

129680	Composite Materials				
Subject:	Catalog Nbr:				
ME	0116				
2024 SPRG	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu		
(Cross-listed w/ CHBE 116 & MSE 172) Fundamentals of design, manufacture, and analysis of composite materials. Fiber materials such as glass, kevlar and carbon fibers along with state-of-the-art thermoplastic and thermoset matrix materials. Rules of mixtures (ROM) to calculate transverse isotropic properties in laminae. Classical Lamination Theory (CLT) and Finite Element Analysis (FEA) to calculate stress and strains in laminates. Case studies in aerospace. Hands-on experiences, such as vacuum bagging to manufacture and test composites. Team project.					

129749	Manufacturing Processes And Materials Technology			
Subject:	Catalog Nbr:			
ME	0110			
2024 FALL	Primary	Anil Saigal	anil.saigal@tufts.edu	
(Cross-listed w/ MSE 170) A study of traditional and nontraditional manufacturing processes related to processing of metals, ceramics, and polymers, including computer-aided manufacturing. Topics include properties and behavior of materials, selection of materials and processes subject to surface finish, tolerance, design, and economic constraints.				
Recommendations: ME 11.				

129829	Computer-integrated Engineering		
Subject:	Catalog Nbr:		
ME	0113		
This is a project-oriented course that introduces students to the concept of integrated engineering consisting of design, analysis, optimization, and manufacturing. Microcomputer-based commercial software packages will be used to design and optimize a mechanical component or an assembly. Engineering constraints such as costs, material selection, and manufacturing techniques will be discussed. The students will then use a CNC Machining Center to produce their optimized design. Recommendations: Senior standing or permission of instructor.			

129898	Theory And Applications Of Polymer Materials And Processing			
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Course Bulletin

Subject: ME	Catalog Nbr: 0114	2024 FALL	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu
(Cross-listed w/ CHBE 114 and MSE 171) Fundamental of polymer materials, including organic chemistry, polymerization, and molecular structure of thermoplastic and thermoset polymers. Four modes of mechanical deformation of polymers: glassy, viscoelastic, rubbery, viscous. Properties of polymers different than ceramics and metals, including behavior above and below glass transition temperature and time dependent properties (creep/stress relaxation). Polymer processing techniques, including injection molding, blow molding, thermoforming. Hands-on lab techniques to measure properties; design projects using data to inform material selection. Recommendation: ME 11					

129926	Nonlinear Analysis of Materials and Structures	
Subject:	Catalog Nbr:	
ME	0175	
(Cross-listed as CEE 128.) Nonlinear solid mechanics, nonlinear constitutive models and variational principles as essential prerequisites for nonlinear finite element formulations. Recommendations: ES 9.		

129977	Finite Element Analysis				
Subject: ME	Catalog Nbr: 0177	2024 SPRG	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu
(Cross-listed as CEE 105 & MSE 161). Finite element analysis of problems important in structural engineering. Overview of direct stiffness method. Discretization of continuum to finite elements for approximate solution of complex engineering problems. Development of governing equations, stiffness and load matrices for deformation and stress analysis. Work and energy theorems. Hands-on experience with industry-standard software and practical applications in structural engineering. Recommendations: CEE 22 or ME 41 or consent of instructor					

130089	Advanced Vibrations	
Subject:	Catalog Nbr:	
ME	0122	
Extension and generalization of single- and two-degree-of-freedom systems to discrete systems with many degrees of freedom, using Lagrange's equations and matrix theory. Numerical integration methods with computer applications. Introduction to continuous systems and random vibration. Recommendations: MATH 51 or graduate standing.		

130187	Acoustics				
Subject:	Catalog Nbr:				

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ME	0126			
	2024 SPRG	Primary	Robert White	R.White@tufts.edu
Wave propagation in fluids and solid structures; sound sources and sound radiation by vibrating structures; fluid-structure interaction; sound transmission and attenuation; laboratory and field measurements; design criteria and methods. Prerequisite: MATH 51 or graduate standing.				

130256	Power Generation Systems			
Subject:	Catalog Nbr:			
ME	0159			
Design and engineering of electric power production systems. Thermal-mechanical principles of electrical energy conversion, cogeneration, and storage using fossil fuel, geothermal, hydroelectric, nuclear, ocean, solar thermal, and wind power sources. Direct generation using fuel cells and photovoltaics. Economic and environmental sustainability aspects. Recommendations: Senior standing. ME 50 and ME 51 or equivalent thermal-fluids background with permission of instructor				

138656		Honors Thesis B		
Subject:	Catalog Nbr:			
CS	0197			
2023 SPRG	Primary	Samuel Guyer	Samuel.Guyer@tufts.edu	
2023 SPRG	Primary	Norman Ramsey	Norman.Ramsey@tufts.edu	
2023 SPRG	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
2023 SPRG	Primary	Bert Huang	No Email on file.	
2023 SPRG	Primary	Antonella Di Lillo	No Email on file.	
2024 SPRG	Primary	Robert Jacob	jacob@cs.tufts.edu	
2024 SPRG	Primary	Alva Couch	alva.couch@tufts.edu	
2024 SPRG	Primary	Soha Hassoun	soha.hassoun@tufts.edu	
2024 SPRG	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu	
2024 SPRG	Primary	Ming Chow	ming.chow@tufts.edu	
2024 SPRG	Primary	Lenore Cowen	lenore.cowen@tufts.edu	
2024 SPRG	Primary	Donna Slonim	Donna.Slonim@tufts.edu	
2024 SPRG	Primary	Remco Chang	Remco.Chang@tufts.edu	
2024 SPRG	Primary	Matthias Scheutz	Matthias.Scheutz@tufts.edu	
2024 SPRG	Primary	Kathleen Fisher	Kathleen.Fisher@tufts.edu	
2024 SPRG	Primary	Noah Mendelsohn	Noah.Mendelsohn@tufts.edu	
2024 SPRG	Primary	Mark Sheldon	Mark.Sheldon@tufts.edu	
2024 SPRG	Primary	Fahad Dogar	Fahad.Dogar@tufts.edu	
2024 SPRG	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu	
2024 SPRG	Primary	Megan Monroe	Megan.Monroe@tufts.edu	
2024 SPRG	Primary	Liping Liu	Liping.Liu@tufts.edu	
2024 SPRG	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu	
2024 SPRG	Primary	Susan Landau	Susan.Landau@tufts.edu	

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2024 SPRG	Primary	Karen Edwards	Karen.Edwards@tufts.edu
2024 SPRG	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu
2024 SPRG	Primary	Michael Hughes	Michael.Hughes@tufts.edu
2024 SPRG	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
2024 SPRG	Primary	Elaine Short	Elaine.Short@tufts.edu
2024 SPRG	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu
2024 SPRG	Primary	Martin Allen	Martin.Allen@tufts.edu
2024 SPRG	Primary	Richard Townsend	Richard.Townsend@tufts.edu
2024 SPRG	Primary	Abani Patra	Abani.Patra@tufts.edu
2024 SPRG	Primary	Daniel Votipka	Daniel.Votipka@tufts.edu
2024 SPRG	Primary	David Lillethun	David.Lillethun@tufts.edu
2024 SPRG	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu
2024 SPRG	Primary	Johes Bater	Johes.Bater@tufts.edu
Honors Thesis Computer Science.Please see departmental website for specific details.			

138675	Tufts Programs Abroad		
Subject: EE	Catalog Nbr: 0340		
2023 FALL	Primary	Meredith Hyde	Meredith.Hyde@tufts.edu
2023 FALL	Primary	Isabela Secanechia	Isabela.Secanechia@tufts.edu
2023 SPRG	Primary	Jeanne Fourneyron	Jeanne.Fourneyron@tufts.edu
Tufts Programs Abroad			

138860	Honors Thesis Research B		
Subject: CHBE	Catalog Nbr: 0096		
2024 SPRG	Primary	Daniel Ryder	daniel.ryder@tufts.edu
2024 SPRG	Primary	David Kaplan	david.kaplan@tufts.edu
2024 SPRG	Primary	Soha Hassoun	soha.hassoun@tufts.edu
2024 SPRG	Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu
2024 SPRG	Primary	Christos Georgakis	Christos.Georgakis@tufts.edu
2024 SPRG	Primary	Hyunmin Yi	Hyunmin.Yi@tufts.edu
2024 SPRG	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu
2024 SPRG	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 SPRG	Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu
2024 SPRG	Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
2024 SPRG	Primary	Emmanouhl Tzanakakis	Emmanuel.Tzanakakis@tufts.edu
2024 SPRG	Primary	James Van Deventer	James.Van_Deventer@tufts.edu
2024 SPRG	Primary	Prashant Deshlahra	Prashant.Deshlahra@tufts.edu
2024 SPRG	Primary	Nathaniel Eagan	Nathaniel.Eagan@tufts.edu
2024 SPRG	Primary	Milo Koretsky	Milo.Koretsky@tufts.edu
Supervised research in chemical and biological engineering leading to the completion of the undergraduate			

Course Bulletin

honors thesis. Please see the Departmental website for specific program details and qualification requirements.

139046	Computer Aided Design w/ Lab			
Subject:	Catalog Nbr:			
ES	0018			
2023 SPRG	Primary	Gian Calise	Gian.Calise@tufts.edu	
2023 SPRG	Primary	Golriz Kermani	Golriz.Kermani@tufts.edu	
2024 FALL	Primary	Ryan Marshall	Ryan.Marshall@tufts.edu	
Computer Aided Design (CAD) software typically used by infrastructure professionals for drafting, modeling, and visualization. Use of Autodesk programs for 2D and 3D geometry construction, engineering drawings, Building Information Modeling (BIM), and visualization renderings and animations. Includes mandatory laboratory. Students may not receive credit for both ES18 and ES19.				

139047	Biological Systems Analysis			
Subject:	Catalog Nbr:			
BME	0143			
2024 FALL	Primary	Bree Aldridge	Bree.Aldridge@tufts.edu	
Mathematical and computational methods of biological systems at molecular and cell levels including regression, logic, statistics, kinetics, dynamical systems, pharmacodynamics, and agent-based modeling. Biological questions coordinated with appropriate mathematical modeling approach. Recommendations: Junior standing, CHEM 2, BIO 13, MATH 42, or permission of instructor				

139048	Biomaterials and Regenerative Medicine			
Subject:	Catalog Nbr:			
BME	0153			
2024 FALL	Primary	Yu-Ting Dingle	Yu-ting.Dingle@tufts.edu	
(Cross-listed as CHBE 164 and MSE 151). Fundamental concepts of biomaterials and regenerative medicine (biomaterial types, synthesis, properties, mechanisms of degradation, biological interfaces, inflammation and related issues). Specific focus on biomaterials related to regenerative medicine. Course independent of, but complementary to, BME 154.				
Recommendations: Junior standing, BIO13, CHEM 1, or consent of instructor				

139050	Tissue Engineering and Regenerative Medicine			
Subject:	Catalog Nbr:			
BME	0154			
2024 SPRG	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu	
(Cross-listed with MSE 152) Fundamental concepts of tissue engineering and regenerative medicine (scaffolds, stem cells and bioreactors); progress with specific tissue systems; applications for tissue engineering; and current state-of-the art of tissue regeneration. Additional topics: transport phenomena and mechanical				

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regulation of stem cell function, with focus on mechanisms of mechanotransduction. Course independent of, but complementary to, BME 153.

Recommendations: Junior standing, BIO 13, CHEM 51, PHYS 11, ES 9, or consent of instructor.

139051	Electronic Devices for Energy Applications
Subject: CHBE	Catalog Nbr: 0175
(Cross-listed with MSE 139) Design and operating principles of a variety of thin-film devices related to electrical energy generation, storage, or conversion. An overview of optical and electronic processes in a variety of materials (metals, insulators, semiconductors), thin film deposition and characterization techniques, as well as photovoltaics (solar cells), electrochemical capacitors, batteries, field-effect transistors, colloidal quantum dot devices, and light-emitting diodes (LEDs). Recent research advances in the field of novel optoelectronic devices for energy applications. Prerequisites: Chem 0002 Recommendations: junior standing.	

139053	Research			
Subject:	Catalog Nbr:			
CS	0191			
2023 SPRG	Primary	Antonella Di Lillo	No Email on file.	
2024 FALL	Primary	Ethan Danahy	ethan.danahy@tufts.edu	
2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu	
2024 FALL	Primary	Robert Jacob	jacob@cs.tufts.edu	
2024 FALL	Primary	Alva Couch	alva.couch@tufts.edu	
2024 FALL	Primary	Soha Hassoun	soha.hassoun@tufts.edu	
2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu	
2024 FALL	Primary	Megumi Ando	Megumi.Ando@tufts.edu	
2024 FALL	Primary	Ming Chow	ming.chow@tufts.edu	
2024 FALL	Primary	Lenore Cowen	lenore.cowen@tufts.edu	
2024 FALL	Primary	Peter Love	Peter.Love@tufts.edu	
2024 FALL	Primary	Donna Slonim	Donna.Slonim@tufts.edu	
2024 FALL	Primary	Remco Chang	Remco.Chang@tufts.edu	
2024 FALL	Primary	Matthias Scheutz	Matthias.Scheutz@tufts.edu	
2024 FALL	Primary	Noah Mendelsohn	Noah.Mendelsohn@tufts.edu	
2024 FALL	Primary	Mark Sheldon	Mark.Sheldon@tufts.edu	
2024 FALL	Primary	Fahad Dogar	Fahad.Dogar@tufts.edu	
2024 FALL	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu	
2024 FALL	Primary	Megan Monroe	Megan.Monroe@tufts.edu	
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu	
2024 FALL	Primary	Liping Liu	Liping.Liu@tufts.edu	
2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu	
2024 FALL	Primary	Susan Landau	Susan.Landau@tufts.edu	
2024 FALL	Primary	Karen Edwards	Karen.Edwards@tufts.edu	

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2024 FALL	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu
2024 FALL	Primary	Michael Hughes	Michael.Hughes@tufts.edu
2024 FALL	Primary	Elaine Short	Elaine.Short@tufts.edu
2024 FALL	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu
2024 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu
2024 FALL	Primary	Richard Townsend	Richard.Townsend@tufts.edu
2024 FALL	Primary	Abani Patra	Abani.Patra@tufts.edu
2024 FALL	Primary	Daniel Votipka	Daniel.Votipka@tufts.edu
2024 FALL	Primary	David Lillethun	David.Lillethun@tufts.edu
2024 FALL	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu
2024 FALL	Primary	Johes Bater	Johes.Bater@tufts.edu
2024 SPRG	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
2024 SPRG	Primary	Vladimir Podolskiy	Vladimir.Podolskii@tufts.edu
2024 SUMR	Primary	Samuel Guyer	Samuel.Guyer@tufts.edu
2024 SUMR	Primary	Norman Ramsey	Norman.Ramsey@tufts.edu
2024 SUMR	Primary	Bert Huang	No Email on file.
Research on a topic in Computer Science or a related discipline, culminating in a final paper describing accomplishments, with the goal of advancing the state of the art. Topic is proposed by a faculty sponsor in Computer Science. Faculty consent required. Students sign up for a section that corresponds to a faculty member.			

139054	Physics of Solar Cells		
Subject:	Catalog Nbr:		
EE	0114		
2023 SPRG	Primary	Brian Aull	Brian.Aull@tufts.edu
2024 SPRG	Primary	Paul Simmonds	Paul.Simmonds@tufts.edu
(Cross-listed w/ MSE 111) Physics of photovoltaic cells including physics of semiconductors in photovoltaic devices, physical models of solar cell operation, characteristics and design of common types of solar cells, and approaches to increasing solar cell efficiency. Recommendations: MATH 42, MATH 51, EE 18, PHYS 42/43, or instructor permission			

139055	Distributed Machine Learning and Control		
Subject:	Catalog Nbr:		
EE	0130		
2023 SPRG	Primary	Usman Khan	Usman.Khan@tufts.edu
(Cross-listed as CS 143) Design and analysis of distributed machine learning and stochastic optimization methods from the perspective of dynamical systems that comes from signal processing and control theory. Topics include: state-space models, state transformations, canonical forms, graph theory, fixed-point theorems, Perron Frobenius theorem, contraction maps, convex and nonconvex functions, stochastic optimization, first and second order methods, accelerated first order methods including heavy-ball and Nesterov momentum, and variance reduction techniques. Python-based programming for machine learning tasks using real datasets including deep learning problems. Pre-requisites: MATH 51, MATH 70, COMP11, and (EE24, MATH165 or ES56) or graduate standing			

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Recommended: EE 105

139056	Power Systems
Subject: EE	Catalog Nbr: 0170
2024 FALL	Primary Per-Anders Lof
Per-Anders.Lof@tufts.edu	
Analysis and design of AC transmission and distribution systems, transmission lines, transformers and generators. Understanding, modeling, operating and controlling such systems; basics of voltage control and power flows in electricity networks. Graduate students are expected to complete and present an additional class project.	
Recommendations: EE 22 or graduate student standing	

139057	Power Electronics
Subject: EE	Catalog Nbr: 0171
2023 SPRG	Primary William Lynch
William.Lynch@tufts.edu	
Analysis and design of energy conversion circuits that contain electronic switching devices. Emphasis on understanding and modeling, and providing engineering background to evaluate power converters. Also covers dynamics and control of this class of systems. Graduate students are expected to complete and present an additional class project.	
Recommendations: EE 22 or graduate student standing.	

139058	Optoelectronic Characterization
Subject: EE	Catalog Nbr: 0214
(Cross-listed with MSE 201) Tools and techniques used to characterize optoelectronic materials and devices. Photoluminescence, ellipsometry, scanning probe microscopy, electron microscopy, and AC/DC electrical characterization. Theoretical underpinning of and practical experience with the measurement techniques. Laboratory.	

139066	Bioinformatics
Subject: CS	Catalog Nbr: 0007
(Cross-listed with BIO 0040) Bioinformatics for students with little or no computer science background. Basic programming skills for data manipulation and analysis. Methods and applications of online tools for sequence alignment, molecular phylogeny, gene expression data analysis, and linking molecular variation to disease. Recommendations: Biology 41 or BME 62 or equivalent.	

139213	Human Factors in Medical Technology
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Course Bulletin

Subject:	Catalog Nbr:
ENP	0110
2024 FALL	Primary
Michael Wiklund	michael.wiklund@tufts.edu
Techniques for ensuring the safety and efficacy of medical technology ranging from over-the-counter devices to complex diagnostic and therapeutic workstations to clinical information systems. Global standards and regulations, usability engineering program planning, function and task analysis, user interface requirements, applied user interface design, user interface simulation, design verification, and design validation via usability testing. Pre-requisites: senior or graduate standing or permission of instructor.	

139374	Master's Degree Continuation
Subject:	Catalog Nbr:
ENP	0401
2024 FALL	Primary
Marc Hodes	Marc.Hodes@tufts.edu
Part-time. Please see departmental website for specific details.	

139375	Master's Degree Continuation
Subject:	Catalog Nbr:
ENP	0402
2024 FALL	Primary
Marc Hodes	Marc.Hodes@tufts.edu
Full-time. Please see departmental website for specific details.	

139447	Special Topics in Engineering Management
Subject:	Catalog Nbr:
EM	0293
2024 FALL	Primary
Samuel Liggero	Samuel.Liggero@tufts.edu
Special topics in engineering management.	

139448	Leadership for Technical Professionals
Subject:	Catalog Nbr:
EM	0261
Development of self-awareness and skills necessary for leadership. Involves 360 degree assessment tools and extensive experiential learning. Oral communication, systems thinking, high performance teams, fostering creativity, team decision making, leading change, influence without authority. Note: for graduate students not enrolled in Gordon Institute Master of Science in Engineering Management (MSEM) program. Pre-requisite: undergraduate degree.	

139449	Financial Management for High Technology Firms
Subject:	Catalog Nbr:
EM	0155

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Concepts in accounting and finance. Review and discussion of business cases. Course project to create a financial plan for a new product or service.

Pre-requisites: Available to Juniors, Seniors & Graduate students.

139522	Project Study In Human Systems			
Subject: ENP		Catalog Nbr: 0120		
2024 SPRG		Primary	Linda Borghesani	Linda.Borghesani@tufts.edu
2024 SPRG		Primary	Nicholas Katis	Nick.Katis@tufts.edu
(Cross-listed as BME 120 and PSY 120.) A senior-level project design (capstone course), led by faculty from engineering and psychology as well as outside lecturers. Students participate in team fashion in human-factors design problems set by industry sponsors. Professional-level work is required, including report preparation and presentations. Timely lectures supplement the projects.				
Recommendation: Senior Standing				

139523	Project Study In Human Systems			
Subject: BME		Catalog Nbr: 0120		
2024 SPRG		Primary	Linda Borghesani	Linda.Borghesani@tufts.edu
2024 SPRG		Primary	Nicholas Katis	Nick.Katis@tufts.edu
(Cross-listed as ENP 120 and PSY 120) A senior-level project design (capstone course), led by faculty from engineering and psychology as well as outside lecturers. Students participate in team fashion in human-factors design problems set by industry sponsors. Professional-level work is required, including report preparation and presentations. Timely lectures supplement the projects.				
Recommendation: Senior Standing				

140067	Microwave System Engineering	
Subject:	Catalog Nbr:	
EE	0119	
Planning and deploying microwave systems and networks. Design and construction of system components. Design and management of microwave networks .Cellular systems Best network topologies and paths for lowest possible operations and maintenance costs. System components: oscillators, attenuators, phase shifters, modulators, mixers, filters, amplifiers, and antennas, A to D and D to A converters. Transmitter and receiver characteristics, Transceiver Design, System Gain, Satellite Communications, Radio Thermal Noise, signal to noise ratio SIN, receiver sensitivity, modulation and SIN, design principles, antenna system considerations. Prerequisite: EE117 and EE107		

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140069	Project Management and Software Methodologies		
Subject:	Catalog Nbr:		
EM	0231		
Development of knowledge and skills to plan and execute engineering projects. Topics include creating work break down structures, schedules, critical path determination, and risk assessment and mitigation. Methodologies also include iterative techniques (agile and scrum) often used in software development. Prerequisite: Undergraduate degree.			

140071	Conflict Resolution				
Subject:		Catalog Nbr:			
EM		0262			
2024 SPRG		Primary	Stacy Lennon	Stacy.Lennon@tufts.edu	
Introduces conceptual frameworks, tools, and skills to effectively manage conflict and negotiate win/win solutions in the workplace. Course will involve lectures, cases, and role plays to simulate real on the job conflicts. Prerequisite: Undergraduate degree.					

140282	Lean Six Sigma				
Subject:		Catalog Nbr:			
EM		0211			
2024 FALL		Primary	Kishore Pochampally	Kishore.Pochampally@tufts.edu	
Provides principles and methods for process improvement by eliminating non-value added work and by reducing output variability. Tools include the define-measure-analyze-improve-control problem solving methodology, statistical process control, statistically designed experiments and risk identification and mitigation strategies.					
Prerequisite: Undergraduate degree					

140391	Tufts Abroad Program	
Subject:	Catalog Nbr:	
CEE	0340	

140782	Probabilistic Systems Analysis			
Subject:	Catalog Nbr:			
EE	0024			
2024 SPRG	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
Development of analytical tools for the modeling and analysis of random phenomena with application to problems across a range of engineering and applied science disciplines. Probability theory, sample and event spaces, discrete and continuous random variables, conditional probability, expectations and conditional expectations, and derived distributions. Sums of random variables, moment generating functions, central limit theorem, laws of large numbers. Statistical analysis methods including hypothesis testing, confidence intervals				

Course Bulletin

and nonparametric methods. Undergraduates may not take both EE 0024 and EE 0104 for degree credit.
Prerequisite: Math 0042 or equivalent

140783	Stochastic Processes, Detection, and Estimation		
	Subject:	Catalog Nbr:	
	EE	0140	
Random vectors including second order characterization; Detection including binary, M-ary, Neyman-Pearson methods; Estimation including Bayes least squares, maximum a posteriori, and maximum likelihood methods; Random processes including notions of stationarity, wide sense stationarity, and independent increments; Bernoulli process, Poisson process, Markov processes including Markov chains, Weiner processes; Wide sense stationary processes and linear systems including power spectral density, spectral factorization, noncausal and causal Weiner filters; Mean square stochastic calculus including Karhunen-Loeve decompositions. Prerequisite: EE-0023, EE-0024 or EE-0104, Math 72 or consent of instructor.			

140784	New Product Innovation			
Subject: EM		Catalog Nbr: 0221		
2024 FALL		Primary	Kevin Oye	Kevin.Oye@tufts.edu
Treatment of both business and technical aspects of new product development. Topics include voice of the customer, concept generation and evaluation, marketing, supply chain, intellectual property and usability. Course enrollment limited to graduate students in the Master of Science in Innovation and Leadership program.				

140786	Innovation and Technology Strategy			
Subject: EM		Catalog Nbr: 0253		
2024 SPRG		Primary	Kevin Oye	Kevin.Oye@tufts.edu
Knowledge and skills to lead and manage innovation initiatives in technology based companies. Topics include understanding technology strategy and its role in the overall business strategy of commercial firms, the role of innovation in entrepreneurial ventures as well as in established firms, and developing skills to present new product development proposals to senior management and/or prospective investors.				

140787	Financial Management in Technology Firms			
Subject: EM		Catalog Nbr: 0255		
2024 FALL		Primary	Frank Apeseche	Frank.Apeseche@tufts.edu
Concepts in accounting and finance. Review and discussion of business cases. Course project to create a financial plan for a new product or service. Enrollment limited to graduate students in the Master of Science in Innovation and Leadership program.				

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140788	Capstone Innovation and Leadership Project				
Subject:		Catalog Nbr:			
EM		0281			
2024 SUMR		Primary	Kevin Oye	Kevin.Oye@tufts.edu	
Engineering project that demonstrate business acumen and leadership skills. Projects taken from employer for which student interns or works full time. Enrollment limited to graduate students in the Master of Science in Innovation and Leadership program.					

140789	Applications in Engineering			
Subject: EN	Catalog Nbr: 0001			
2024 FALL	Primary	Ethan Danahy	ethan.danahy@tufts.edu	
2024 FALL	Primary	Mark Kachanov	mark.kachanov@tufts.edu	
2024 FALL	Primary	Harold Miller-Jacobs	harold.miller-jacobs@tufts.edu	
2024 FALL	Primary	Soha Hassoun	soha.hassoun@tufts.edu	
2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu	
2024 FALL	Primary	Kyongbum Lee	Kyongbum.Lee@tufts.edu	
2024 FALL	Primary	Thomas Vandervelde	tvanderv@ece.tufts.edu	
2024 FALL	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu	
2024 FALL	Primary	Eli Cushner	Eli.Cushner@tufts.edu	
2024 FALL	Primary	Elizabeth Kirtland	Elizabeth.Kirtland@tufts.edu	
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu	
2024 FALL	Primary	Steven Bell	Steven.Bell@tufts.edu	
2024 FALL	Primary	Felix Huang	Felix.Huang@tufts.edu	
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu	
2024 FALL	Primary	Juan Gnecco	Juan.Gnecco@tufts.edu	
2024 FALL	Primary	Nisha Iyer	Nisha.Iyer@tufts.edu	
2024 SPRG	Primary	Christopher Swan	chris.swan@tufts.edu	
Introduction of various concepts in engineering. Emphasis on project work, engineering ethics, and engineering design process. Discipline topic areas vary each term. Limited to first-year students.				

140795	Engineering and Science for Elementary School Educators I		
Subject: ENE	Catalog Nbr: 0110		
Introduction to engineering for those with limited STEM background. Topics include fundamentals of engineering in society, basics of the engineering design process, introduction to programming (sense-think-act), and the integration of a selection of simple machines with engineering.			

140797	Engineering and Science for Elementary School Educators II			
Subject:	Catalog Nbr:			

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ENE	0111				
	2024 SUMR	Primary	Merredith Portsmore	merredith.portsmore@tufts.edu	
Exploring client-centered engineering design for novices. Topics will include techniques for defining design requirements and constraints, approaches to testing prototypes and interpreting results and engineering connections to science topics in circuits.					

140798	Teaching and Learning in Engineering I				
	Subject:	Catalog Nbr:			
	ENE	0130			
	2024 SPRG	Primary	Merredith Portsmore	merredith.portsmore@tufts.edu	
Practices for understanding of K-12 students' engineering thinking and teaching practices that support innovative K-12 engineering education curricula. Additional topics include issues of access, equity and social justice in the engineering classroom as well as instructional strategies that support students' engagement with open-ended engineering design challenges. Design an engineering lesson is required.					

140799	Teaching and Learning in Engineering II				
	Subject:	Catalog Nbr:			
	ENE	0131			
	2024 FALL	Primary	Merredith Portsmore	merredith.portsmore@tufts.edu	
Structures for responsive teaching as well as assessment of students' competencies in engineering. Additional topics include foundational knowledge of current policy and research in K-12 engineering education. Design of a curriculum unit is required.					

140800	Engineering and Science for Middle and High School Educators				
	Subject:	Catalog Nbr:			
	ENE	0150			
Understanding of the relationship between science and engineering, and techniques and knowledge that support the formative modeling of design ideas and summative testing of prototypes. Topics will include the following: techniques for analysis of design ideas (vibrations and controls), instrumentation, and computer programming					

140802	Robotics for Educators				
	Subject:	Catalog Nbr:			
	ENE	0152			
Fundamental robotics knowledge in the domains of mechanical and electrical engineering as well as computer science-- include understanding actuators, microprocessors and sensors, controls, and human-robotics interfaces. Uses robotics kits and a graphical programming environment.					

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140803	Engineering and Science for Middle and High School Educators II				
Subject:	Catalog Nbr:				
ENE	0151				
2024 SUMR	Primary	Merredith Portsmore			merredith.portsmore@tufts.edu
The role of product design, manufacturing and human factors elements of engineering in design process. Additional topics will include fundamental human factors techniques and theories and tools for prototyping and modeling (CAD, 3-D printing).					

141009	Information Theory			
Subject:	Catalog Nbr:			
CS	0149			
2024 FALL	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
(Cross-listed as EE 127). Information theory as a systematic framework to address fundamental laws and limits of data compression and digital communication. Source coding/data compression; information measures on discrete memory-less sources; practical schemes and algorithms for lossless data compression such as Huffman coding, arithmetic coding, Lempel-Ziv Coding; channel coding for reliable communication and rate distortion for lossy source compression. Advanced topics such as information theoretic cryptography. Recommendations: EE 104 or permission of instructor.				

141134	Mechanics of Materials at the Micro & Nano Scale			
Subject:	Catalog Nbr:			
ME	0125			
(Cross-listed with MSE 176) Mechanics of materials, in particular, soft materials when studied at the micro and nanoscale. Classical approaches to mechanics of materials, both static and dynamic properties. Extension of classical knowledge to the micro and nanoscale, with methods to measure the material mechanics at those scales. Practical examples of biological tissues, cells, and polymers in different environments. Recommendations: ME 21 and MATH 42, or Senior standing.				

141135	Mechanics of Materials at the Micro & Nano Scale			
Subject:	Catalog Nbr:			
ME	0225			
Mechanics of materials, in particular, soft materials when studied at the micro and nanoscale. Classical approaches to mechanics of materials, both static and dynamic properties. Extension of classical knowledge to the micro and nanoscale, with methods to measure the material mechanics at those scales. Practical examples of biological tissues, cells, and polymers in different environments. Assignments identical to ME130 with additional project paper.				

141384	Music Recording and Production with Audio Electronics			
Subject:	Catalog Nbr:			
ES	0065			

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2024 FALL	Primary	Paul Lehrman	paul.lehrman@tufts.edu
2024 FALL	Secondary	Daniel Fox	Daniel.Fox@tufts.edu
Theory and techniques for recording, editing, and producing acoustic music, and principles of audio system design. Topics include acoustics, audio perception, physics and electronics of transducers, analog and digital audio principles, stereo and multitrack recording, mixing, virtual instruments, and synchronization. Additional material in circuit design, signal flow, and analog and digital audio theory. Develop technical and listening skills to understand and evaluate the aesthetics of recorded sound, and an understanding of how circuits and components influence the sound of a recording. Students may not receive credit for both Music 140 and 142. Music 142 is required for the Recording & Production emphasis of the Music Engineering minor. Recommendations: Ability to play an instrument, musical literacy, MATH 30 or 32 or equivalent, PHY 1 and 2 or equivalent, and one of the following: ES 3, EE21, ME 93-01, EN 1-02. Permission of instructor required.			

141451	Computer Engineering W/lab		
Subject:	Catalog Nbr:		
CS	0146		
2024 SPRG	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
(Cross-listed w/ EE 126) Topics covered include computer abstractions, performance measurements, instruction set architectures, designing processor datapath and control, pipelining, memory hierarchy, I/O, multiprocessors. The associated lab consists of designing, implementing, and validating a simplified MIOS processor using Verilog, a hardware description language. Fall. Recommendations: EE 14.			

141475	Tufts Abroad Program		
Subject:	Catalog Nbr:		
EN	0340		
Tufts Abroad Program			

141488	Internet-scale Distributed Systems		
Subject:	Catalog Nbr:		
CS	0117		
2024 FALL	Primary	Noah Mendelsohn	Noah.Mendelsohn@tufts.edu
Principles and practices in designing large-scale distributed software systems on the Internet and beyond, including core principles of the design of the World-Wide Web. Key issues and fundamental principles are explored, e.g. global uniform naming, location independence, Metcalfe's law and network effects, function placement and the End-to-End principle, extensibility and evolution of distributed systems including Postel's law, leaky abstractions, etc. Comparison with more traditional distributed system designs, e.g. distributed objects, client/server, publish/subscribe, reliable queuing, and remote procedure calls.			

141489	Cloud Computing		
Subject:	Catalog Nbr:		

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CS	0118
Cloud computing fundamentals, including cloud architecture, scalability, elasticity, and metrics of cloud performance including service-level objectives (SLOs) and service-level agreements (SLAs). Cloud programming models and abstractions including Map/Reduce. Persistent storage mechanisms, including key/value stores and cold storage. Geo-distributed cloud systems. Cloud networking, including data center architecture, software defined networking, and middleboxes. Cloud security.	

141490	Visualization
Subject: CS	Catalog Nbr: 0177
Visualization as a tool for data analysis, recall, inference, and decision-making. Tools for visual description and presentation. Principles of effective visualization, including data-visual mapping, interaction techniques, color theory, cognitive and perceptual psychology, and human factors of visual depictions of data.	

141491	Optimal Control and State Estimation
Subject: ME	Catalog Nbr: 0234
State-space methods for multi-input, multi-output controller and observer design. LQR control. Bayesian estimation techniques including least-squares estimation, Kalman filters, unscented Kalman filters, and particle filters. Effects of process noise and sensor noise. Emphasis on applications through student projects. Recommendations: ME130, EE105, or permission of instructor.	

141564	Internship In Computer Science
Subject: CS	Catalog Nbr: 0299
2024 FALL	Primary Ming Chow ming.chow@tufts.edu
Study of approved topics in Computer Science in concert with an internship in computing or a related field outside the University. Prerequisites: Permission of instructor	

141592	Engineering Education Design
Subject: ME	Catalog Nbr: 0145
2024 SPRG	Primary Kristen Wendell Kristen.Wendell@tufts.edu
Research-based approaches to the design of complex engineering learning experiences. Methodologies from the learning sciences. Characterization of engineering cognition, problem-solving, epistemologies, and identities. Considerations of diversity and inclusion in engineering education. Focus is on engineering education at the postsecondary level. Emphasis on applications through student projects.	

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141648	Internship Computer Science				
Subject:		Catalog Nbr:			
CS		0099			
2024 FALL		Primary	Ming Chow	ming.chow@tufts.edu	
Study of approved topics in Computer Science in concert with an internship in computing or a related field. Prerequisites: Permission of instructor.					

141729	Bringing Products to Market			
Subject:	Catalog Nbr:			
ENT	0162			
2024 SPRG	Primary	Luke Fraser	Luke.Fraser@tufts.edu	
User-centered approach to the creative product design process from ideation to pre-production. Identification and evaluation of a problem (opportunity), creation, development, testing (with consumers), and selection of prototyping strategies. Basic project and risk management, engineering, and analysis skills to deliver a robust working product on time and on budget. Content assumes competence in basic problem-solving skills. Prerequisite: Sophomore Standing				

141730	Societal Aspects of Design: Integration, Innovation, and Impact			
Subject:	Catalog Nbr:			
ENT	0109			
2024 SPRG	Primary	Ronald Lasser	Ron.Lasser@tufts.edu	
(Cross-listed as CVS 149 and EE 159) Multi-disciplinary perspective of innovative technology-based design process for societal, community influence, and civic engagement. Elements and principles of design from product development process and societal value systems thinking, thought and emotion, ethics and responsibility. Experiments to explore bias, failure, and iteration, reflection for self-discovery and innovation. Articulation and expression via written, oral and pre-recorded audio and video presentations showing measurable impact of solutions as societal benefits.				

141815	Applied Data Science				
Subject: EM		Catalog Nbr: 0212			
2024 SPRG		Primary	Kyle Monahan	Kyle.Monahan@tufts.edu	
Foundational skills for data science practice in business. Using data and systematic methods to generate business value. Shaping data practices within organizations.					

141816	MSIM Graduate Seminar			
Subject:	Catalog Nbr:			
EM	0292			
2024 FALL	Primary	Jane Seminara	Jane.Seminara@tufts.edu	
2024 FALL	Primary	Christopher Di Fronzo	Christopher.Di_Fronzo@tufts.edu	

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Contemporary innovation issues and topics via presentations, workshops, and discussion. Pre-reading, post-seminar writing, or other project assignments. See department website for specific details.

141817	Special Topics in Innovation and Management			
Subject:	Catalog Nbr:			
EM	0294			
2024 FALL	Primary	Kevin Oye	Kevin.Oye@tufts.edu	
2024 SPRG	Primary	Gerald Brown	Gerald.Brown@tufts.edu	
2024 SPRG	Primary	Gavin Finn	Gavin.Finn@tufts.edu	
Special topics course within the field of innovation and management. Please see department website for specific details on focus of the course.				

141853	Special Topics for non-majors			
Subject:	Catalog Nbr:			
CS	0005			
2024 FALL	Primary	Micah Saxton	Micah.Saxton@tufts.edu	
Content and prerequisites to be announced. Please see department website for specific details.				

141854	Convex Optimization			
Subject:	Catalog Nbr:			
EE	0109			
2023 SPRG	Primary	Jeanne Fourneyron	Jeanne.Fourneyron@tufts.edu	
2024 SPRG	Primary	Mai Vu	Mai.Vu@tufts.edu	
(Crosslisted as CS 168) Convex optimization theory and algorithms. Convex sets, convex functions and convex optimization problems; duality theory and optimality conditions; algorithms for solving convex problems including descent, gradient descent, Newton and interior point methods. Examples of applications taken from communications, signal processing, machine learning and other fields. Students may receive credit for only one of the following courses: EE109, EE159, or CS168				

142322	Undergraduate research			
Subject:	Catalog Nbr:			
BME	0091			
2024 FALL	Primary	David Kaplan	david.kaplan@tufts.edu	
2024 FALL	Primary	Sergio Fantini	sergio.fantini@tufts.edu	
2024 FALL	Primary	Irene Georgakoudi	Irene.Georgakoudi@tufts.edu	
2024 FALL	Primary	Lorin Polidora	Lorin.Polidora@tufts.edu	
2024 FALL	Primary	Fiorenzo Omenetto	Fiorenzo.Omenetto@tufts.edu	
2024 FALL	Primary	Lauren Black III	Lauren.Black@tufts.edu	
2024 FALL	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu	
2024 FALL	Primary	Brian Timko	Brian.Timko@tufts.edu	

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2024 FALL	Primary	Madeleine Oudin	Madeleine.Oudin@tufts.edu
2024 FALL	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu
2024 FALL	Primary	Juan Gnecco	Juan.Gnecco@tufts.edu
2024 FALL	Primary	Nisha Iyer	Nisha.Iyer@tufts.edu
Independent undergraduate research in the field of biomedical engineering. Term paper required. Credit not given retroactively. Prior arrangements necessary. Prerequisite: Permission of instructor.			

142323	Undergraduate research		
Subject: BME	Catalog Nbr: 0092		
2024 SPRG	Primary	David Kaplan	david.kaplan@tufts.edu
2024 SPRG	Primary	Sergio Fantini	sergio.fantini@tufts.edu
2024 SPRG	Primary	Irene Georgakoudi	Irene.Georgakoudi@tufts.edu
2024 SPRG	Primary	Fiorenzo Omenetto	Fiorenzo.Omenetto@tufts.edu
2024 SPRG	Primary	Lauren Black III	Lauren.Black@tufts.edu
2024 SPRG	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
2024 SPRG	Primary	Brian Timko	Brian.Timko@tufts.edu
2024 SPRG	Primary	Madeleine Oudin	Madeleine.Oudin@tufts.edu
2024 SPRG	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu
2024 SPRG	Primary	Juan Gnecco	Juan.Gnecco@tufts.edu
2024 SPRG	Primary	Nisha Iyer	Nisha.Iyer@tufts.edu
2024 SUMR	Primary	Lorin Polidora	Lorin.Polidora@tufts.edu
Independent undergraduate research in the field of biomedical engineering. Term paper required. Credit not given retroactively. Prior arrangements necessary. Prerequisite: Permission of instructor.			

142324	Field Methods for Global Health		
Subject: CEE	Catalog Nbr: 0150		
Hands-on approach to evaluating global health projects. Research question and study design, human subjects research ethics, survey tool development, sampling techniques (water quality/anthropometrics), data collection and analysis, and information dissemination. Emphasis on applying topics to develop a full evaluation protocol for a self-selected project.			

142325	Biostatistics		
Subject: CEE	Catalog Nbr: 0156		
2024 SPRG	Primary	Helen Suh	Helen.Suh@tufts.edu
Statistical methods for analysis and interpretation of data generated by biomedical, environmental health, and public health studies. Descriptive statistics for continuous and categorical data, probability, hypothesis testing, correlation, analysis of variance, linear and logistic regression, multivariable regression, and			

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non-parametric methods. Foundations of probability and statistical theory, and how to apply concepts by analyzing data.

142326	Cataldo Scholar Research			
Subject:	Catalog Nbr:			
CEE	0090			
2024 FALL	Primary	John Durant	john.durant@tufts.edu	
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu	
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu	
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu	
2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu	
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu	
2024 FALL	Primary	Paul Dombrowski	Paul.Dombrowski@tufts.edu	
2024 FALL	Primary	Neelakshi Hudda	Neelakshi.Hudda@tufts.edu	
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	
Supervised research through the Cataldo Scholars Program within Civil and Environmental Engineering. Department consent and Senior standing required				

142327	Doctoral Thesis I			
Subject: CEE		Catalog Nbr: 0297		
2024 FALL	Primary	Anne Marie Desmarais	annemarie.desmarais@tufts.edu	
2024 FALL	Primary	Mark Woodin	mark.woodin@tufts.edu	
2024 FALL	Primary	David Gute	david.gute@tufts.edu	
2024 FALL	Primary	John Durant	john.durant@tufts.edu	
2024 FALL	Primary	James Limbrunner	James.Limbrunner@tufts.edu	
2024 FALL	Primary	Wayne Chudyk	wayne.chudyk@tufts.edu	
2024 FALL	Primary	Christopher Swan	chris.swan@tufts.edu	
2024 FALL	Primary	Masoud Sanayei	masoud.sanayei@tufts.edu	
2024 FALL	Primary	Brian Brenner	brian.brenner@tufts.edu	
2024 FALL	Primary	Laurie Baise	laurie.baise@tufts.edu	
2024 FALL	Primary	Eric Hines	Eric.Hines@tufts.edu	
2024 FALL	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu	
2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu	
2024 FALL	Primary	Luis Dorfmann	Luis.Dorfmann@tufts.edu	
2024 FALL	Primary	Babak Moaveni	Babak.Moaveni@tufts.edu	
2024 FALL	Primary	Robert Viesca	Robert.Viesca@tufts.edu	
2024 FALL	Primary	Daniele Lantagne	Daniele.Lantagne@tufts.edu	
2024 FALL	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu	
2024 FALL	Primary	John Germaine	John.Germaine@tufts.edu	
2024 FALL	Primary	Helen Suh	Helen.Suh@tufts.edu	
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu	

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2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu
2024 SPRG	Primary	Lucy Jen	Lucy.Jen@tufts.edu
Guided research on a topic suitable for a doctoral dissertation. Required: Consent of instructor.			

142328	Independent Study			
Subject:	Catalog Nbr:			
CEE	0294			
2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	
2024 SPRG	Primary	C. Andrew Ramsburg	Andrew.Ramsburg@tufts.edu	
Supervised, independent study of topics related to civil and environmental engineering. Departmental consent required				

142345	Master's Project			
Subject:	Catalog Nbr:			
CEE	0290			
2024 FALL	Primary	John Durant	john.durant@tufts.edu	
A project under the guidance of a faculty adviser that addresses an engineering topic related to the student's program of study. Students who are practicing engineers are encouraged to consider projects relevant to their own work. Topic, scope and SHUs must be approved by department. See departmental website for details.				

142502	Engineering Design Process			
Subject:	Catalog Nbr:			
BME	0066			
2023 SPRG	Primary	Janet Krevolin	Janet.Krevolin@tufts.edu	
2023 SPRG	Primary	Zheng Zhang	jonathan.zhang@tufts.edu	
2024 FALL	Primary	Angela Lai	Angela.Lai@tufts.edu	
Principles of design within the context of the medical device industry. Practical experience with design and product development. Converting a product from concept through design and deployment. Identifying unmet needs, inventing a new device, and implementing within the framework of medical-device design controls. Fabrication methods and version control. Prerequisites: ES 2 or COMP 11 Recommendations: PHY12 and (BME11, ES9, or ME20)				

142503	Marketing: Branding and Digital Communications			
Subject:	Catalog Nbr:			
EM	0242			
2024 FALL	Primary	Marci Sapers	Marci.Sapers@tufts.edu	

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Institutional and product marketing methods used by businesses launching new ventures. Overview of basic marketing principles, from day-to-day marketing activities to positioning and strategy. Analysis, formulation, and implementation of marketing strategies; concepts for understanding customer behavior and creating marketing strategy; fundamentals of market research, pricing, and reaching and selling to customers. Generating and delivering written and oral communications with clarity and precision, for different stakeholders and audiences. Course enrollment limited to Master of Science in Innovation and Management (MSIM) students.

142504	Leading for Impact			
Subject: EM		Catalog Nbr: 0263		
2024 FALL		Primary	Stacy Lennon	Stacy.Lennon@tufts.edu
Development of self-awareness and skills necessary for leadership. 360 degree assessment tools and extensive experiential learning. Oral communication, systems thinking, high performance teams, fostering creativity, team decision making, leading change, influence without authority. Conceptual frameworks, tools, and skills to effectively manage conflict and negotiate win/win solutions in the workplace. Cases and role plays to simulate real on the job conflicts. Course enrollment limited to Master of Science in Innovation and Management (MSIM) students.				

142505	Integrating Engineering and Literacy in Elementary and Middle School			
Subject: ENE		Catalog Nbr: 0120		
2024 SPRG		Primary	Elissa Milto	elissa.milto@tufts.edu
Introduction to the theory, curricula and practices of teaching integrated engineering and literacy. Topics include disciplinary engineering practices, connecting literacy to engineering, analysis of example implementations, and literacy practices. Required implementation of sample curricular units in educational settings.				

142506	Forces at Nanoscale	
	Subject: ME	Catalog Nbr: 0124
(Cross-listed as MSE 175) Interaction between basic components of matter: atoms, molecules, nano- and micro particles. Forces that occur between surfaces/particles at the nanoscale including Van der Waals, dipole, electric, electric double layer, hydrogen, ionic, and adhesion forces. Modern achievements in studying these forces with the help of the force apparatus and atomic force microscopy. DLVO theory, Derjaguin approximation. Analysis of experimental data to extract the force parameters. Prerequisites: Senior or graduate standing		

142507	Forces at Nanoscale
Subject:	Catalog Nbr:

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ME 0224

Interaction between basic components of matter: atoms, molecules, nano- and micro particles. Forces that occur between surfaces/particles at the nanoscale including Van der Waals, dipole, electric, electric double layer, hydrogen, ionic, and adhesion forces. Modern achievements in studying these forces with the help of the force apparatus and atomic force microscopy. DLVO theory, Derjaguin approximation. Analysis of experimental data to extract the force parameters. A project related to graduate research is required.

142811

Introduction to Remote Sensing

Subject: Catalog Nbr:
CEE 0189

2024 FALL

Primary

Aggeliki Barberopoulou

Aggeliki.Barberopoulou@tufts.edu

(Cross-listed with UEP 189) Satellite remote sensing technology and its applications to a variety of fields including urban and land use planning, natural resources monitoring and management, and environmental sciences. Physical processes in remote sensing; optical, thermal and microwave based sensors; image analysis to derive desired information, and applications for geo-environmental studies. Laboratory exercises in remote sensing.

142812

Environmental Systems Modeling

Subject: Catalog Nbr:
CEE 0215

Numerical computer modeling for environmental and water-resources simulation. Mass and energy balances, reaction kinetics, transport, and numerical solution techniques. Pollutants including pathogens, toxic substances, organic carbon/oxygen, heat, eutrophication, and pH in rivers, lakes and estuaries. Recommendations: Math 51 and CEE1, or equivalents.

142815

New Product Development

Subject: Catalog Nbr:
EM 0220A

Students learn what questions to ask and actions to take at various phases of new product evolution. Emphasis is placed on customer input and cross-functional team roles and responsibilities. Elements of marketing are presented including: market research tools, product positioning, branding and marketing communications. The central focus of this module is the development of a new product concept by cross-functional student teams that integrates learning from other modules. The student teams formally present their concepts at the end of the semester and develop effective techniques to present to senior management and/or prospective investors. This course is only open to students in the MS Engineering Management Program.

142816

Project Management and Software Methodologies

Subject: Catalog Nbr:
EM 0230A

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Students learn the fundamentals and modern heuristics for project management, with a focus on product development/engineering projects. The Project Management Body of Knowledge from the Project Management Institute (PMI) is explored in depth. Additional special topics include: quantitative project management; iterative and agile project lifecycles; software development lifecycles; and project defect models. This course is only open to students in the MS Engineering Management Program.

142817	Financial and Managerial Accounting		
	Subject:	Catalog Nbr:	
	EM	0230B	
Students learn how to analyze and create financial statements including the income statement, balance sheet and cash flow statement. We explore managerial tools for optimizing financial decisions including the economic feasibility of projects and products. In conjunction with the course project in the New Product Development course, student teams are required to develop a complete financial plan including a full set of pro forma financial statements and an analysis of return on investment. This course is only open to students in the MS Engineering Management Program.			

142818	Building Teams and Leading Teams		
	Subject:	Catalog Nbr:	
	EM	0260A	
In this two module sequence (260A and 260B), students learn the basic concepts of leadership, management and teamwork. The uniqueness of this course is within the teaching methodology, which has been developed to accelerate the advancement of self-awareness and interpersonal competencies. Specific topics covered in Building and Leading Effective Teams include: personality types (Myers-Briggs type indicator assessment), best practices in forming and maintaining team performance, giving and receiving feedback, individual and team creativity, communicating to inspire and influencing without authority. Topics in Leading Organizations include systems thinking, team decision-making, communication across cultures, shared visions and organizational change. This course is only open to students in the MS Engineering Management Program.			

142820	Capstone Leadership Project		
Subject:	Catalog Nbr:		
EM	0282		
2023 SUMR	Primary	Jill Parlee	Jill.Parlee@tufts.edu
2024 FALL	Primary	Mary Viola	Mary.Viola@tufts.edu
2024 FALL	Primary	Partha Ghosh	Partha.Ghosh@tufts.edu
2024 FALL	Primary	Samuel Liggero	Samuel.Liggero@tufts.edu
2024 FALL	Primary	Gerald Brown	Gerald.Brown@tufts.edu
2024 FALL	Primary	James Nash	James.Nash@tufts.edu
2024 FALL	Primary	Abbott Weiss	Abbott.Weiss@tufts.edu
2024 FALL	Primary	Frank Apeseche	Frank.Apeseche@tufts.edu
2024 FALL	Primary	Mark Bamford	Mark.Bamford@tufts.edu
Student led 'real-life' project to demonstrate business acumen and leadership skills. Project must be complex and involve risk with a 3-6 month duration, often			

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done with the student's current employer.

Pre-requisites EM-201, EM-202, EM-203, EM-204, EM-205, EM-206, EM-207, EM-208, EM-209

142821	Process Capability and Big Data Overview
Subject: EM	Catalog Nbr: 0210A
Introduction to “quality initiatives” (Six Sigma, TQM, Lean), and related probability and statistics fundamentals. Data types (nominal, ordinal, interval, and ratio), and their relationship to distribution types (normal [Gaussian], binomial, Poisson). Techniques for estimating population statistics from sampled data, and for performing tests of hypotheses to compare samples and populations. Statistical tools and strategies in the context of big data. Enrollment is restricted to MS Engineering Management Program students	

142822	Design of Experiments and Predictive Models
Subject: EM	Catalog Nbr: 0210B
Design of Experiments as a method for characterizing a process or system as a transfer function of its input variables, use of transfer functions to obtain optimal, real-world settings for the input variables. Exploration of big data approaches, regression analysis, and logistic regression. Statistical process control methods for analyzing and maintaining the behavior of systems and processes over time.	

142823	Selected Topics in Data Science and Big Data
Subject: EM	Catalog Nbr: 0210C
Overview of data science techniques. Topics include: machine learning; decision trees; logistic regression; multiple linear regression; linear programming; data visualization; kNN classification. Includes hands on experiences. This course is only open to students in the MS Engineering Management Program. Enrollment restriction: MSEM Students Only	

142824	Experience Design
Subject: EM	Catalog Nbr: 0220B
2024 SPRG	Primary Debra Reich Debra.Reich@tufts.edu
Application of the core principles of experience design to the creation of compelling products, services, brands and environments. The role of brand in experience design; approaches to customer understanding; the development of customer personas and journey maps; envisioning systems; experiential modeling; and designing for products and services. Presentation of team projects. Consideration of the role of experience design in business strategy.	

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142825	Sustainability
Subject: EM	Catalog Nbr: 0220C
An overview of lifecycle thinking in product design, as well as the business case for sustainability. Topics include sustainable product development, cradle-to-cradle lifecycle concepts, life-cycle assessments, nature-inspired design, and systems thinking. Opportunity to develop workplace sustainability initiatives and learn how to drive sustainable thinking into product development and the corporation.	

142827	Supply Chain Management
Subject: EM	Catalog Nbr: 0230C
The course focuses on the strategic impact of supply chain excellence. Topics explored include: strategic supplier management, global supply chains, outsourcing decisions, inventory management and replenishment methodologies.	

142828	Operations Management
Subject: EM	Catalog Nbr: 0230D
Problems and analysis related to the design, planning, control, and improvement of manufacturing and service operations. Topics include: how to map and analyze process flows, determining process capacities and bottlenecks, and designing and coordinating operations in concert with the whole organization. Course activities focus on diagnosing and solving problems, and recommending and implementing process improvement actions.	

142831	Fundamentals of Economics
Subject: EM	Catalog Nbr: 0240C
2023 SPRG	Primary Partha Ghosh Partha.Ghosh@tufts.edu
Overview of macro and microeconomics in preparation for the Globalization and Multinational Strategies module. Topics include: (i) global economic issues related to trade balance, government budgets, unemployment, competitiveness of innovation and manufacturing processes; (ii) fiscal and monetary discipline impacts on economic growth and social & political stability; (iii) economic philosophies impact on individual and collective behaviors; (iv) market behaviors; and, (v) basics of game theory.	

142832	Globalization and Multinational Strategy
Subject: EM	Catalog Nbr: 0240D

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2024 SPRG	Primary	Partha Ghosh	Partha.Ghosh@tufts.edu
A study of globalization and the evolution of multinational companies from different regions of world. Topics include: strategic, organizational and operational implications of working and leading in the global environment; implications of globalization on large multinational organizations as well as startups; and how globalization models work across various industries.			

142833	Personal Leadership	
	Subject:	Catalog Nbr:
	EM	0250A
The ability to lead starts with the process of self-discovery. In order to succeed externally, leaders need to develop an ability to understand their own internal environments - their energy, motivation, priorities, core values, etc. They need to develop their self-management skills and cultivate their self-confidence. Learning in this context does not mean simply acquiring new information, but elevating self-awareness, discovering one's authentic self and taking responsibility for her/his development as a leader. This module helps students develop a better understanding of their internal environment and to learn (and implement) techniques for improving their personal effectiveness. This course is only open to students in the MS Engineering Management Program.		

142834	Ethics of Leadership	
	Subject: EM	Catalog Nbr: 0250B
Students learn what constitutes a situation with moral or ethical stakes, how such situations develop and how leaders think through these challenges. Topics discussed include: different types of moral challenges, moral leadership, moral identity and professionalism, as well as moral reasoning, and moral action. This module gives students the intellectual tools and depth of understanding to assess moral issues as they arise in their personal and professional life. Students apply these concepts and insights into their own growth as engineering leaders. This course is only open to students in the MS Engineering Management Program.		

142835	Practice of Ethical Leadership		
Subject: EM		Catalog Nbr: 0250C	
2023 SPRG		Primary	Ewa Winston
2023 SPRG		Primary	Jane Seminara
Students are encouraged to look outward and expand their understanding of leadership, the world and their place in it as future engineering leaders. Students are challenged to formulate their own leadership message, to translate it into action and demonstrate it in the real world. Topics discussed include: giving voice to values, taking stand, exercising authority and emergent leadership. This course is only open to students in the MS Engineering Management Program.			

142836	Leading Organizations		
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Subject: Catalog Nbr:
EM 0260B

In this two module sequence (260A and 260B), students learn the basic concepts of leadership, management and teamwork. The uniqueness of this course is within the teaching methodology, which has been developed to accelerate the advancement of self-awareness and interpersonal competencies. Specific topics covered in Building and Leading Effective Teams include: personality types (Myers-Briggs type indicator assessment), best practices in forming and maintaining team performance, giving and receiving feedback, individual and team creativity, communicating to inspire and influencing without authority. Topics in Leading Organizations include systems thinking, team decision-making, communication across cultures, shared visions and organizational change. This course is only open to students in the MS Engineering Management Program.

142837**Conflict Resolution**

Subject: Catalog Nbr:
EM 0260C

A practitioner-focused module, students are introduced to frameworks, tools, and skills to effectively manage conflict in the workplace. Building on prior modules and tailored to address the specific challenges students have faced (or anticipate facing in the future), this module draws upon relevant literature and uses student examples and action learning to develop insights and approaches. A central feature of this module is an exercise, in which students perform a real life negotiation in a session with two classmates and an instructor. This course is only open to students in the MS Engineering Management Program.

143027**Systematic Innovations**

Subject: Catalog Nbr:
EM 0220D

This module introduces students to the general principles of TRIZ-based systematic innovation. A collection of tools is applied algorithmically to identify the right problem, solve the problem efficiently and ensure the solutions align with the business strategy. Students develop skills that can be applied to improve functionality within existing products, develop new generation products, or reduce cost. This course is only open to students in the MS Engineering Management Program.

143209**Senior Capstone Project in Data Science I**

Subject: Catalog Nbr:
DS 0097

2024 FALL

Primary

Fabrizio Santini

Fabrizio.Santini@tufts.edu

Application of data science and analytic principles to the solution of a real-world problem in a group setting. Requirements analysis, review of available data sources, and proposal of a solution strategy to the problem.

143210**Senior Capstone Project in Data Science II**

Subject: Catalog Nbr:
DS 0098

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2023 SPRG	Primary	Alva Couch	alva.couch@tufts.edu
2024 SPRG	Primary	Fabrizio Santini	Fabrizio.Santini@tufts.edu
A continuation of DS 97. Analysis of the problem proposed in DS 97 is completed and a final paper summarizes data gathered, analytic results, lessons learned, and opportunities for future study.			

143211	Special Topics in Data Infrastructure and Systems		
Subject:	Catalog Nbr:		
CS	0051		
A special topics course in data infrastructures and systems, suitable for fulfilling requirements of the Bachelor of Science in Data Science.			

143212	Special Topics in Data Infrastructure and Systems		
Subject:	Catalog Nbr:		
CS	0151		
2024 FALL	Primary	Ronald Simmons	Ronald.Simmons@tufts.edu
2024 SPRG	Primary	Megumi Ando	Megumi.Ando@tufts.edu
2024 SPRG	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu
2024 SPRG	Primary	Laurin Weissinger	Laurin.Weissinger@tufts.edu
2024 SPRG	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu
2024 SPRG	Primary	Johes Bater	Johes.Bater@tufts.edu
A special topics course in data infrastructures and systems, suitable for fulfilling requirements of the Bachelor of Science in Data Science.			

143213	Special Topics in Data Analysis and Interfaces		
Subject:	Catalog Nbr:		
CS	0052		
2023 SPRG	Primary	Gregory Crane	gregory.crane@tufts.edu
A special topics course in data analysis and interfaces, suitable for fulfilling requirements of the Bachelor of Science in Data Science.			

143214	Special Topics in Data Analysis and Interfaces		
Subject:	Catalog Nbr:		
CS	0152		
2024 FALL	Primary	Josephine Wolff	Josephine.Wolff@tufts.edu
2024 FALL	Primary	Daniel Votipka	Daniel.Votipka@tufts.edu
2024 SPRG	Primary	Megan Monroe	Megan.Monroe@tufts.edu
2024 SPRG	Primary	Roy Shilkrot	Roy.Shilkrot@tufts.edu
A special topics course in data analysis and interfaces, suitable for fulfilling requirements of the Bachelor of Science in Data Science.			

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143215	Special topics in Computational and Theoretical Aspects of Data Science.			
Subject:	Catalog Nbr:			
DS	0153			
2023 SPRG	Primary	Shuchin Aeron	Shuchin.Aeron@tufts.edu	
2023 SPRG	Primary	Theresa Law	No Email on file.	
2024 FALL	Primary	Roy Shilkrot	Roy.Shilkrot@tufts.edu	
A special topics course in computational and theoretical aspects of data science, suitable for fulfilling requirements of the Bachelor of Science in Data Science.				

143216	Special topics in Computational and Theoretical Aspects of Data Science			
Subject:	Catalog Nbr:			
DS	0053			
A special topics course in computational and theoretical aspects of data science, suitable for fulfilling requirements of the Bachelor of Science in Data Science.				

143234	Musical Instrument Design And Manufacture			
Subject:	Catalog Nbr:			
ME	0045			
2024 SPRG	Primary	Chris Rogers	chris.rogers@tufts.edu	
(Cross-listed as ES 73) Review of the underlying engineering and the basic fabrication of musical instruments, including an introduction to musical acoustics, computer-based simulation tools, laboratory measurement, and manufacturing. The bulk of the class is dedicated to designing, simulating, building, and testing of an instrument.				

143282	Fundamentals of Biostatistics			
Subject:	Catalog Nbr:			
CEE	0006			
2024 FALL	Primary	Mark Woodin	mark.woodin@tufts.edu	
2024 FALL	Primary	Qiang Fu	John.Fu@tufts.edu	
2024 SPRG	Primary	David Tybor	DJ.Tybor@tufts.edu	
(Cross listed as CH 36) Examination of statistical methods used in biomedical and public health studies. Descriptive statistics, probability, basic hypothesis testing, ANOVA, linear regression, logistic regression, and an introduction to survival analysis. Instruction in the use of statistical software will be provided throughout the course. CEE 6 and CEE 156 cannot both be taken for credit				

143283	Integrated Planning and Management of Civil Infrastructure Systems			
Subject:	Catalog Nbr:			
CEE	0080			
2024 SPRG	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	

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Decision making for integrated, complex and adaptive civil infrastructure systems. Rigorous exploration of economic efficiency, robustness, and resilience of infrastructure design and management. Simulation and optimization. Explicit consideration of technical, environmental, societal, and climate risks and uncertainties.

143284	Structural Health Monitoring			
Subject:		Catalog Nbr:		
CEE		0127		
2024 FALL		Primary	Babak Moaveni	Babak.Moaveni@tufts.edu
(Cross-listed as ME 176) Vibration-based structural health monitoring including system identification of linear systems. Data acquisition, signal processing, modal identification, parameter estimation, and optimization.				

143285	Advanced Soil Mechanics			
Subject: CEE		Catalog Nbr: 0242		
2024 FALL		Primary	Juan Pestana	Juan.Pestana@tufts.edu
Soil composition, index properties, classification. Mohr circles and stress paths. Consolidation behavior; consolidation theory including radial and 3-D solutions; secondary compression. Shear strength of soils; effects of soil composition, stress history, drainage conditions, and rate of loading. Recommendation: CEE 42 or equivalent				

143286	Parallel Computing			
Subject:	Catalog Nbr:			
EE	0155			
2023 SPRG	Primary	Jeanne Fourneyron	Jeanne.Fourneyron@tufts.edu	
2024 SPRG	Primary	Joel Grodstein	Joel.Grodstein@tufts.edu	
(Cross-listed as CS 122) Programming modern parallel computer architectures, especially GPUs and multi-core CPUs. Rationale for modern multi-core CPUs. Challenges of multi-threaded programming. High-performance software taking advantage of hardware caches, cache coherency, memory systems and parallel computation. Recommendations: EE 25 or CS 40.				

143301	Professional Preparation for Cooperative Education				
Subject:		Catalog Nbr:			
ES		0085			
2024 FALL		Primary	Anil Saigal	anil.saigal@tufts.edu	
2024 FALL		Primary	Robin Kahan	robin.kahan@tufts.edu	
2024 FALL		Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu	
Introduction to work-based learning, strategies to optimize work experience and learn skills and habits to best transition into a professional work environment. Writing an effective resume, strategic interviewing, professional networking strategies, and developing a list of goals to achieve and skills to develop in a professional environment. Effective approaches to oral and written communications.					

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143347	Computer Science for All			
Subject:	Catalog Nbr:			
CS	0010			
2023 SPRG	Primary	Antonella Di Lillo	No Email on file.	
2024 SPRG	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu	
Fundamental concepts of computer science and computer programming for students with no prior programming experience but who are interested in taking CS11. Introduction to computer programming in the language Python. Data structures and algorithms, text and data manipulation, simulation using random numbers.				
Recommendation: high school algebra				

143348	A Machine-Centric Approach to Programming, Data Structures and Algorithms			
Subject:	Catalog Nbr:			
EE	0200			
2024 FALL	Primary	Steven Bell	Steven.Bell@tufts.edu	
Programming in C and C++ with coverage of data structures (linked lists, binary trees, hash tables, graphs), abstract data types (stacks, queues, maps, sets) and algorithms (sorting, graph search, minimal spanning tree). Efficiency of these structures and algorithms is compared via Big-O analysis. Brief coverage of concurrent (multi-threaded) programming. Object-oriented design: inheritance, templates and virtual methods. Embedded, high-performance and close-to-hardware applications. Defensive coding and use of standard UNIX development tools. Requirements: graduate standing				

143349	Fundamentals of Computer Systems and Engineering			
Subject:	Catalog Nbr:			
EE	0201			
2024 SPRG	Primary	Steven Bell	Steven.Bell@tufts.edu	
Fundamentals of digital systems and computer architecture for master’s students whose undergraduate background did not cover this material. Topics covered include digital logic, assembly programming, computer architecture, memory hierarchies and technologies, I/O, hardware implementation in VHDL, operating systems and networking. Analysis and hands-on implementation of complex digital systems. EE201 and EE126 cannot both be taken for credit.				
Requirements: graduate standing				

143350	Methods for Human Factors Engineering			
Subject:	Catalog Nbr:			
ENP	0064			

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2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu
2024 FALL	Primary	Dave Miller	Dave.Miller@tufts.edu
Qualitative and quantitative methods and techniques used in human factors engineering research. Usability testing, structured observation, questionnaire design, focus group design, psychophysical methods, signal detection theory, and field studies. Examples of good and bad methods/techniques.			
Recommendations: PSY53			

143398	Synthetic Biology		
Subject:	Catalog Nbr:		
CHBE	0159		
2024 FALL	Primary	Nikhil Nair	Nikhil.Nair@tufts.edu
Overview of Synthetic biology. Origin, techniques, current status, and applications to chemical, pharmaceutical, energy, environmental, and agriculture industries. Recommendation: Bio 41 or equivalent, and Bio 152/Chem 171 or equivalent			

143423	Medical Technology Development		
Subject:	Catalog Nbr:		
ENP	0109		
2024 SPRG	Primary	Michael Wiklund	michael.wiklund@tufts.edu
Medical technology development and healthcare delivery. Human anatomy, medical conditions, roles of clinicians, and effect of medical care environments on medical care quality. User interfaces of diagnostic, therapeutic, and monitoring technologies. Design of medical devices to optimize medical care, user satisfaction, and patient safety. Visits to clinical care environments. Guest lectures by clinicians. Individual and group projects structured around real world problems.			
Recommendations: Junior Standing			

143424	Engineering Forensics		
Subject:	Catalog Nbr:		
ENP	0112		
2024 FALL	Primary	Mary Stearns	Mary.Stearns@tufts.edu
2024 FALL	Primary	Divya Chandra	D.Chandra@tufts.edu
Prevention of recurrence for high-profile accidents in transportation and related industries. Accident-investigation methods, discovery of system-safety faults, and identification of user-interface design errors. Case studies with emphasis on individual analysis and presentation. Site visits and guest lectures.			
Recommendations: PSY 53, ENP 64 and junior standing.			

143425	Ergonomic in Design		
Subject:	Catalog Nbr:		
ENP	0114		

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2024 FALL	Primary	Gary Leisk	Gary.LEISK@tufts.edu
Topics related to the domain of physical ergonomics with emphasis on the quality of fit between humans and the things they interact with on a job site, in sports, or at home. Applications drawn from aspects of human-made environments and designed products. Extensive in-class activities, group work, and collaborative discussion. Project experiences involving analysis of real-life scenarios. Anthropometry, functional anatomy, ergonomics, body mechanics, and human factors research methods. Guest lectures with local industry and professionals. Recommendations: Junior, Senior or Graduate Standing			

143426	Industrial Design		
Subject: ENP	Catalog Nbr: 0165		
2024 SPRG	Primary	Maxwell Bischoff	Maxwell.Bischoff@tufts.edu
History and current state of industrial design, the industrial design process, and industrial design principles. Application of industrial design for user needs and expectations. Product safety, efficacy and consumer satisfaction. Recommendations: Junior standing			

143427	GPS & Satellite Navigation		
Subject: ME	Catalog Nbr: 0133		
2024 FALL	Primary	Pratap Misra	Pratap.Misra@tufts.edu
Positioning by trilateration; satellite-based, global radio-navigation systems; requisite technologies including global coordinate frames, ultra-stable clocks; GPS satellite constellation and orbits; GPS Time; WGS 84 coordinate frame; signal theory including spread spectrum signals, code division multiple access (CDMA); GPS system theory including receiver algorithms for acquisition and tracking of GPS signals; estimation of position, velocity and time from measurements of pseudoranges including least-squares and Gauss-Newton method; hands-on data collection with a GPS receiver. Recommendation: Senior standing			

143428	Global Climate Change and Human Health		
Subject: CEE	Catalog Nbr: 0151		
Human health implications of global climate change, including extreme weather events and air pollution. Climate change effects on infectious disease transmission, vector distribution, agricultural productivity, and ecological systems. Use of risk assessment, statistical modeling, and data visualization tools to identify and predict current and future health impacts resulting from climate change. Recommendation: ES55 and (ES56 or CEE156)			

143429	Environmental Health Data-Lab		
Subject: CEE	Catalog Nbr: 0152		
2024 FALL	Primary	Mark Woodin	mark.woodin@tufts.edu

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Use of publicly available environmental and health data for in-depth analysis of environmental health topics such as air pollution, exposure disparities, water quality, and contaminant source contributions, with knowledge of contaminant fate and transport, statistics, and data visualization.

143430	Water, Sanitation, and Hygiene (WASH) Design			
Subject: CEE		Catalog Nbr: 0159		
2024 FALL		Primary	Ana Fernandes	Ana.Fernandes@tufts.edu
User-centered design of WASH systems for low-cost, community- and household-level treatment. Topics include technologies, health impacts, societal contexts, and monitoring for achieving sustainability. Emphasis on applying topics to develop a WASH design for a self-selected project.				

143431	Special Topics in Social Context of Computing	
Subject:	Catalog Nbr:	
CS	0055	
Study of various topics in the social and ethical context of computing. Content and prerequisites to be announced. Please see departmental website for specific details.		

143432	Special Topics in Social Context of Computing	
Subject:	Catalog Nbr:	
CS	0155	
ABET CAC requires us to include more social context in our curriculum, and this course provides a vehicle for such interaction, by allowing us to cross-list specific courses in A&S and Fletcher as satisfying that requirement via this number. Thus, this number can be used to change the description of the BSCS to include social context courses as required by ABET. We desire both undergraduate-only and undergraduate/graduate numbers for this option, depending upon course level.		

143433	Big Data			
Subject: CS		Catalog Nbr: 0119		
2024 FALL		Primary	Andrew Winslow	Andrew.Winslow@tufts.edu
2024 SPRG		Primary	Jitendra Singh	Jitendra.Singh@tufts.edu
Collecting, processing, analyzing and acting on data at Internet scale with speed and complexity. Techniques and infrastructures developed for big data including parallel and distributed database systems, map-reduce infrastructures, scalable platforms for complex data types, stream processing systems, and cloud-based computing. Course blends theory, algorithms and practical (hands on) work.				

143434	Special Topics in the Practice of Data Science		
Subject:		Catalog Nbr:	

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DS	0154			
	2023 SPRG	Primary	Gregory Crane	gregory.crane@tufts.edu
	2024 FALL	Primary	Donna Slonim	Donna.Slonim@tufts.edu
	2024 FALL	Primary	Josephine Wolff	Josephine.Wolff@tufts.edu
Study of various topics in the practice of Data Science, suitable for fulfilling requirements of the Master of Science in Data Science. Content and prerequisites to be announced. Please see departmental website for specific details. Prerequisite: Graduate standing				

143435	Masters Project in Data Science			
Subject:	Catalog Nbr:			
DS	0293			
	2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu
	2024 FALL	Primary	Robert Jacob	jacob@cs.tufts.edu
	2024 FALL	Primary	Alva Couch	alva.couch@tufts.edu
	2024 FALL	Primary	Soha Hassoun	soha.hassoun@tufts.edu
	2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu
	2024 FALL	Primary	Ming Chow	ming.chow@tufts.edu
	2024 FALL	Primary	Lenore Cowen	lenore.cowen@tufts.edu
	2024 FALL	Primary	Peter Love	Peter.Love@tufts.edu
	2024 FALL	Primary	Donna Slonim	Donna.Slonim@tufts.edu
	2024 FALL	Primary	Samuel Guyer	Samuel.Guyer@tufts.edu
	2024 FALL	Primary	Norman Ramsey	Norman.Ramsey@tufts.edu
	2024 FALL	Primary	Remco Chang	Remco.Chang@tufts.edu
	2024 FALL	Primary	Matthias Scheutz	Matthias.Scheutz@tufts.edu
	2024 FALL	Primary	Kathleen Fisher	Kathleen.Fisher@tufts.edu
	2024 FALL	Primary	Noah Mendelsohn	Noah.Mendelsohn@tufts.edu
	2024 FALL	Primary	Mark Sheldon	Mark.Sheldon@tufts.edu
	2024 FALL	Primary	Fahad Dogar	Fahad.Dogar@tufts.edu
	2024 FALL	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu
	2024 FALL	Primary	Megan Monroe	Megan.Monroe@tufts.edu
	2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
	2024 FALL	Primary	Liping Liu	Liping.Liu@tufts.edu
	2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu
	2024 FALL	Primary	Susan Landau	Susan.Landau@tufts.edu
	2024 FALL	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu
	2024 FALL	Primary	Michael Hughes	Michael.Hughes@tufts.edu
	2024 FALL	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
	2024 FALL	Primary	Elaine Short	Elaine.Short@tufts.edu
	2024 FALL	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu
	2024 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu
	2024 FALL	Primary	Richard Townsend	Richard.Townsend@tufts.edu
	2024 FALL	Primary	Abani Patra	Abani.Patra@tufts.edu
	2024 FALL	Primary	Daniel Votipka	Daniel.Votipka@tufts.edu
	2024 FALL	Primary	Bert Huang	No Email on file.

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2024 FALL	Primary	David Lillethun	David.Lillethun@tufts.edu
2024 FALL	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu
2024 FALL	Primary	Johes Bater	Johes.Bater@tufts.edu
2024 FALL	Primary	Antonella Di Lillo	No Email on file.
Guided individual study of an approved topic suitable for a master's project in Data Science. Please see departmental website for specific details.			

143474	Computational Biology		
Subject:	Catalog Nbr:		
BME	0167		
2024 SPRG	Primary	Donna Slonim	Donna.Slonim@tufts.edu
(Cross listed as CS 167) Computational challenges in molecular biology, including sequence alignment and comparison, genomic annotation, transcriptomic data analysis, and proteomics. Underlying computational techniques such as dynamic programming, hidden Markov models, statistical analyses, and search and optimization procedures.			

143563	Advanced Engineering Psychology		
Subject:	Catalog Nbr:		
ENP	0130		
2023 SPRG	Primary	David Aurelio	David.Aurelio@tufts.edu
(Cross-listed as PSY 130) Seminar on the various functions that humans perform in complex modern human-machine systems. Examination of psychological and engineering theories and models as they relate to these functions. Recommendations: Three courses in psychology, including PSY 53, or graduate standing.			

143647	Parallel Computing		
Subject:	Catalog Nbr:		
CS	0122		
2024 SPRG	Primary	Joel Grodstein	Joel.Grodstein@tufts.edu
(Cross-listed as EE 155) Programming modern parallel computer architectures, especially GPUs and multi-core CPUs. Rationale for modern multi-core CPUs. Challenges of multi-threaded programming. High-performance software taking advantage of hardware caches, cache coherency, memory systems and parallel computation. Recommendations: EE 25 or CS 40.			

143715	Biomechanics		
Subject:	Catalog Nbr:		
BME	0152		
(Cross-listed as ME 123) Mechanical properties of muscle and bone, activation of muscles, kinematics and dynamics of joints, forces and energy in movement, movement data recording and analysis. Classroom presentations and research projects.			

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Recommendations: ES 9 Applied Mechanics (Strength of Materials) or equivalent.

143783	The Engineering Method of Technical Writing	
	Subject:	Catalog Nbr:
	CS	0179
Principles of writing papers and theses on Computer Science topics. Editing principles for technical papers, including word choice, word placement, paragraph design, and section structure. Working practices for manuscript production: active waiting, prewriting, drafting, and editing. Analysis of student work and published papers. Experimental study of effective practices. Prerequisites: Enrollment by permission of instructor only. Preference given to students writing or planning to write a doctoral, master's, or bachelor's thesis.		

143784	Principles of Data Science in Python	
	Subject:	Catalog Nbr:
	DS	0205
Fundamentals of python programming for data analysis. Common python data structures and algorithms. Design of python programs. Coding standards and practices. Use and creation of software libraries. Examples drawn from data preparation and transformation, statistical data analysis, machine learning, deep learning, and deep data science including recommendation systems and trend analysis. Labs utilizing iPython and the Jupyter data analysis workflow framework.		

143805	Applied Behavioral Statistics for Engineering			
Subject: ENP		Catalog Nbr: 0164		
2024 FALL		Primary	Daniel Hannon	Dan.Hannon@tufts.edu
Behavioral statistics for human factors and applied behavioral research. Parametric, nonparametric, descriptive and inferential concepts. Small n and case study designs, factor analysis and power analysis. Use of modern statistical software package(s). Applications to product design and development, human performance, and survey methods.				

143806	Masters Capstone			
Subject: ENP		Catalog Nbr: 0220		
2023 SPRG		Primary	Chaiwoo Lee	Chaiwoo.Lee@tufts.edu
2024 SPRG		Primary	Jason Ryan	Jason.Ryan@tufts.edu
Individual projects in human factors. Design problems set by industry sponsors, employers, faculty members and other sources. Written research proposal, weekly progress reports, and written semester report.				

143854	Micro/Nanofabrication in Practice			
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Subject:	Catalog Nbr:
ME	0144
Hands on instruction in fundamental micro/nano fabrication processes. Contact lithography, positive and negative photoresists, multi-layer registration. Physical vapor deposition, sputtering, thermal evaporation. Atomic layer deposition. Wet and dry etching. Microfluidics. Electron beam lithography. Introduction to micro/nano device design. Prerequisites : ME 70 or graduate standing	

143855	Microfluidics			
Subject:	Catalog Nbr:			
ME	0155			
2024 FALL	Primary	Jeffrey Guasto	Jeffrey.Guasto@tufts.edu	
Microscale fluid mechanics and mass transport. Microfluidic device design, fabrication, and experimental characterization. Hydraulic circuit analysis, electrokinetic flow, capillary effects, and multiphase flow. Brownian motion, diffusion, and dispersion. Applications including mixing and separations, cell sorting and chemotaxis, droplets and emulsions, and pumps and valves. Laboratory component including micro particle image velocimetry. Meets with ME 217. In no case may a student receive credit for both ME 155 and ME 217. Prerequisites: ME 51 or ME 150 or graduate standing				

143856	Microfluidics		
Subject:	Catalog Nbr:		
ME	0255		
Introduction to microscale fluid mechanics and mass transport. Microfluidic device design, fabrication, and experimental characterization. Hydraulic circuit analysis, electrokinetic flow, capillary effects, and multiphase flow. Brownian motion, diffusion, and dispersion. Applications including mixing and separations, cell sorting and chemotaxis, droplets and emulsions, and pumps and valves. Laboratory component including micro-PIV. Meets with ME117. Students enrolled in ME217 are assigned additional independent readings and a final project. In no case may a student receive credit for both ME117 and ME217. Prerequisites: ME 150 and graduate standing.			

143857	The Emerging Global Health Crisis			
Subject:	Catalog Nbr:			
CEE	0059			
2024 SUMR	Primary	David Gute	david.gute@tufts.edu	
The principal focus of CEE 59 in the summer of 2020 will be on an examination of the global reach of COVID-19. The course will place it within a context of other emerging and re-emerging diseases such as HIV/AIDS, SARS, measles, avian flu and review how they are transmitted and distributed. Find out why the control of this unfolding pandemic requires not only solid science but also effective public health policy. The social and structural inequities exacerbated by the spread of COVID-19 will also be explored.				

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143858	The Energy Transition			
Subject:		Catalog Nbr:		
CEE		0101		
2024 FALL		Primary	Eric Hines	Eric.Hines@tufts.edu
(Cross-listed as STS 101) Consideration of engineering concepts relevant to the global transition from fossil fuels to renewable sources of energy. Interface between policy and technology in the energy sector and its relevance to decision making. Offshore wind energy is used as an example to illustrate the convergence of technology, infrastructure, policy, and markets that is necessary to achieve a just and equitable energy transition. Course is open to juniors, seniors, and graduate students from across the university.				

143859	Human-Robot Interaction			
Subject: CS		Catalog Nbr: 0133		
2024 FALL		Primary	Elaine Short	Elaine.Short@tufts.edu
Human-robot interaction (HRI) at the intersection of psychology, human factors engineering, computer science, and robotics. Case studies of developing robots for various societal tasks, from flexible and adaptive robots for industrial manufacturing, to socially assistive robots for elder care. Discussion of key papers in HRI. Short student presentations on HRI studies and designs; work in interdisciplinary groups on a term project to design and conduct an HRI study.				
Recommendations: At least one course beyond Math 34, including Math 42, 44, 61, 70, or 72				

143860	Ethics for AI, Robotics, and Human Robot Interaction			
Subject: CS		Catalog Nbr: 0139		
2024 FALL		Primary	Matthias Scheutz	Matthias.Scheutz@tufts.edu
Ethical problems and challenges prompted by current and future technological advances in AI, robotics, and human-robot interaction. Philosophical foundations of the main ethical theories and links between these and algorithmic approaches in artificial agents. Functional tradeoffs and implications for autonomous robots and AI systems, explicating and contrasting the assumptions underlying each algorithmic approach. Moral psychology and human-robot/human-technology interaction, including the societal implications of AI and robot technology. Social, economic, legal, and military ramifications. Prerequisites: senior standing, or permission of instructor. Recommendations: CS/MATH 61 and CS 15.				

144098	Materials & Manufacturing I			
Subject: ME		Catalog Nbr: 0010		
2024 FALL	Primary	Gary Leisk	Gary.LEISK@tufts.edu	
2024 FALL	Primary	Luisa Chiesa	Luisa.Chiesa@tufts.edu	
Product teardown, component and sub-assembly identification, CAD modeling of parts and assembly. Materials identification and selection for engineering applications, Ashby charts. Basic principles and				

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advantages/disadvantages of manufacturing processes, hands on component manufacturing.

Recommendations: Sophomore standing

144099	Materials & Manufacturing II				
	Subject:	Catalog Nbr:			
	ME	0011			
	2023 SPRG	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu	
	2024 SPRG	Primary	Anil Saigal	anil.saigal@tufts.edu	
Phase diagrams, microstructures of materials, methods of structural material modification. Material classification and basic structures, material properties, property characterization and testing methods. Dislocations, twinning, diffusion and strengthening mechanisms.					
Recommendations: ME-0020					
Pre-requisites: ME-0010, CHEM-0001					

144100	Mechanics I			
Subject:	Catalog Nbr:			
ME	0020			
2024 FALL	Primary	Robert White	R.White@tufts.edu	
2024 FALL	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu	
2024 FALL	Primary	Golriz Kermani	Golriz.Kermani@tufts.edu	
Analysis and problem solving in statics. Vector and matrix analysis. Force-moment balance equations. Analysis of stress and strain. Behavior of isotropic materials. Area moments of inertia. Behavior of members subjected to axial, torsional, and flexural loadings, combined stress, compression members and columns.				
Recommendations: Sophomore standing				
Pre-requisites: PHY-0011 and MATH-0034				

144101	Mechanics II			
Subject:	Catalog Nbr:			
ME	0021			
2023 SPRG	Primary	Mark Kachanov	mark.kachanov@tufts.edu	
2024 SPRG	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu	
Equilibrium of particles and rigid bodies in two and three dimensions. Kinematics and kinetics of particles and of rigid bodies in plane motion. Mass moments of inertia of solid bodies. Momentum and impulse methods. Energy methods. Single degree of freedom vibrations. Derivation and solution of differential equations of motion.				
Recommendations: MATH-0051				
Pre-requisites: ME-0020				

Course Bulletin

144102	Electronics & Controls I			
Subject: ME		Catalog Nbr: 0030		
	2024 FALL	Primary	Kristen Wendell	Kristen.Wendell@tufts.edu
	2024 FALL	Primary	Brandon Stafford	Brandon.Stafford@tufts.edu
	2024 FALL	Secondary	Kristen Wendell	Kristen.Wendell@tufts.edu
	2024 FALL	Secondary	Brandon Stafford	Brandon.Stafford@tufts.edu
Analysis and design of circuits using ideal voltage and current sources, resistors, capacitors, and inductors. Actuators such as electric motors, solenoids, and heaters. Amplifiers. Microcontrollers. Sampling sensors and driving actuators. Applications of proportional-integral-derivative control. Hardware implementation. Use of oscilloscopes to test and debug circuits. Printed circuit board (PCB) design. Students may not receive credit for both ME30 and EE31.				

144103	Electronics & Controls II			
Subject: ME		Catalog Nbr: 0031		
	2023 SPRG	Primary	Robert White	R.White@tufts.edu
	2024 SPRG	Primary	Matthew Woodward	Matthew.Woodward@tufts.edu
Modeling and control of dynamic electromechanical systems. Transfer functions and other methods for continuous linear system analysis. Time-domain response, frequency response. Performance of feedback controllers, including proportional-integral-derivative controllers. Computer tools for design and measurement. Sensors, actuators, hardware implementation.				
Pre-requisites: ME-0030, PHY-0011				

144104	Engineering Design I			
Subject: ME		Catalog Nbr: 0040		
	2023 SPRG	Primary	Daniel Hannon	Dan.Hannon@tufts.edu
	2023 SPRG	Primary	Luisa Chiesa	Luisa.Chiesa@tufts.edu
	2024 SPRG	Primary	Gary Leisk	Gary.LEISK@tufts.edu
	2024 SPRG	Primary	Kristen Wendell	Kristen.Wendell@tufts.edu
	2024 SPRG	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu
User-centric design process, project planning, framing the design challenge. Intellectual property, market research. Task analysis, identification of user needs and engineering requirements, user profiles and persona, need ranking. Ideation techniques, decision making based on design criteria, detailed design. Working with vendors and communicating designs, usability testing, design iteration, engineering drawings in CAD, prototype fabrication.				
Pre-requisites: Sophomore standing				

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144105	Engineering Design II			
Subject:	Catalog Nbr:			
ME	0041			
2024 FALL	Primary	Douglas Matson		Douglas.Matson@tufts.edu
Machine applications, component analysis, load analysis, free body diagrams. Analytical modeling, finite element analysis, failure modes, stress concentrations, failure theories. Machine design component selection, applications, materials, loading conditions.				
Recommendations: ME-0020				
Pre-requisites: ME-0040				

144106	Thermal Fluid Systems I			
Subject:	Catalog Nbr:			
ME	0050			
2024 SPRG	Primary	Douglas Matson		Douglas.Matson@tufts.edu
2024 SPRG	Primary	Jeffrey Guasto		Jeffrey.Guasto@tufts.edu
2024 SPRG	Primary	Jannatun Nawer		Jannatun.Nawer@tufts.edu
Classical thermodynamics and energy balances. Thermophysical properties of matter, first and second law of thermodynamics in closed and open systems, entropy, and thermodynamic cycles. Dimensional analysis. One-dimensional steady state and transient conduction, and radiative heat transfer. Emphasis on application of thermodynamic reasoning to system design.				
Recommendations: Sophomore standing, CHEM-0001				
Pre-requisites: PHY-0011				
Pre-requisites or Co-requisites: MATH-0042 or MATH-0044				

144107	Thermal Fluid Systems II			
Subject:	Catalog Nbr:			
ME	0051			
2024 FALL	Primary	Erica Kemmerling		Erica.Kemmerling@tufts.edu
Fluid mechanics and convective heat transfer for internal and external flows. Properties of fluids, pressure, hydrostatic forces. Control volume and differential analysis. Conservation of mass, momentum, and energy. Bernoulli and Navier-Stokes equations. Introduction to turbulent flows. Momentum and thermal boundary layers. Forced and free heat convection, and heat exchangers. Emphasis on combined heat transfer and fluid flow in thermodynamic systems.				
Pre-requisites: ME-0050 and MATH-0051				

144108	Structural Dynamics			
Subject:	Catalog Nbr:			

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ME	0178
(Cross-listed as CEE 106) Fundamentals of vibration theory with applications important in structural engineering. Free, forced, and transient vibration analysis. Time and frequency domain analysis of single and multi-degree of freedom systems. Natural frequencies and normal modes of vibration. Vibration mitigation and base isolation. Understanding behavior of structures subjected to various dynamic loads such as wind, earthquake, machine vibration, and ambient vibration. Hands-on experience with industry-standard software and practical applications in structural engineering. Recommendations: CEE 22 or ME 41, or consent of instructor	

144127	Convex Optimization
Subject: CS	Catalog Nbr: 0168
2024 SPRG	Primary Mai Vu
(Cross-listed with EE 109) Convex optimization theory and algorithms. Convex sets, convex functions and convex optimization problems; duality theory and optimality conditions; algorithms for solving convex problems including descent, gradient descent, Newton and interior point methods. Examples of applications taken from communications, signal processing, machine learning and other fields. Students may receive credit for only one of the following courses: EE109, EE159, or CS169	
Mai.Vu@tufts.edu	

144141	Structural Health Monitoring
Subject: ME	Catalog Nbr: 0176
(Cross-listed as CEE 176) Vibration-based structural health monitoring including system identification of linear systems. Data acquisition, signal processing, modal identification, parameter estimation, and optimization. Recommendations: ES55 and ES56, or consent	

144208	Special Topics in Engineering Education
Subject: ENE	Catalog Nbr: 0193
2024 SPRG	Primary Ethan Danahy
2024 SPRG	Primary Merredith Portsmore
2024 SPRG	Primary Chelsea Andrews
Special topics in K-12 Engineering Education for practicing educators. See Tufts Engineering Education Program website (teep.tufts.edu) for specific details.	
ethan.danahy@tufts.edu merredith.portsmore@tufts.edu Chelsea.Andrews@tufts.edu	

144209	Cyber for Future Policymakers
Subject: CS	Catalog Nbr: 0012
2024 FALL	Primary David Lillethun
Relevance of computer technologies to policy development. Internet architecture and basic networking, the	
David.Lillethun@tufts.edu	

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Web, cloud architectures, cryptography, security and privacy, AI and machine learning, and open-source systems. Developing technologies, including quantum computing and post-quantum cryptography. Recommendations: CS 10 or CS 11.

144210	How Systems Work			
Subject:	Catalog Nbr:			
CS	0013			
2024 FALL	Primary	Mark Sheldon	Mark.Sheldon@tufts.edu	
2024 FALL	Primary	Jared Chandler	Jared.Chandler@tufts.edu	
How computing systems work: bits, bytes, the representation of information, the CPU, assembly language, programming languages. Networking: including peering, packets, and the Internet. Algorithms and the fundamental limitations of computing. Recommendations: CS 10 or CS 11.				

144211	How Systems Fail				
	Subject:	Catalog Nbr:			
	CS	0027			
	2023 SPRG	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu	
	2024 SPRG	Primary	David Lillethun	David.Lillethun@tufts.edu	
Failure of computer systems within the larger context of complex systems, including the power grid and aviation. Failures of algorithms and protocols, engineering and implementation, systems and applications, people and culture. Attacks, attack recovery, security, privacy, and attribution. Case studies of failures and attacks, including distributed denial of service, Meltdown, Spectre, and spear-phishing attacks.					

144256	Computational Models in Cognitive Science			
Subject:	Catalog Nbr:			
CS	0134			
2024 FALL	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu	
(Cross-listed w/ PSY 141) Scientific logic of using computational models for testing theories in cognitive science. Connectionist and Bayesian models; agent-based simulation. Emphasis upon using models in combination with empirical data to test theories. Appropriate use and critical evaluation of computational modeling as found in scientific publications. Recommendations:CS 10, 11, or equivalent programming experience in any computer language. An introductory course in statistics.				

144257	Deep Neural Networks			
Subject:	Catalog Nbr:			
CS	0137			
2024 FALL	Primary	Liping Liu	Liping.Liu@tufts.edu	
Deep neural networks and their applications including computer vision and natural language processing. Feed-forward, convolutional, and recurrent neural networks. Techniques for training deep neural networks, including optimization, regularization, and usage of related software. Recommendations: CS 135, MATH 42,				

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and MATH 70.

144258	Reinforcement Learning			
Subject:	Catalog Nbr:			
CS	0138			
2024 FALL	Primary	Jivko Sinapov		Jivko.Sinapov@tufts.edu
Agents that learn, plan, and act in complex, uncertain environments. Varying topics that may include practical successes and challenges of reinforcement learning; common software libraries and packages used to implement and test reinforcement learning algorithms, and advanced topics such as transfer learning and deep reinforcement learning. Recommendations: CS 131 and/or CS 135. Proficiency in one of C++, Java, or Python.				

144259	Special Topics in the Practice of Software Development			
Subject:	Catalog Nbr:			
CS	0156			
Special topics in the practice of software development. Please see departmental website for specific details and prerequisites.				

144264	Concurrent Programming			
Subject:	Catalog Nbr:			
CS	0021			
2024 SPRG	Primary	Mark Sheldon		Mark.Sheldon@tufts.edu
Shared memory concurrency including threads, locks, mutexes, semaphores, Deadlock, livelock, shared mutable state. Native concurrency including communicating processes, message send/receive, synchronous and asynchronous communication, isolated mutable state. Team project using students' choice of paradigm and topic. Recommendations: Two programming courses past CS 15.				

144461	Biothermodynamics			
Subject:	Catalog Nbr:			
BME	0012			
2023 SPRG	Primary	Nicholas Vanderslice		No Email on file.
2024 SPRG	Primary	Zheng Zhang		jonathan.zhang@tufts.edu
Fundamental concepts and principles of classical thermodynamics including the first law, the second law, enthalpy, entropy, free energy, equilibrium, and phase transitions. Applications of thermodynamics concepts to biologically important systems and processes such as chemical equilibrium, biomolecular binding, protein folding, oxygen transport, and enzyme kinetics.				
Recommendations: MATH 32, CHEM 2 or 12, or permission of instructor.				

Course Bulletin

144462	Bio-surfaces and Interfaces			
Subject:	Catalog Nbr:			
BME	0155			
2024 FALL	Primary	Zheng Zhang		jonathan.zhang@tufts.edu
Physical chemistry of biological surfaces and bio-synthetic interfaces including surface tension, surface free energy, adsorption, diffusion, bio-molecular interactions, chemical/mechanical/electrical aspects of cellular interfaces. Applications to biomedical engineering such as biosensing, immunostaining, drug design, tissue engineering, bioMEMS, and electrophysiology.				
Recommendations: BME 12, or permission of instructor.				

144464	Visual Programming for Biomedical Data Acquisition and Control			
Subject:	Catalog Nbr:			
BME	0164			
Use of computers and microprocessors to acquire data and control biomedical instruments. The focus of the course is on graphical programming using LabVIEW, MATLAB, GUIDE and Simulink. Elements of programming style. Data acquisition systems. Analog electronics for signal conditioning. Design of feedback control systems. Course project.				
Prerequisite: ES2 or COMP 11				

144481	Biomechanics: Solids and Fluids			
Subject:	Catalog Nbr:			
BME	0011			
2024 FALL	Primary	Brian Timko		Brian.Timko@tufts.edu
Solid and fluid mechanics as related to biological systems. Stress, strain, motion and constitutive relations; force, mass, and momentum balances; equilibrium, universal solutions and inflation; extension and torsion, beam bending and column buckling; nonlinear solid biomechanics methods; exact solutions for biologically relevant fluid flow; coupled solid-fluid problems. With demonstrations of methods for measuring mechanical properties of biological systems. Prerequisite: PHY11; Co-requisite: MATH 42				

144482	Biomedical Concepts at the Molecular, Protein and Cellular Scales I			
Subject:	Catalog Nbr:			
BME	0033			
2024 FALL	Primary	Madeleine Oudin		Madeleine.Oudin@tufts.edu
2024 FALL	Primary	Ying Luo		Ying.Luo@tufts.edu
First course of a two-course sequence on biomedical concepts at the molecular, protein and cellular level scales: nucleic acid structure and function, recombinant DNA techniques, genome sequencing, CRISPR gene editing, protein structure and function, regulation of protein expression, signal transduction, cellular receptors. Mix of didactic lectures, case studies, experimental/computational labs, and clinical/industrial				

Course Bulletin

presentations/visits.

Students may not receive credit for BME 33 and BIO 13, BME 162, or BME 163

Prerequisites or co-requisites: Chem 1 or Phy 11

144483	Biomedical Concepts at the Molecular, Protein and Cellular Scales II			
Subject: BME	Catalog Nbr: 0034			
2024 SPRG	Primary	Laura Place		Laura.Place@tufts.edu
2024 SPRG	Primary	Juan Gnecco		Juan.Gnecco@tufts.edu
Second course of a two-course sequence on biomedical concepts at the molecular, protein and cellular level scales: enzyme machinery and metabolism in cells, phage display, enzyme engineering, cellular structure and physiology, transport across membranes, cells acting alone and together in systems, stem cells, extracellular matrix, integrating cells into tissues, organs, and the body. Mix of didactic lectures, case studies, experimental/computational labs, and clinical/industrial presentations/visits. Students may not receive credit for both BME 34 and BME 175. Prerequisites: BME 33				

144499	Modern Optics and Photonics			
Subject: ES	Catalog Nbr: 0015			
2024 FALL	Primary	Giulia Guidetti		Giulia.Guidetti@tufts.edu
An introduction to the world of optics and the use of light today. Application of the underlying physics behind light propagation, processing, and detection to practical technological/engineering applications. Concepts include imaging, LEDs, lasers, microscopy, optical coding, fiber optics, information transfer, nanotechnology, and nano-optics. Prerequisites or co-requisites: PHY 12, or permission of instructor				

144604	Biomedical Concepts at the Tissue, Organ and Systems Scales I			
Subject: BME	Catalog Nbr: 0044			
2024 SPRG	Primary	Lauren Black III		Lauren.Black@tufts.edu
2024 SPRG	Primary	Laura Place		Laura.Place@tufts.edu
skin; feedback loops and controllers as applied to physiological homeostasis and control of cellular biochemical pathways; thermodynamics of chemical reactions and reaction kinetics as applied to enzymes; and sensor design & optimization as applied to skin sensors and the central nervous system. Applications to physiological homeostasis, modes of cell and tissue communication, the integumentary system, the immune system and the central nervous system. Instruction using a mix of didactic lectures, case studies, experimental/computational labs and clinical/industrial presentations/visits. Prerequisites: BME 33 or BIO 13				

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144605	Biomedical Concepts at the Tissue, Organ and Systems Scales II			
Subject: BME		Catalog Nbr: 0045		
2024 FALL		Primary	Lauren Black III	Lauren.Black@tufts.edu
2024 FALL		Primary	Ying Luo	Ying.Luo@tufts.edu
Mechanics of solids, lever systems and moments as applied to bones, joints and muscles; linear and nonlinear circuit theory as applied to computational models of the respiratory and cardiovascular systems; mechanics of fluid flow through pipes as applied to vessels and airways; work and thermodynamic cycles as applied to pressure-volume systems of the heart and lungs; and basic control systems theory as applied to regulation of mean arterial pressure in the cardiovascular system. Applications to the musculoskeletal system, motor neurons, the cardiovascular system, the respiratory system, the lymphatic system, metabolism, the renal system and the digestive system. Instruction using a mix of didactic lectures, case studies, experimental/computational labs and clinical/industrial presentations and visits. Prerequisites: BME 44				

144695	Graduate Internship in Chemical & Biological Engineering			
Subject:	Catalog Nbr:			
CHBE	0299			
2024 FALL	Primary	Ayse Asatekin	Ayse.Asatekin@tufts.edu	
2024 SPRG	Primary	Nikhil Nair	Nikhil.Nair@tufts.edu	
2024 SUMR	Primary	Matthew Panzer	Matthew.Panzer@tufts.edu	
Study of approved topics in Chemical & Biological Engineering in concert with an internship in engineering outside the University. Requires department approval.				

144696	Nano Course		
Subject:	Catalog Nbr:		
ME	0090		
Focused study of a selected engineering topic such as an engineering skill, method, or software package. Cannot be counted toward the BSME Major Requirement.			

144697	Biomolecular Engineering and Design			
Subject:	Catalog Nbr:			
CHBE	0165			
2024 SPRG	Primary	James Van Deventer	James.Van_Deventer@tufts.edu	
Protein and nucleic acid engineering and design for applications in basic research, diagnostic and therapeutic development, and sustainable chemical production. Methods and theory including directed evolution, high throughput screening, antibody engineering, genetic code manipulation, nucleic acid nanotechnology, and computational strategies.				

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144897	Essentials of Technology Strategy			
Subject:	Catalog Nbr:			
EM	0201			
2024 SPRG	Primary	Samuel Ligero	Samuel.Ligero@tufts.edu	
Elements of technology strategy including portfolio management, development of product/technology roadmaps, product lifecycles, new product development stage gate processes, and intellectual property. Focus on disruptive, incremental, sustaining and breakthrough innovations.				

144898	Leadership: Personal Development				
Subject:		Catalog Nbr:			
EM		0202			
2024 SPRG		Primary	Jerome Brightman	Jerome.Brightman@tufts.edu	
Individual leadership development to lead effective teams and organizations. Focus on techniques for developing ethical and empathetic leaders.					

144899	Building Financial Intelligence			
Subject:	Catalog Nbr:			
EM	0203			
2024 SPRG	Primary	Frank Apeseche	Frank.Apeseche@tufts.edu	
Development, analysis, and communication of financial aspects of a company’s product or service and the impact on the health and competitiveness of the firm.				

144900	Customer Discovery and Solution Design				
Subject:		Catalog Nbr:			
EM		0204			
2024 SPRG		Primary	Hannah Lippe	Hannah.Lippe@tufts.edu	
2024 SPRG		Primary	Bennett Baldwin	Bennett.Baldwin@tufts.edu	
Identification of target customers and discovery of solutions to unmet needs. The use of tools to systematically generate and sort diverse options to create products and solve customers' needs.					

144901	Milestone Project: New Product & Service Development			
Subject:	Catalog Nbr:			
EM	0205			
2024 SUMR	Primary	Paul Klein	Paul.Klein@tufts.edu	
Team project to develop business plan for a new product or service and apply learning from the first core components of the MSEM Online Program.				
Prerequisites EM-201, EM-202, EM-203, EM-204				

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144902	Introduction to Data Analytics			
Subject:	Catalog Nbr:			
EM	0206			
2024 SPRG	Primary	Kishore Pochampally	Kishore.Pochampally@tufts.edu	
Data identification, analysis and interpretation to drive strategic and operational success in technology-based companies. Data-based decisions with uncertain or ambiguous conditions, and development of models for decision-making in a business setting.				

144903	Solving Complex Problems through Systems Thinking			
Subject:	Catalog Nbr:			
EM	0207			
2024 SPRG	Primary	James Nash	James.Nash@tufts.edu	
Interconnected complex systems considering human, political, community, resource, environmental, and social processes. Application of insights from structural influences to maximize impact and solve problems.				

144904	Program and Project Management			
Subject: EM		Catalog Nbr: 0208		
2024 SPRG		Primary	Kishore Pochampally	Kishore.Pochampally@tufts.edu
Methodologies, tools, and strategies for managing projects and portfolios of projects (programs).				

144905	Leadership: Driving and Managing Change			
Subject:	Catalog Nbr:			
EM	0209			
2023 FALL	Primary	Jerome Brightman	Jerome.Brightman@tufts.edu	
Management of uncertainty and complexity in the presence of constant change. Application of conflict management and negotiation to manage large and diverse groups through change resulting from internal and external forces. Pre-requisites EM 201, EM 202, EM 203, EM 204				

144906	Teaching Computer Science			
Subject:	Catalog Nbr:			
CS	0004			
2024 FALL	Primary	Megan Monroe	Megan.Monroe@tufts.edu	
Mechanics of teaching, reviewing, and evaluating computer science coursework. Constructive question answering, grading with consistency, and creating an inclusive and welcoming environment. Enrolled students must be undergraduate teaching assistants for Computer Science classes.				

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144907	Cyber-Security and Cyber-Warfare			
Subject:	Catalog Nbr:			
CS	0028			
2024 SPRG	Primary	Jeffrey Taliaferro		jeff.taliaferro@tufts.edu
2024 SPRG	Primary	Ming Chow		ming.chow@tufts.edu
An interdisciplinary analysis of cybersecurity and cyberwar in the United States and other countries. Policymaking and intelligence aspects of cybersecurity and political science and the technical constraints of computer networks and software. Exploit methods including packet analysis, password cracking, social engineering, reconnaissance, and malware analysis. State-backed and non-state actors engaged in cyber-espionage, counterintelligence, deterrence, and offensive cyber-operations. Prerequisites: Political Science 61 or Computer Science 11.				

144908	Probabilistic Robotics for Human-Robot Interaction			
Subject:	Catalog Nbr:			
CS	0141			
2024 SPRG	Primary	Jivko Sinapov		Jivko.Sinapov@tufts.edu
Techniques for probabilistic state estimation and their application to problems such as robot localization, mapping, perception, and planning in the context of Human-Robot Interaction. Machine learning and computer vision techniques commonly used by robots interacting with humans. Recommendations: Proficiency in C/C++ or Python				

144909	Computational Systems Biology			
Subject:	Catalog Nbr:			
CS	0166			
2024 SPRG	Primary	Soha Hassoun		soha.hassoun@tufts.edu
Computational modeling of complex biological systems to analyze their emergent properties and understand or predict system behavior. Molecular and protein modeling in the context of biochemical networks. Application of these models across a select set of applications such as metabolomics, gut microbiome analysis, modularity analysis, flux balance analysis, and biological discovery. Introductions to machine learning, linear systems, and statistical concepts that are commonly used in systems biology.				

144944	Actionable Engineering Diplomacy			
Subject:	Catalog Nbr:			
ES	0100			
2024 FALL	Primary	Shafiqul Islam		Shafiqul.Islam@tufts.edu
Approaches that leverage tools and techniques from complexity science with negotiation theory for use in solving practical problems with societal relevance. Systems thinking, policy relevance and effective implementation within the context of nonlinearity, uncertainty, and unpredictability associated with coupled natural,				

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engineered, and human systems. Integration of numbers and narratives to create actionable technological solutions with a problem-driven strategy.

Prerequisite: MATH 34 or graduate standing

Recommendations: ES 2 or COMP11, Probability and Statistics

144945	Bioelectricity	
Subject:	Catalog Nbr:	
EE	0123	
(Cross-listed with BME 123) Fundamental physical basis of bioelectricity; understanding its role in various living organisms. Action-potential creation and transmission in the nervous system. Analysis of the heart as a distributed, highly fault-tolerant electrical system. Potential bioelectrical role in morphogenesis (creation of bodily shape). Application of engineering concepts to understand molecular processes associated with bioelectricity.		
Prerequisites: MATH 42 and (PHY 12 or ES 3), or graduate standing		

144946	Digital Design Verification			
Subject: EE		Catalog Nbr: 0165		
2024 FALL		Primary	Joel Grodstein	Joel.Grodstein@tufts.edu
(Cross-listed as CS 147) Verification of digital hardware designs at the Register-Transfer Level (RTL) using System Verilog. Types of verification: formal vs. simulation-based; random vs. targeted; full-chip vs. unit-level; pre-silicon vs. post-silicon. Standardized frameworks: Universal Verification Methodology (UVM). Assertion-based checking, equivalence checking.				
Prerequisites: EE 25 or EE 126 or graduate standing.				

144947	Digital IC Design using FPGAs			
Subject: EE		Catalog Nbr: 0166		
2024 FALL		Primary	Marco Donato	Marco.Donato@tufts.edu
Complete design of a digital integrated circuit. Register-transfer-level design, presilicon verification and timing analysis, test/debug logic insertion, fabrication (via Field-Programmable Gate Array) and post-silicon verification of a full digital design.				
Prerequisites: EE 25 or EE 126 or graduate standing				

144952	Directed Study			
Subject: DS		Catalog Nbr: 0093		
2023 SPRG		Primary	Samuel Guyer	Samuel.Guyer@tufts.edu
2023 SPRG		Primary	Bert Huang	No Email on file.

Course Bulletin

2023 SPRG	Primary	Antonella Di Lillo	No Email on file.
2024 FALL	Primary	Robert Jacob	jacob@cs.tufts.edu
2024 FALL	Primary	Alva Couch	alva.couch@tufts.edu
2024 FALL	Primary	Soha Hassoun	soha.hassoun@tufts.edu
2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu
2024 FALL	Primary	Megumi Ando	Megumi.Ando@tufts.edu
2024 FALL	Primary	Ming Chow	ming.chow@tufts.edu
2024 FALL	Primary	Lenore Cowen	lenore.cowen@tufts.edu
2024 FALL	Primary	Donna Slonim	Donna.Slonim@tufts.edu
2024 FALL	Primary	Remco Chang	Remco.Chang@tufts.edu
2024 FALL	Primary	Matthias Scheutz	Matthias.Scheutz@tufts.edu
2024 FALL	Primary	Noah Mendelsohn	Noah.Mendelsohn@tufts.edu
2024 FALL	Primary	Mark Sheldon	Mark.Sheldon@tufts.edu
2024 FALL	Primary	Fahad Dogar	Fahad.Dogar@tufts.edu
2024 FALL	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu
2024 FALL	Primary	Megan Monroe	Megan.Monroe@tufts.edu
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 FALL	Primary	Liping Liu	Liping.Liu@tufts.edu
2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu
2024 FALL	Primary	Susan Landau	Susan.Landau@tufts.edu
2024 FALL	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu
2024 FALL	Primary	Michael Hughes	Michael.Hughes@tufts.edu
2024 FALL	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
2024 FALL	Primary	Elaine Short	Elaine.Short@tufts.edu
2024 FALL	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu
2024 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu
2024 FALL	Primary	Richard Townsend	Richard.Townsend@tufts.edu
2024 FALL	Primary	Abani Patra	Abani.Patra@tufts.edu
2024 FALL	Primary	Daniel Votipka	Daniel.Votipka@tufts.edu
2024 FALL	Primary	David Lillethun	David.Lillethun@tufts.edu
2024 FALL	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu
2024 FALL	Primary	Johes Bater	Johes.Bater@tufts.edu
Guided study of an approved topic. Please see departmental website for specific details.			

144953	Internship in Data Science		
Subject:	Catalog Nbr:		
DS	0099		
2024 SUMR	Primary	Alva Couch	alva.couch@tufts.edu
Study of approved topics in Data Science in concert with an internship in computing or a related field.			
Prerequisites: Permission of instructor.			

144954	Directed Study		
Subject:	Catalog Nbr:		

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DS	0193			
	2023 SPRG	Primary	Samuel Guyer	Samuel.Guyer@tufts.edu
	2023 SPRG	Primary	Bert Huang	No Email on file.
	2023 SPRG	Primary	Antonella Di Lillo	No Email on file.
	2024 FALL	Primary	Ethan Danahy	ethan.danahy@tufts.edu
	2024 FALL	Primary	Robert Jacob	jacob@cs.tufts.edu
	2024 FALL	Primary	Alva Couch	alva.couch@tufts.edu
	2024 FALL	Primary	Soha Hassoun	soha.hassoun@tufts.edu
	2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu
	2024 FALL	Primary	Megumi Ando	Megumi.Ando@tufts.edu
	2024 FALL	Primary	Ming Chow	ming.chow@tufts.edu
	2024 FALL	Primary	Lenore Cowen	lenore.cowen@tufts.edu
	2024 FALL	Primary	Peter Love	Peter.Love@tufts.edu
	2024 FALL	Primary	Donna Slonim	Donna.Slonim@tufts.edu
	2024 FALL	Primary	Remco Chang	Remco.Chang@tufts.edu
	2024 FALL	Primary	Matthias Scheutz	Matthias.Scheutz@tufts.edu
	2024 FALL	Primary	Kathleen Fisher	Kathleen.Fisher@tufts.edu
	2024 FALL	Primary	Noah Mendelsohn	Noah.Mendelsohn@tufts.edu
	2024 FALL	Primary	Mark Sheldon	Mark.Sheldon@tufts.edu
	2024 FALL	Primary	Fahad Dogar	Fahad.Dogar@tufts.edu
	2024 FALL	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu
	2024 FALL	Primary	Megan Monroe	Megan.Monroe@tufts.edu
	2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
	2024 FALL	Primary	Liping Liu	Liping.Liu@tufts.edu
	2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu
	2024 FALL	Primary	Susan Landau	Susan.Landau@tufts.edu
	2024 FALL	Primary	Karen Edwards	Karen.Edwards@tufts.edu
	2024 FALL	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu
	2024 FALL	Primary	Michael Hughes	Michael.Hughes@tufts.edu
	2024 FALL	Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
	2024 FALL	Primary	Elaine Short	Elaine.Short@tufts.edu
	2024 FALL	Primary	Raja Sambasivan	Raja.Sambasivan@tufts.edu
	2024 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu
	2024 FALL	Primary	Richard Townsend	Richard.Townsend@tufts.edu
	2024 FALL	Primary	Abani Patra	Abani.Patra@tufts.edu
	2024 FALL	Primary	Daniel Votipka	Daniel.Votipka@tufts.edu
	2024 FALL	Primary	David Lillethun	David.Lillethun@tufts.edu
	2024 FALL	Primary	Saeed Mehraban	Saeed.Mehraban@tufts.edu
	2024 FALL	Primary	Johes Bater	Johes.Bater@tufts.edu

Guided study of an approved topic. Please see departmental website for specific details.

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Internship In Data Science

Subject: Catalog Nbr:
DS 0299

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2024 FALL	Primary	Alva Couch	alva.couch@tufts.edu
Study of approved topics in Computer Science in concert with an internship in computing or a related field outside the University. Prerequisites: Permission of instructor			

145048	Structural Reliability		
Subject:	Catalog Nbr:		
CEE	0227		
Methods of structural reliability analysis based on the theory of probability. Probability of failure of a limit-state function for a structural system at a given performance level.			
Recommendation: ES56 or equivalent			

145049	Network Science	
Subject:	Catalog Nbr:	
CS	0142	
Methods for analyzing massive graphs and networks that arise from social networks and biological networks. Scalable methods for classification, clustering, centrality, and inference on real-world example datasets. Specialized methods for social networks including link prediction, spread of influence, and emergent communities. Page rank in networks of web pages. Term project to identify a network science problem and test solutions on a real-world dataset. Recommendations: MATH 70 or 72 or CS 135 or 160.		

145050	Seminar in Computer Science		
Subject: CS	Catalog Nbr: 0291		
2023 SPRG	Primary	Elaine Short	Elaine.Short@tufts.edu
2023 SPRG	Primary	Jennifer Mooney	No Email on file.
2024 FALL	Primary	Diane Souvaine	Diane.Souvaine@tufts.edu
2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu
2024 FALL	Primary	Sandra Schulenburg	Sandra.Schulenburg@tufts.edu
A weekly seminar with guest speakers discussing research challenges and recent advances in Computer Science. Pass/fail only. Satisfactory completion requires students attend and provide feedback for at least 50% of the seminars.			

145051	Introduction to Circuits and Electronics		
Subject: EE	Catalog Nbr: 0020		
2024 FALL	Primary	Sameer Sonkusale	sameer@ece.tufts.edu
Definitions of circuit elements, fundamental laws, selected network theorems, controlled sources, energy and			

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power, response of first order circuits, operational amplifiers, semiconductor materials and doping, diodes, MOS field effect transistors, MOS logic circuits, oscilloscope, measurements and instrumentation, computer-aided circuit analysis and design. Associated laboratory project work. Recommendations: MATH 34

145052	Computer Organization			
	Subject:	Catalog Nbr:		
	EE	0025		
	2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu
(Cross-listed w/ CS 45) Computer organization including performance measurement, instruction set architectures, digital arithmetic, processor datapath, control, pipelining, memory hierarchy, caches and input/output. Prerequisite: ES 4				

145080	Non Major Credit			
	Subject:	Catalog Nbr:		
	DS	0310		

145081	Lower Level Elective Crd			
	Subject:	Catalog Nbr:		
	DS	0320		

145082	Upper Level Elective Crd			
	Subject:	Catalog Nbr:		
	DS	0330		

145083	Tufts Abroad Program			
	Subject:	Catalog Nbr:		
	DS	0340		

145084	Masters Degree Cont.			
	Subject:	Catalog Nbr:		
	DS	0401		
Part-time.Please see departmental website for specific details.				

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145085	Masters Degree Continuation
Subject: DS	Catalog Nbr: 0402
Full-time. Please see departmental website for specific details.	

145087	Grad Teaching Assistant
Subject: DS	Catalog Nbr: 0405

145088	Grad Research Assistant
Subject: DS	Catalog Nbr: 0406

145155	BME Graduate Project			
Subject:	Catalog Nbr:			
BME	0290			
2024 FALL	Primary	David Kaplan	david.kaplan@tufts.edu	
2024 FALL	Primary	Sergio Fantini	sergio.fantini@tufts.edu	
2024 FALL	Primary	Irene Georgakoudi	Irene.Georgakoudi@tufts.edu	
2024 FALL	Primary	Lorin Polidora	Lorin.Polidora@tufts.edu	
2024 FALL	Primary	Fiorenzo Omenetto	Fiorenzo.Omenetto@tufts.edu	
2024 FALL	Primary	Lauren Black III	Lauren.Black@tufts.edu	
2024 FALL	Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu	
2024 FALL	Primary	Brian Timko	Brian.Timko@tufts.edu	
2024 FALL	Primary	Madeleine Oudin	Madeleine.Oudin@tufts.edu	
2024 FALL	Primary	Srivalleesha Mallidi	Srivalleesha.Mallidi@tufts.edu	
2024 FALL	Primary	Juan Gnecco	Juan.Gnecco@tufts.edu	
2024 FALL	Primary	Nisha Iyer	Nisha.Iyer@tufts.edu	
Execution of a major, graduate project under the guidance of a faculty adviser. Each project must address a substantive engineering analysis or design problem. Students are required to submit a written report and make an oral presentation of their project work. Students are expected to enroll in this course in the last term of their degree program.				

145184	Data Science for Sustainability
Subject: CEE	Catalog Nbr: 0132
(Cross-listed w/ DS 143 and ME 173). Emerging topics in data science and statistical learning with applications	

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to the three pillars of sustainability (environmental, economic, and social). Building, estimating and interpreting models used in energy and environmental decision-making with emphasis on social justice. Development of critical consumers and responsible producers of data-driven analysis through: learning a suite of data-driven modeling and prediction tools; building the programming and computing expertise to use those tools; and, developing the ability to formulate analyses to answer questions pertaining to sustainability.

145246	Data Science for Sustainability		
Subject:		Catalog Nbr:	
DS		0143	
(Cross-listed w/ CEE 0132 and ME 173). Emerging topics in data science and statistical learning with applications to the three pillars of sustainability (environmental, economic, and social). Building, estimating and interpreting models used in energy and environmental decision-making with emphasis on social justice. Development of critical consumers and responsible producers of data-driven analysis through: learning a suite of data-driven modeling and prediction tools; building the programming and computing expertise to use those tools; and, developing the ability to formulate analyses to answer questions pertaining to sustainability.			

145247	Data Science for Sustainability	
	Subject: ME	Catalog Nbr: 0173
(Cross-listed w/ CEE 0132 and DS 143). Emerging topics in data science and statistical learning with applications to the three pillars of sustainability (environmental, economic, and social). Building, estimating and interpreting models used in energy and environmental decision-making with emphasis on social justice. Development of critical consumers and responsible producers of data-driven analysis through: learning a suite of data-driven modeling and prediction tools; building the programming and computing expertise to use those tools; and, developing the ability to formulate analyses to answer questions pertaining to sustainability.		

145287	Programming for Data Science			
Subject: CS		Catalog Nbr: 0030		
2024 FALL		Primary	Benjamin Stubbs	Benjamin.Stubbs@tufts.edu
Fundamentals of programming for data-intensive science. Data structures and algorithms for data manipulation, cleaning, and preparation. Design of data manipulation programs. Coding standards and practices. Use and creation of software libraries. Techniques for improving program performance. Examples drawn from data preparation and transformation, statistical data analysis, machine learning, deep learning, and deep data science including recommendation systems and trend analysis.				

145288	Cyber for Future Policymakers			
Subject: CS		Catalog Nbr: 0201		
2024 FALL		Primary	David Lillethun	David.Lillethun@tufts.edu

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(Cross-listed w/ DHP D291) Graduate version of CS 12. Relevance of computer technologies to policy development. Internet architecture and basic networking, the Web, cloud architectures, cryptography, security and privacy, artificial intelligence and machine learning, and open-source systems. Developing technologies, including quantum computing and post-quantum cryptography.

Prerequisites: Graduate standing in a discipline other than Computer Science, Data Science, Bioinformatics, Cognitive Science, or Human-Robot Interaction.

Recommendation: An introductory course in computer science including programming in any language, roughly equivalent to CS 10 or 11.

145289	How Systems Work			
Subject: CS		Catalog Nbr: 0202		
2024 FALL		Primary	Mark Sheldon	Mark.Sheldon@tufts.edu
2024 FALL		Primary	Jared Chandler	Jared.Chandler@tufts.edu
(Cross-listed w/ DHP D292) Graduate version of CS 13. How computing systems work: bits, bytes, the representation of information, the CPU, assembly language, programming languages. Networking: including peering, packets, and the Internet. Algorithms and the fundamental limitations of computing. Recommendations: An introductory course in computer science including programming in any language, roughly equivalent to CS 10 or 11.				

145290	How Systems Fail			
Subject: CS		Catalog Nbr: 0203		
2023 SPRG		Primary	Milod Kazerounian	Milod.Kazerounian@tufts.edu
2024 SPRG		Primary	David Lillethun	David.Lillethun@tufts.edu
(Cross-listed w/ DHP D293) Graduate version of CS 27. Failure of computer systems within the larger context of complex systems, including the power grid and aviation. Failures of algorithms and protocols, engineering and implementation, systems and applications, people and culture. Attacks, attack recovery, security, privacy, and attribution. Case studies of failures and attacks, including distributed denial of service, Meltdown, Spectre, and spear-phishing attacks.				

145292	Graduate Internship in Mechanical Engineering			
Subject: ME		Catalog Nbr: 0299		
2024 FALL		Primary	Behrouz Abedian	behrouz.abedian@tufts.edu
2024 FALL		Primary	Mark Kachanov	mark.kachanov@tufts.edu
2024 FALL		Primary	Anil Saigal	anil.saigal@tufts.edu
2024 FALL		Primary	Chris Rogers	chris.rogers@tufts.edu
2024 FALL		Primary	Daniel Hannon	Dan.Hannon@tufts.edu
2024 FALL		Primary	Douglas Matson	Douglas.Matson@tufts.edu
2024 FALL		Primary	Gary Leisk	Gary.LEISK@tufts.edu
2024 FALL		Primary	Robert White	R.White@tufts.edu

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2024 FALL	Primary	Kristen Wendell	Kristen.Wendell@tufts.edu
2024 FALL	Primary	Jason Rife	Jason.Rife@tufts.edu
2024 FALL	Primary	Marc Hodes	Marc.Hodes@tufts.edu
2024 FALL	Primary	Luisa Chiesa	Luisa.Chiesa@tufts.edu
2024 FALL	Primary	Igor Sokolov	Igor.Sokolov@tufts.edu
2024 FALL	Primary	Jeffrey Guasto	Jeffrey.Guasto@tufts.edu
2024 FALL	Primary	Erica Kemmerling	Erica.Kemmerling@tufts.edu
2024 FALL	Primary	James Intriligator	James.Intriligator@tufts.edu
2024 FALL	Primary	Deborah Sunter	Deborah.Sunter@tufts.edu
2024 FALL	Primary	Jivko Sinapov	Jivko.Sinapov@tufts.edu
2024 FALL	Primary	Hoda Koushyar	Hoda.Koushyar@tufts.edu
2024 FALL	Primary	Matthew Woodward	Matthew.Woodward@tufts.edu
2024 FALL	Primary	Elaine Short	Elaine.Short@tufts.edu
2024 FALL	Primary	Felix Huang	Felix.Huang@tufts.edu
2024 FALL	Primary	Abani Patra	Abani.Patra@tufts.edu
2024 FALL	Primary	Greses Perez	Greses.Perez@tufts.edu
2024 FALL	Primary	Trevion Henderson	Trevion.Henderson@tufts.edu
2024 SPRG	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu
2024 SPRG	Primary	Michael Wiklund	michael.wiklund@tufts.edu
2024 SPRG	Primary	Pratap Misra	Pratap.Misra@tufts.edu
2024 SPRG	Primary	Briana Bouchard	Briana.Bouchard@tufts.edu
2024 SPRG	Primary	Dave Miller	Dave.Miller@tufts.edu

A mentored preprofessional experience in mechanical engineering at an off-site organization. The department will grant course credit for internships if the following conditions are met: 1) The student submits a written internship proposal that is approved by the department prior to the semester in which the internship will be performed (no internships with course credit will be approved once the semester of the internship has started), 2) a faculty mentor has supervisory control of any work that receives credit, and 3) a written report is submitted that will be evaluated by the faculty adviser and the outside institutional supervisor.
Prerequisite: Graduate Standing and Permission of Department.

145297	Privacy in the Digital Age		
Subject: CS	Catalog Nbr: 0183		
2023 SPRG	Primary	David O'Brien	David.O_brien658468@tufts.edu
(Cross-listed with DHP P237) This module will provide an introduction to the threats to and protections for privacy in the digital age, examining public and private sector threats, and looking at issues from an international point of view. Topics to be covered include privacy threat models, location tracking and first and third party collection by private parties, government threats to privacy, and privacy protective technologies. No programming background needed, but a willingness and interest to play with digital tools is required.			

145371	Bioelectricity
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Subject: BME	Catalog Nbr: 0123
(Cross-listed with EE 123) Fundamental physical basis of bioelectricity; understanding its role in various living organisms. Action-potential creation and transmission in the nervous system. Analysis of the heart as a distributed, highly fault-tolerant electrical system. Potential bioelectrical role in morphogenesis (creation of bodily shape). Application of engineering concepts to understand molecular processes associated with bioelectricity. Prerequisites: MATH 42 and (PHY 12 or ES 3), or graduate standing	

145373	Introduction To Biophotonics
Subject: EE	Catalog Nbr: 0151
(cross-listed as BME 151 and MSE151) Basic concepts in electromagnetism and light matter interactions, including optical properties, absorption, near-infrared, light scattering and fluorescence spectroscopy, microscopy, optical coherence tomography and photodynamic therapy and their relevance to human disease diagnostic and therapeutic applications.	

145374	Graduate Introduction To Biophotonics
Subject: EE	Catalog Nbr: 0253
2023 SPRG	Primary Irene Georgakoudi Irene.Georgakoudi@tufts.edu
(Cross-listed w/ BME 251 & EE 253) A graduate-level version of BME 51. Additional homework problems and a term paper are required for graduate level credit. Recommendations: PHY 31, or BME 215, or permission of instructor. Graduate students only.	

145380	Tufts Transformative Leadership Community
Subject: UCW	Catalog Nbr: 0030
2023 FALL	Primary Monica Pheifer Monica.Pheifer@tufts.edu
2023 SPRG	Primary Warren Hilton Warren.Hilton@tufts.edu
The workshops described below are offered as part of Tufts Transformative Leadership Community, a go-to resource for learning, advice and thought-provoking experiences that support your growth as a leader throughout your career.	

145436	Introduction to Music Engineering
Subject: ES	Catalog Nbr: 0062
2024 FALL	Primary Daniel Fox Daniel.Fox@tufts.edu
Interdisciplinary course in the science, engineering and technology of music - from creation, to propagation, to reception. Demonstrations, discussion, and interactive projects. Physics of sound. Acoustic and electronic	

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musical instrument design. Room acoustics. Sound production and recording. Human perception of sound.

145437	Special Topics in Engineering Management				
Subject:	Catalog Nbr:				
EM	0193				
2024 FALL	Primary	Ronald Lasser	Ron.Lasser@tufts.edu		
Special Topics in Engineering Management					

145438	Advanced Topics in Data Analytics			
Subject:	Catalog Nbr:			
EM	0213			
2023 FALL	Primary	Kishore Pochampally	Kishore.Pochampally@tufts.edu	
Use of established software frameworks to support applied projects in data science. Topics include: PyMC3, PySpark, NLP tools, PyTorch, TensorFlow, Keras, Flask and Docker.				
Pre-requisite EM206 or instructor consent.				

145439	Modern Product Management				
Subject:		Catalog Nbr:			
EM		0222			
2024 SUMR		Primary	Warren Hilton	Warren.Hilton@tufts.edu	
Basic product management processes from ideation through launch. Topics include stakeholder mapping, standard taxonomy, customer workflows, business stage and strategy evaluation, metrics and evaluation of a product, and communication skills for product managers.					

145440	Advanced Topics In Product Management				
Subject:		Catalog Nbr:			
EM		0223			
2024 SPRG		Primary	Warren Hilton	Warren.Hilton@tufts.edu	
Pressing topics in the product process including pricing, go-to market acceleration, building and ecosystem and lifecycle management.					
Pre-requisite: EM222 or instructor consent					

145441	Creativity and Innovation				
Subject:	Catalog Nbr:				
EM	0224				
2024 SUMR	Primary	Jerome Brightman	Jerome.Brightman@tufts.edu		
Foundations for creativity and innovation that can be used in a variety of business and technical roles. Topics					

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include: self-awareness, mental models, influence of organizational culture on creativity and innovation, and systems thinking for creativity.

145442	Supply Chain and Operations Management			
Subject: EM		Catalog Nbr: 0232		
2024 SPRG		Primary	Gerald Brown	Gerald.Brown@tufts.edu
Basic supply chain and operations functions such as sourcing, materials management, operations planning, distribution, logistics, retail, demand forecasting, and order fulfillment.				

145443	Marketing: Branding and Strategy			
Subject: EM		Catalog Nbr: 0243		
2023 FALL		Primary	Marci Sapers	Marci.Sapers@tufts.edu
Overview of what makes brands successful including proven “Brand Building Frameworks”. Development of key elements needed to write strong brand positioning statements and pragmatic skills to market products and/or services in corporate environments.				

145444	Introduction to Management Consulting			
Subject: EM		Catalog Nbr: 0244		
2023 FALL		Primary	Partha Ghosh	Partha.Ghosh@tufts.edu
Problem-solving frameworks and analytical techniques used to make strategic choices between business models and technologies with different risk profiles. Topics include: strategies for analyzing complex problems, strategic management of corporate and business units, effective communication and storytelling.				

145457	Network Security			
Subject: CS		Catalog Nbr: 0114		
2024 SPRG		Primary	Daniel Votipka	Daniel.Votipka@tufts.edu
Vulnerabilities, attacks, and mitigations at all layers of the network stack. Public and private key cryptography, confidentiality and authentication protocols, botnets, firewalls, intrusion detection systems, and communication privacy and anonymity. Recommendations: CS 40.				

145458	Visual Analytics		
Subject:	Catalog Nbr:		
CS	0178		

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2023 SPRG	Primary	Remco Chang	Remco.Chang@tufts.edu
The science of combining interactive visual interfaces with data science, machine learning, and AI algorithms to support analytical reasoning. Principles, approaches, and tools for deriving insight from large, dynamic, ambiguous, and often conflicting data, and communicating findings effectively to aid in decision-making. Theoretical foundations illustrated via applying and developing visual analytics tools, as well as evaluating the effectiveness of these tools. Recommendations: CS 20 or 120.			

145460	Master of Science Capstone Project II		
Subject:	Catalog Nbr:		
CS	0289		
2024 FALL	Primary	Ming Chow	ming.chow@tufts.edu
2024 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu
Part two of a two-course, hands-on, project-based culmination experience for the Master of Science in Computer Science Online program. Implementation of the project defined in part one, including use of principles, tools, and strategies for implementation, debugging, testing, documentation, maintenance, and release management. Presentation of final project results and documentation. To be taken in the last term of the Master of Science in Computer Science Online degree. Not available to students outside that program. Prerequisites: CS 288, and enrollment in the Master of Science in Computer Science Online program.			

145465	Cyberlaw and Cyberpolicy		
Subject:	Catalog Nbr:		
CS	0184		
(Cross-listed w/ ILO 184) The complex legal issues of cyberspace, including the effect of the Digital Revolution on existing laws concerning wiretapping, copyright, and espionage; influence of the Digital Revolution on First, Fourth, and Fifth Amendment law; failure and solutions of copyright in the Digital Age; failures and limitations of the Computer Fraud and Abuse Act, and function of the Law of Armed Conflict. Focus is placed on U.S. law and jurisprudence, with some consideration of international perspectives. Recommendations: familiarity with Internet systems and/or law and policy			

145477	Computational Models in Cognitive Science		
Subject:	Catalog Nbr:		
PSY	0141		
2024 FALL	Primary	Johannes De Ruiter	jp.deruiter@tufts.edu
(Cross-listed w/ CS 134) Scientific logic of using computational models for testing theories in cognitive science. Connectionist and Bayesian models; agent-based simulation. Emphasis upon using models in combination with empirical data to test theories. Appropriate use and critical evaluation of computational modeling as found in scientific publications. Recommendations: CS 10, 11, or some programming experience.			

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145487	Cyber in the Civilian Sector: Threats and Upheavals			
Subject:	Catalog Nbr:			
CS	0182			
2024 FALL	Primary	Josephine Wolff		Josephine.Wolff@tufts.edu
(Cross-listed w/ DHP P236) There is a myth that the Internet erases borders. But as Internet companies' ability to place localized ads show, that's false. What's more accurate is that the Internet complicates a nation's ability to control of the flow of information within its borders. (This is not a new challenge for sovereign nations; consider the telegraph.) This fluidity has created great economic opportunity and simplified trans-border access, the latter potentially threatening security and other basic state functions. With bits increasingly controlling the world around us, the Digital Revolution poses a highly disruptive threat. In this course, we'll explore cyber clashes in the civilian sector: from jurisdictional issues and the challenges posed by new technologies to criminal activities and impacts on civil infrastructures. While several of the topics are also covered in International Cyber Conflict: An Introduction to Power and Conflict in Cyberspace, DHP P249, the intersection between the two courses will be relatively minimal. Cyber in the Civilian Sector will have a greater focus on technology and, naturally enough, on the civilian, as opposed to national security, side of the house.				

145497	Cellular Agriculture & Biofabricated Foods			
Subject:	Catalog Nbr:			
BME	0173			
2024 FALL	Primary	David Kaplan		david.kaplan@tufts.edu
(Cross-listed as NUTR 253) Introduction to the concepts of cellular agriculture, food science and the use of biotechnology in food production. Laboratory experience in cell culture and biomaterials processing from cell isolation to generation of in vitro meat using tissue engineering techniques. Course culminates in a scientific, creative proposal based on student interests.				

145498	Cellular Agriculture & Cultured Meat Lab			
Subject:	Catalog Nbr:			
BME	0174			
2023 SPRG	Primary	David Kaplan		david.kaplan@tufts.edu
2024 SPRG	Primary	Jake Marko		Jake.Marko@tufts.edu
Scientific process of producing meat from cell culture (termed "cultured meat"). Cell isolations and cell culture, cell analysis (such as immunostaining), and various food science analyses (of texture, flavor, etc.). Distinctions between biomedical engineering for food and biomedical engineering for medicine, demonstration of key areas of research that are needed to advance the field of cellular agriculture. Recommendation: BME 0173				

145499	BME Entrepreneurship & Strategy			
Subject:	Catalog Nbr:			
BME	0184			

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2023 SPRG	Primary	Bryce Klontz	No Email on file.
2024 SPRG	Primary	Janet Krevolin	Janet.Krevolin@tufts.edu
Translational research, strategic business planning, and inter-functional leadership critical to the successful development of biomedical innovation. Conceptual development through commercialization of a med-tech product. Establishes a foundation upon which one can evaluate opportunities, formulate a business plan, identify executable steps towards a commercialization goal. Recommendations: Junior, Senior, Graduate standing			

145500	Applied Probability Theory		
Subject: CEE	Catalog Nbr: 0201		
2023 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu
Foundational treatment of probability theory with a focus on science and engineering applications. Elements of probability theory, random variables and their properties, probability distributions: discrete and continuous, conditional probability, joint distributions, derived distributions, laws of large numbers and reality of small numbers, properties of estimators, and estimation of confidence intervals. Emphasis on analysis and implications of small data, data from skewed and fat-tail distributions commonly used in risk analysis and engineering decision making. Recommendation: Undergraduate Level Probability & Statistics and Coding Experience			

145501	Data Analysis and Statistical Methods		
Subject: CEE	Catalog Nbr: 0202		
2023 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu
Exploratory data analysis, descriptive statistics, representativeness of samples, inferential statistics, statistical estimation, sampling distributions of estimators, residual analysis, and confidence intervals. Recommendation: CEE201			

145502	Statistical Inferences and Prediction		
Subject: CEE	Catalog Nbr: 0203		
2024 SPRG	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu
Foundational treatment of statistical inference and prediction methods with a focus on science and engineering applications. Frequentist and Bayesian statistical tests and inference, linear and multi-linear regression, logistic regression, regression versus classification, and clustering. Emphasis on analysis and implications of using small, incomplete and missing data sets. Recommendation: CEE201 and CEE 202			

145503	Hypothesis Testing and Uncertainty Analysis		
Subject:	Catalog Nbr:		

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CEE	0204				
	2024 SPRG	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	
Formulation of hypotheses, and design of tests to accept or reject hypotheses. Examination of the role of uncertainty, statistical significance and societal relevance by connecting numbers and narratives for various data driven decision making applications. Focus is placed on understanding and explaining what can or cannot be inferred from a given set of data. Recommendation: CEE201 and CEE 202 or permission from instructor					

145504	Problem Focused Immersion for Making Data Driven Decisions				
	Subject:	Catalog Nbr:			
	CEE	0209			
	2024 FALL	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu	
	2024 FALL	Primary	Jonathan Lamontagne	Jonathan.Lamontagne@tufts.edu	
Year-long interdisciplinary immersion into identifying and solving problems that lead to effective data-driven decision making. Focused feedback provided to foster and clarify research development. Must be taken in sequential terms beginning in the fall term.					

145505	Physical Hydrology				
	Subject:	Catalog Nbr:			
	CEE	0211			
	2024 SPRG	Primary	Shafiqul Islam	Shafiqul.Islam@tufts.edu	
Water science related precipitation, evapotranspiration, infiltration and streamflow. Application of data and models to describe aspects of the hydrologic cycle and address a range of applied problems in water resources engineering. Emphasis on uncertainties, scales, and societal impact.					

145506	Off Shore Wind Structures				
	Subject:	Catalog Nbr:			
	CEE	0220			
	2024 SPRG	Primary	Daniel Kuchma	Dan.Kuchma@tufts.edu	
Design and analysis of structures that support wind turbines. Topics include steady state & turbulent winds, drag & inertial effects from waves, turbine rotor induced loadings, aerodynamics, hydrodynamics, turbine control, dynamic response, metocean conditions, and seabed properties. Focus placed on a hand-based process for the selection, design, and assessment of offshore wind turbine support structures. Validation of designs using computational models.					

145507	Virtual Machines and Language Translation				
	Subject:	Catalog Nbr:			
	CS	0106			
	2023 SPRG	Primary	Norman Ramsey	Norman.Ramsey@tufts.edu	

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Translation of high-level, functional programming languages to virtual-machine code. Design and implementation of register-based virtual machines and instruction sets. Bytecode interpretation. Function calls including optimized tail calls. Virtual assembly language, virtual object code, and code loading. Automated memory management (garbage collection). Functional-programming techniques for translation. Composition of translation passes using an error monad. Parsing and unparsing. Parsing combinators. Translation of higher-order functions via closure conversion. Naive register allocation by reduction to K-normal form. Code generation from K-normal form to virtual assembly language. Lightweight benchmarking.

145508	Computing for Developing Regions				
Subject:		Catalog Nbr:			
CS		0185			
2024 SPRG		Primary	Fahad Dogar	Fahad.Dogar@tufts.edu	
An interdisciplinary approach to the role of computing technologies in developing regions. Low-cost communication infrastructure; socially relevant technologies for education, healthcare, and governance; and the use of technology by underserved communities and populations in developing regions. Problems and existing solutions covered through case studies. Group projects on designing, implementing, and evaluating a solution. Recommendations: CS10 or CS11 or some background in computer science and/or technology.					

145509	Master's Thesis in Data Science	
Subject:	Catalog Nbr:	
DS	0295	
Guided individual study of an approved topic suitable for a master's thesis in Data Science. Please see departmental website for additional information.		

145511	Engineering Education Field Experience			
Subject:	Catalog Nbr:			
ENE	0090			
2024 FALL	Primary	Merredith Portsmore	merredith.portsmore@tufts.edu	
2024 SPRG	Primary	Chelsea Andrews	Chelsea.Andrews@tufts.edu	
Work and study in programs with a focus on Engineering Education in pre-K through university settings. Placements include CEEO's STOMP program, CSD's STEM Ambassadors, Learning Assistants, Equity Learning Assistants, and Teaching Assistant positions that include teaching responsibilities.				
Prerequisite: Departmental Consent				

145512	Special Topics in Engineering Education				
Subject:	Catalog Nbr:				
ENE	0093				
2024 SPRG	Primary	Chelsea Andrews	Chelsea.Andrews@tufts.edu		
Special topics in Engineering Education.					

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145513	Creativity, Innovation and Entrepreneurial Thinking			
Subject: ENT		Catalog Nbr: 0100		
2023 SPRG		Primary	Reginauld Williams	No Email on file.
2023 SPRG		Primary	Will Trevor	Will.Trevor@tufts.edu
2023 SPRG		Primary	Avital Ziegler	No Email on file.
2024 FALL		Primary	Luke Fraser	Luke.Fraser@tufts.edu
2024 SPRG		Primary	Elizabeth Goodrich	Elizabeth.Goodrich@tufts.edu
Tools and techniques to promote creativity and innovation with application to everyday problem solving, launching new ventures, and working in businesses and non-profit organizations. Rapid ideation workshops for novel solutions and innovations. Tools to stimulate brainstorming and creativity. This class is designed for undergraduate students, particularly Freshmen and Sophomores, who have not taken an ENT core course and are interested in learning more about innovation and entrepreneurship. Restrictions on Enrollment: No previous ENT credit Recommendation: Students with significant design thinking, innovation or entrepreneurship experience should not take this introductory class.				

145514	Entrepreneurship for Computer Scientists			
Subject: ENT		Catalog Nbr: 0151		
2023 SPRG		Primary	Gavin Finn	Gavin.Finn@tufts.edu
Overview of entrepreneurship, development of an entrepreneurial perspective, framework for learning the fundamentals of the essential elements of entrepreneurial ventures. Focus on software-related industries and products. Develop technical ideas into potential business opportunities, evaluate likelihood of becoming a viable business. Market research, go-to-market strategies, value propositions and differentiation of products or services from competitors. Restrictions on Enrollment: Computer science or data science majors and minors with junior or senior standing, or CS or DS graduate students				

145515	Entrepreneurial Business Law			
Subject: ENT		Catalog Nbr: 0163		
2024 FALL		Primary	Josef Volman	Josef.Volman@tufts.edu
Legal issues and considerations common to the business life cycle. Formation, seed and venture capital financing, mergers and acquisitions, initial public offerings, securities law, employment and intellectual property, and governance considerations. Negotiation of various financing and other transactions. Speakers from the private equity, venture capital, and investment banking worlds as well as executives who have exited				

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through a public offering or sale of their company.

Enrollment Restriction: Sophomore standing

145593	Deconstructing Engineering Design
Subject: ENE	Catalog Nbr: 0010
Exploration of the engineering design process. Engineering methodology is examined with respect to history, society, and culture. Culminates in a complete engineering design project. No prior coursework or experience is necessary.	

145594	Engineering for Future Changemakers
Subject: ENE	Catalog Nbr: 0011
Overview of key topics in engineering for individuals interested in careers in policy, government, and other systems-level change structures. Topics include artificial intelligence and robotics, sustainable cities, and tools for application of science. Hands on experience with aspects of engineering projects including scope, constraints, and evaluation.	

145664	Business Strategy
Subject: EM	Catalog Nbr: 0240A
Background and insights required to develop a differentiating business strategy. Business fundamentals, the strategic planning process, competitive strategies, core competencies, strategic alliances, acquisitions and mergers, and franchising. Teamwork to develop a complete business strategy for a high tech company. This course is only open to students in the MS Engineering Management Program. Enrollment Restriction: MSEM Students Only	

145665	Technology Strategy
Subject: EM	Catalog Nbr: 0240B
Background and insights required for an organization focused on technology commercialization strategies. Technology portfolio management; roadmapping; innovation strategies; business fundamentals. This course is only open to students in the MS Engineering Management Program. Enrollment Restriction: MSEM Students Only	

145666	Business Communications: Written Skills
Subject: EM	Catalog Nbr: 0252A
Apply principles of effective, inclusive written communication for different purposes and different audiences	

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in the workplace. Strategies and methodologies to improve tone, focus, clarity, and organization in both day-to-day and formal writing.

145667	Business Communications: Presentation Skills				
Subject:		Catalog Nbr:			
EM		0252B			
2024 SPRG		Primary	Amy Hirschfeld	amy.hirschfeld@tufts.edu	
Planning and delivering effective business presentations for diverse audiences, including creating clear, engaging slides and data graphics. Gain confidence in public speaking for in-person and virtual formats.					

145668	Data Visualization and Communication				
Subject:		Catalog Nbr:			
EM		0251			
2023 FALL		Primary	Kyle Monahan	Kyle.Monahan@tufts.edu	
Concepts of visual analytics such as visual reports and dashboards with a hands-on tutorial using leading self-service business intelligence and data visualization tools. Hands-on exercises to identify datasets, explore, analyze, filter and structure data to communicate via visualizations.					

145669	Leadership in the Age of Technology				
	Subject:	Catalog Nbr:			
	EM	0254			
	2024 SUMR	Primary	Will Trevor	Will.Trevor@tufts.edu	
Theory and practice of leadership in the Age of Technology. Necessity for leaders to confront change and embrace the technologies in a world that is increasingly volatile, uncertain, complex, and ambiguous. Human-centered soft skills to lead teams that are increasingly remote and global. Hard skills to plan and organize. Navigatation of ethical and moral dilemmas inherent in balancing the needs of people, planet, and profit.					

145670	Essentials of Strategic Management			
Subject:	Catalog Nbr:			
EM	0256			
2024 SPRG	Primary	Partha Ghosh	Partha.Ghosh@tufts.edu	
Use of analytics driven insight and imaginative reasoning in making strategic decisions. Integration of the emerging geo-economic, environmental, geo-political, technological and demographic trends with analytical techniques including game & option(s) theories.				

145671	Prescriptive Analytics			
Subject:	Catalog Nbr:			
EM	0257			

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2024 SPRG	Primary	Kishore Pochampally	Kishore.Pochampally@tufts.edu
Quantitative models for effective and efficient decision-making. Applications in fields such as operations, supply chain, marketing, human resource, and finance. Identification of decision variables, the objective function, and the constraints. Modeling skills and efficient solution methods with a proper selection of software. Sensitivity analysis. Excel Solver® and Python will be used.			

145672	Industry Consulting Project – Online Team Practicum		
Subject: EM	Catalog Nbr: 0271	2024 SUMR	Primary Gerald Brown Gerald.Brown@tufts.edu
Problem solving /consulting skills through work with a company. Student teams act as consultants and make recommendations to a company by solving specific strategic and operational problems or developing new opportunities, through analytics driven insights and imaginative reasoning.			

145673	Immersive Experience: Innovation		
Subject: EM	Catalog Nbr: 0275	2024 SUMR	Primary Samuel Liggero Samuel.Liggero@tufts.edu
Immersive synchronous experience occurring over one weekend. Innovation across multiple disciplines and industries with an emphasis on future trends in technology. Team-building and networking activities including business case analysis, role-playing, scenario planning and other group work.			

145775	Electrical Circuits and Biomedical Applications		
Subject: BME	Catalog Nbr: 0010	2024 FALL	Primary Giles Blaney Giles.Blaney@tufts.edu
Fundamentals of electrical circuits, resistors, basic laws, methods of analysis, and network theorems. Capacitors, inductors, and impedance. Transient and steady-state sinusoidal analysis of electrical circuits. Laplace and Fourier analysis. Frequency response of circuits and transfer function. Basic concepts of amplifiers and operational amplifiers. Biomedical applications of electrical circuit concepts and methods. Prerequisite: MATH 34			

145818	Advanced Research Methods in Human Factors Eng		
Subject: ENP	Catalog Nbr: 0264	2024 FALL	Primary David Aurelio David.Aurelio@tufts.edu
Human factors methods to propel product development. Literature review methodology, contextual inquiry, morphological ordering, affinity diagrams, journey maps, data visualization, traceability matrix, expert reviews, mental model development, psychophysics (differences, preferences, acceptability), psychomotor, and psychometrics. Advanced research planning, design, execution, analysis and impact. Applications, possibly			

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including driver distraction, human performance and fatigue, video game testing, and addictive UI design.

145819	Immersive Experience: Leadership				
	Subject:	Catalog Nbr:			
	EM	0276			
	2024 SPRG	Primary	Samuel Liggero	Samuel.Liggero@tufts.edu	
Immersive synchronous experience held over one weekend comprising a series of lectures, discussions and workshops with overarching themes across multiple disciplines and industries. Emphasis on future trends in technology. Networking and social engagement opportunities for students, faculty and staff. Team-Building activities including business case analysis, role-playing, scenario planning and other group work.					

145820	The Science of Sales				
Subject:		Catalog Nbr:			
ENT		0106			
2024 SPRG		Primary	John Derby	Jack.Derby@tufts.edu	
Process, tools, technology, metrics and most importantly, the people that are required to sell, close orders and bring in revenue.					
Enrollment Restriction: sophomore standing					

145821	Consumer Product Ventures			
Subject:	Catalog Nbr:			
ENT	0161			
2024 FALL	Primary	Joshua Wiesman	Joshua.Wiesman@tufts.edu	
2024 FALL	Primary	Kathryn Weiler	Kathryn.Weiler@tufts.edu	
The entrepreneurial process from conception to commercialization or launch of a new venture focused on a consumer product.				
Enrollment Requirement: Sophomore Standing				

145822	Climate Change Science and Engineering				
	Subject:	Catalog Nbr:			
	CEE	0103			
	2024 FALL	Primary	John Durant	john.durant@tufts.edu	
Broad exposure to the interdisciplinary nature of responses to climate change. Sources and behavior of greenhouse gases in the atmosphere; mitigation strategies to reduce greenhouse gas emissions; adaptation strategies for reducing climate change impacts on humans and the environment. Low carbon fuels, sea-level rise planning and management, geo-engineering, economic and policy considerations. Emphasis on local examples and on project-based learning. Course is open to juniors, seniors, and graduate students. Recommendations: CHEM1 or CHEM11 Enrollment Requirement: Junior Standing					

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145823	Nano Course			
Subject: CEE		Catalog Nbr: 0092		
2024 FALL		Primary	James Limbrunner	James.Limbrunner@tufts.edu
Focused study of a selected engineering topic such as an engineering skill, method, or software package. Cannot be counted toward the Major Requirement for BSCE, BSEvE, BSE-EH or BSE-Arch.				

145873	Theory And Applications Of Polymer Materials And Processing				
Subject:	Catalog Nbr:				
CHBE	0114				
2024 FALL	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu		
(Cross-listed w/ ME 114 & MSE 171). Fundamental of polymer materials, including organic chemistry, polymerization, and molecular structure of thermoplastic and thermoset polymers. Four modes of mechanical deformation of polymers: glassy, viscoelastic, rubbery, viscous. Properties of polymers different than ceramics and metals, including behavior above and below glass transition temperature and time dependent properties (creep/stress relaxation). Polymer processing techniques, including injection molding, blow molding, thermoforming. Hands-on lab techniques to measure properties; design projects using data to inform material selection.					
Recommendation: ME 11					

145880	Site Remediation Tech			
Subject: CHBE		Catalog Nbr: 0143		
2024 FALL		Primary	Paul Dombrowski	Paul.Dombrowski@tufts.edu
(Cross-listed w/ CEE 143). Conventional and innovative remediation technologies are examined under the remedial investigation/feasibility study (RI/FS) process. Knowledge of fundamental processes governing remedy implementation is integrated with an understanding of site characterization and applicable regulations to enable design of site-specific treatment systems for clean-up of the contaminated subsurface environment. Recommendations: CEE 12 and CEE 32, or consent of instructor				

145893	Collaborative Introduction to Computer Science	
	Subject:	Catalog Nbr:
	CS	0001
An optional preparatory course for students with no prior programming experience and limited experience in college-level STEM classes. Basics of programming including variables, control flow, subroutines, and problem solving in a hands-on, collaborative environment. The class will meet over the latter half of the semester, and prepare students to enter CS11 with prior exposure to topics that CS 11 discusses in depth. Pass/fail grading.		

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Recommendations: high school algebra.

145904	Digital Marketing: Strategy and Applications				
Subject:		Catalog Nbr:			
EM		0241			
2024 SPRG		Primary	Will Trevor	Will.Trevor@tufts.edu	
Introduction to the dynamic world of digital marketing. Email marketing; search engine optimization (SEO); social media and content marketing; online advertising and metrics; conversions. Development of a strategic approach to digital marketing. Application of digital marketing across different contexts.					

145905	Immersive Experience: Business Analytics	
Subject:	Catalog Nbr:	
EM	0277	
Immersive synchronous experience held over one weekend comprising a series of lectures, discussions and workshops with overarching themes across multiple disciplines and industries. Emphasis on best practice and next practice in Data and Business Analytics. Networking and social engagement opportunities for students, faculty and staff. Team-Building activities including business case analysis, roleplaying, scenario planning and other group work.		

145906	Sustainable Water Engineering	
Subject:	Catalog Nbr:	
CHBE	0133	
(Cross-listed with CEE 133) Means of providing safe, reliable, and cost-effective potable water, sanitation, and water quality protection through municipal infrastructure. Methods of ensuring resilience and adaptation to changes in source quality and climate. Treatment and process design integrating considerations of cost and sustainability. Design projects using mandated standards. Recommendations: CEE 32 or consent of instructor		

145931	Computer Organization			
Subject:	Catalog Nbr:			
CS	0045			
2024 FALL	Primary	Mark Hempstead	Mark.Hempstead@tufts.edu	
(Cross-listed w/ EE 25) Computer organization including performance measurement, instruction set architectures, digital arithmetic, processor datapath, control, pipelining, memory hierarchy, caches and input/output.				
Prerequisite: ES 4				

145939	Programming for Data Science			
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Subject:	Catalog Nbr:
CS	0204
algorithms for data manipulation, cleaning, and preparation. Design of data manipulation programs. Coding standards and practices. Use and creation of software libraries. Techniques for improving program performance. Examples drawn from data preparation and transformation, statistical data analysis, machine learning, deep learning, and deep data science including recommendation systems and trend analysis. Co-located with CS 30. Students enrolled in CS 204 are expected to meet requirements for CS 30, along with an additional term project. Recommendations: a course in data structures that is roughly equivalent to CS 15, and a course in linear algebra roughly equivalent to Math 70.	

145940	Practice of Ethical Leadership				
Subject:	Catalog Nbr:				
EM	0264				
2024 SPRG	Primary	Jane Seminara	Jane.Seminara@tufts.edu		
Examination of leadership, and the role of future engineering leaders. Formulation of leadership messages, translation of leadership messages into action and realworld demonstation of those actions. Topics include: giving voice to values, taking a stand, exercising authority, and emergent leadership.					

145941	Preparing New and Aspiring Leaders				
Subject:	Catalog Nbr:				
TGI	0110				
2024 SPRG	Primary	Jayne Nucete	Jayne.Nucete@tufts.edu		
(Cross-listed as ENT 180) Theory and practice of leadership. Development and application of leadership skills across a range of contexts including startups, corporations, and nonprofits. Focus placed on developing self-awareness in preparation for the initial leadership position.					

145942	Mastering Money: Developing Financial Literacy			
Subject:	Catalog Nbr:			
TGI	0111			
2024 SPRG	Primary	George Blount	George.Blount@tufts.edu	
(Cross-listed as ENT 181) Introduction to sound money management in personal and professional finance. Creation of greater financial awareness, and development of financial vocabulary. Financial requirements across life stages including student finances, purchasing the first home planning, and investing for life events and a comfortable retirement. Basic business finances, such as budgeting, accounting statements, and taxation.				

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145943	Communication Skills for Personal and Professional Life			
Subject:	Catalog Nbr:			
TGI	0112			
2023 SPRG	Primary	Matthew McMahan	No Email on file.	
2024 SPRG	Primary	Holly Tarnower	Holly.Tarnower@tufts.edu	
(Cross-listed as ENT 182) Development of effective communications skills across a range of personal and professional scenarios, interpersonal communication, networking, and best practices in both verbal and non-verbal communications. Written communication skills for developing formal reports, drafting emails, and using social media.				

145944	Essentials of Marketing for Personal and Business Success			
Subject:	Catalog Nbr:			
TGI	0113			
2024 SPRG	Primary	Michelle Tempesta	Michelle.Tempesta@tufts.edu	
(Cross-listed as ENT 183) Practical examination of marketing from startups to nonprofits, including opportunities to gain hands-on, applicable experience, emphasizing the mindset and skillset to apply marketing principles. Consumer behavior, market research, audience targeting and segmentation, positioning, digital marketing, and the elements of the marketing mix. Importance of personal branding and the application of marketing principles in professional settings.				

145945	Planning Your Career Pathway			
Subject:	Catalog Nbr:			
TGI	0114			
2024 FALL	Primary	Malakia Silcott	Malakia.Silcott@tufts.edu	
(Cross-listed as ENT 184) Exploring the skills and knowledge needed across an individual's career. Planning for internships and placements, preparing for a job search and gaining the skills and confidence for interviewing and starting a job. Students will develop the skills and knowledge needed to plan for a successful and fulfilling career.				

145946	Living a Life with Purpose			
Subject:	Catalog Nbr:			
TGI	0115			
2024 SPRG	Primary	Jane Seminara	Jane.Seminara@tufts.edu	
(Cross-listed as ENT 185) Holistic view of a human life. Work-life balance, mindfulness, personal ethics, physical and mental health, setting achievable and meaningful goals, and developing the skills of personal effectiveness. How to contribute to global society with an ethical mindset and cultural sensitivity.				

145947	Introduction to Making			
Subject:	Catalog Nbr:			
TGI	0116			

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How to make physical things, make them work, and integrate them with electronics/software. Common fabrication techniques including foamboard, 3D printing, laser cutting, electronics, Arduino programming. Demonstration of hands-on skills in an individual final project.

145959	Semiconduct Device W/lab			
Subject: MSE		Catalog Nbr: 0110		
2024 FALL		Primary	Dante DeMeo	Dante.DeMeo@tufts.edu
(Cross-listed w/ EE 113) Introduction to semiconductor physics; quantum mechanics, equilibrium distribution; charge transport; P-N junction theory; diodes; bipolar junction transistors; field-effect devices; heterojunction devices; novel semiconductor devices such as carbon nanotubes. Recommendations: EE 21 and MATH 51 (formerly MATH 38).				

145960	Physics of Solar Cells			
Subject: MSE		Catalog Nbr: 0111		
2023 SPRG		Primary	Brian Aull	Brian.Aull@tufts.edu
2024 SPRG		Primary	Paul Simmonds	Paul.Simmonds@tufts.edu
(Cross-listed w/ EE 114) Physics of photovoltaic cells including physics of semiconductors in photovoltaic devices, physical models of solar cell operation, characteristics and design of common types of solar cells, and approaches to increasing solar cell efficiency. Recommendations: MATH 42, MATH 51, EE 18, PHYS 42/43, or instructor permission				

145961	Introduction Microwaves		
Subject: MSE		Catalog Nbr: 0112	
(Cross-listed w/ EE 117) Transmission and reflection of guided waves. The Smith chart and matching. Scattering parameters and flow graphs. Biological effects. Laboratory measurement of power, frequency, attenuation, Q-factor, and time-domain reflectometry. Fall. Recommendations: EE 18, or 13 and permission of instructor.			

145962	Microwave Semiconductor Devices And Circuits		
	Subject:	Catalog Nbr:	
	MSE	0113	
(Cross-listed with EE 118) Varistor and varactor diodes, PIN diodes, microwave transistors, negative resistance devices. Gallium arsenide properties and technology. Receiving mixers, transmitting modulators, amplifiers, oscillators, switches, limiters, duplexers, phase shifters, and harmonic generators. Laboratory characterization of devices and circuits, including noise measurements. Spring. Recommendations: EE 117 or permission of instructor.			

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145963	Microwave Integrated Circuits
Subject: MSE	Catalog Nbr: 0114
(Cross-listed with EE 161) Review of CAD techniques for microwave circuits. Substrate, conductor, dielectric, and resistive film materials for integrated circuits. Mask layout, mask layout tools, and mask fabrication. Hybrid microwave integrated circuits, monolithic integrated circuits, foundry requirements, hybrid versus monolithic circuits, performance and testing. Extensive laboratory work. Recommendations: EE 160.	

145966	Optoelectronic Characterization
Subject: MSE	Catalog Nbr: 0201
(Cross-listed with EE 214) Tools and techniques used to characterize optoelectronic materials and devices. Photoluminescence, ellipsometry, scanning probe microscopy, electron microscopy, and AC/DC electrical characterization. Theoretical underpinning of and practical experience with the measurement techniques. Laboratory.	

145979	Principles Of Polymerization
Subject: MSE	Catalog Nbr: 0137
(Cross-listed with CHBE 121) Synthesis of polymeric materials. Three major types of polymerization--step, chain, and ring-opening--are reviewed with emphasis on reaction mechanisms, kinetics, and thermodynamics of the reactions, and their relationships to molecular weight and molecular structures of macromolecules. Recommendations: Physical and organic chemistry	

145980	Physical Chemistry Of Polymers
Subject: MSE	Catalog Nbr: 0138
(Cross-listed with CHBE 122) Physicochemical properties of polymeric materials with emphasis on the relationship between molecular architecture and physical properties. Topics include polymer solution theories, thermal transitions, conformational analysis, polymer microstructure, crystallinity and morphology, the rubbery and glassy states, rheology, and statistical thermodynamics. Recommendations: CHBE 11	

145981	Electronic Devices for Energy Applications
Subject: MSE	Catalog Nbr: 0139
(Cross-listed with CHBE 175) Design and operating principles of a variety of thin-film devices related to electrical energy generation, storage, or conversion. An overview of optical and electronic processes in a	

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variety of materials (metals, insulators, semiconductors), thin film deposition and characterization techniques, as well as photovoltaics (solar cells), electrochemical capacitors, batteries, field-effect transistors, colloidal quantum dot devices, and light-emitting diodes (LEDs). Recent research advances in the field of novel optoelectronic devices for energy applications.

Prerequisites: Chem 0002

Recommendations: junior standing.

145984	Biomechanics		
Subject: MSE		Catalog Nbr: 0150	
(Cross-listed with BME 149) Graduate-level seminar course designed for students who are interested in getting a broad overview of different research methods and analytical techniques in human factors/ergonomics research. Topics to be covered are related to the acquiring, recording, and analyzing of empirical data. Theory underlying these methods in human factors/ergonomics research is also studied.			

145985	Biomaterials and Regenerative Medicine			
Subject: MSE		Catalog Nbr: 0151		
2024 FALL		Primary	Yu-Ting Dingle	Yu-ting.Dingle@tufts.edu
(Cross-listed as CHBE 164 and BME 153). Fundamental concepts of biomaterials and regenerative medicine (biomaterial types, synthesis, properties, mechanisms of degradation, biological interfaces, inflammation and related issues). Specific focus on biomaterials related to regenerative medicine. Course independent of, but complementary to, BME 154. Recommendations: Junior standing, BIO13, CHEM 1, or consent of instructor				

145986	Tissue Engineering and Regenerative Medicine			
Subject: MSE		Catalog Nbr: 0152		
2024 SPRG		Primary	Qiaobing Xu	Qiaobing.Xu@tufts.edu
(Cross-listed with BME 154) Fundamental concepts of tissue engineering and regenerative medicine (scaffolds, stem cells and bioreactors); progress with specific tissue systems; applications for tissue engineering; and current state-of-the art of tissue regeneration. Additional topics: transport phenomena and mechanical regulation of stem cell function, with focus on mechanisms of mechanotransduction. Course independent of, but complementary to, BME 153. Recommendations: Junior standing, BIO 13, CHEM 51, PHYS 11, ES 9, or consent of instructor.				

145987	Graduate Introduction To Biophotonics			
Subject: MSE		Catalog Nbr: 0251		
2023 SPRG		Primary	Irene Georgakoudi	Irene.Georgakoudi@tufts.edu

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(Cross-listed w/ EE 253 and BME 251) A graduate-level version of BME/EE 51. Additional homework problems and a term paper are required for graduate level credit.

Recommendations: PHY 31, or BME 215, or permission of instructor. Graduate students only.

145988	Biophotonics Laboratory
Subject: MSE	Catalog Nbr: 0156
(Cross-listed as/ BME 156) Biophotonic approaches used to characterize biological specimens including standard microscopy (brightfield, phase contrast, fluorescence), depth-resolved microscopy (confocal fluorescence and reflectance, two-photon excited fluorescence and second harmonic generation), near infrared spectroscopy, and photoacoustic imaging.	

145989	Quantitative Biomaterials Characterization Laboratory
Subject: MSE	Catalog Nbr: 0157
(cross-listed as BME 157) Methods used to characterize biomaterials including mass spectrometry, scanning electron microscopy, optical spectroscopy and flow cytometry.	

145990	Nonlinear Analysis of Materials and Structures
Subject: MSE	Catalog Nbr: 0160
(Cross-listed as ME 175 and CEE 128) Nonlinear solid mechanics, nonlinear constitutive models and variational principles as essential prerequisites for nonlinear finite element formulations. Recommendations: ES 9.	

145991	Finite Element Analysis
Subject: MSE	Catalog Nbr: 0161
2024 SPRG	Primary Masoud Sanayei masoud.sanayei@tufts.edu
(Cross-listed as ME 177 & CEE 105). Finite element analysis of problems important in structural engineering. Overview of direct stiffness method. Discretization of continuum to finite elements for approximate solution of complex engineering problems. Development of governing equations, stiffness and load matrices for deformation and stress analysis. Work and energy theorems. Hands-on experience with industry-standard software and practical applications in structural engineering. Recommendations: CEE 22 or ME 41 or consent of instructor	

145992	Manufacturing Processes And Materials Technology
Subject: MSE	Catalog Nbr: 0170

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2023 SPRG	Primary	Anil Saigal	anil.saigal@tufts.edu
(Cross-listed w/ ME 110) A study of traditional and nontraditional manufacturing processes related to processing of metals, ceramics, and polymers, including computer-aided manufacturing. Topics include properties and behavior of materials, selection of materials and processes subject to surface finish, tolerance, design, and economic constraints. Recommendations: ME 11.			

145993	Theory And Applications Of Polymer Materials And Processing		
Subject: MSE	Catalog Nbr: 0171		
2024 FALL	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu
(Cross-listed w/ CHBE 114 and ME 114) Fundamental of polymer materials, including organic chemistry, polymerization, and molecular structure of thermoplastic and thermoset polymers. Four modes of mechanical deformation of polymers: glassy, viscoelastic, rubbery, viscous. Properties of polymers different than ceramics and metals, including behavior above and below glass transition temperature and time dependent properties (creep/stress relaxation). Polymer processing techniques, including injection molding, blow molding, thermoforming. Hands-on lab techniques to measure properties; design projects using data to inform material selection. Recommendation: ME 11			

145994	Composite Materials		
Subject: MSE	Catalog Nbr: 0172		
2024 SPRG	Primary	Michael Zimmerman	Michael.Zimmerman@tufts.edu
(Cross-listed as ME 116 & CHBE 116) Fundamentals of design, manufacture, and analysis of composite materials. Fiber materials such as glass, kevlar and carbon fibers along with state-of-the-art thermoplastic and thermoset matrix materials. Rules of mixtures (ROM) to calculate transverse isotropic properties in laminae. Classical Lamination Theory (CLT) and Finite Element Analysis (FEA) to calculate stress and strains in laminates. Case studies in aerospace. Hands-on experiences, such as vacuum bagging to manufacture and test composites. Team project.			

145995	Biomaterials		
Subject: MSE	Catalog Nbr: 0173		
2024 FALL	Primary	Kenneth James	ken.james@tufts.edu
(Cross-listed with ME 117) This course presents the following topics: elementary solid mechanics; aspects of material science applied to metals, polymers, ceramics, and biological tissues; tissue reactions to artificial materials; pathohistology; and inflammatory and immune responses. The course is completed by a survey of artificial materials and devices in clinical use, emphasizing vascular and orthopedic prostheses. A literature review and oral presentation covering a current device is assigned.			

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Recommendations: ME 11 or senior standing or permission of instructor

145996	Solid Mechanics
Subject: MSE	Catalog Nbr: 0174
(Cross-listed as CEE 122 and MSE 174). Strain tensor, stress tensor, elastic stress analysis, isotropic and anisotropic materials, torsion problem, inelastic behavior of materials, elements of plasticity and creep. Recommendations: ES 9 or ME 20 or equivalent.	

145997	Forces at Nanoscale
Subject: MSE	Catalog Nbr: 0175
(Cross-listed as ME 124) Interaction between basic components of matter: atoms, molecules, nano- and micro particles. Forces that occur between surfaces/particles at the nanoscale including Van der Waals, dipole, electric, electric double layer, hydrogen, ionic, and adhesion forces. Modern achievements in studying these forces with the help of the force apparatus and atomic force microscopy. DLVO theory, Derjaguin approximation. Analysis of experimental data to extract the force parameters. Prerequisites: Senior or graduate standing	

145998	Mechanics of Materials at the Micro & Nano Scale
Subject: MSE	Catalog Nbr: 0176
(Cross-listed with ME 125) Mechanics of materials, in particular, soft materials when studied at the micro and nanoscale. Classical approaches to mechanics of materials, both static and dynamic properties. Extension of classical knowledge to the micro and nanoscale, with methods to measure the material mechanics at those scales. Practical examples of biological tissues, cells, and polymers in different environments. Recommendations: ME 37, ME42, or Senior standing.	

145999	Micro-fabrication And Design
Subject: MSE	Catalog Nbr: 0178
(Cross-listed as ME 146) An introduction to Micro-Electro-Mechanical Systems (MEMS). Topics include fabrication, design, and applications of MEMS devices. Introduction to computer-aided design techniques and tools. Recommendations: Senior Standing.	

146000	Mass Transfer And Phase Transformations In Materials Processing
Subject: MSE	Catalog Nbr: 0179

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(Cross-listed as ME 157) The course is designed for students interested in thermal, fluid, and mass transport aspects of materials processing. Topics include heat treatment, continuum diffusion, atomistics of diffusion, oxidation, evaporation, and solidification. A wide range of practical examples and applications is drawn on, and class work and readings are supplemented by in-class presentations, guest lectures, and small projects. Recommendations: ME 51 or permission of instructor.

146003	BEST Seminar			
	Subject:	Catalog Nbr:		
	ACL	0015		
	2023 FALL	Primary	Sehba Hasan	Sehba.Hasan@tufts.edu

146008	Non Major Credit			
	Subject:	Catalog Nbr:		
	TGI	0310		

146009	Lower Level Elective Crd			
	Subject:	Catalog Nbr:		
	TGI	0320		

146010	Upper Level Elective Crd			
	Subject:	Catalog Nbr:		
	TGI	0330		
	2024 FALL	Primary	Meredith Hyde	Meredith.Hyde@tufts.edu

146015	Composite Materials			
	Subject:	Catalog Nbr:		
	CHBE	0116		
(Cross-listed w/ ME 116 & MSE 172) Fundamentals of design, manufacture, and analysis of composite materials. Fiber materials such as glass, kevlar and carbon fibers along with state-of-the-art thermoplastic and thermoset matrix materials. Rules of mixtures (ROM) to calculate transverse isotropic properties in laminae. Classical Lamination Theory (CLT) and Finite Element Analysis (FEA) to calculate stress and strains in laminates. Case studies in aerospace. Hands-on experiences, such as vacuum bagging to manufacture and test composites. Team project.				

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146063	Nanophotonics
Subject: EE	Catalog Nbr: 0115
2024 SPRG	Primary Aseema Mohanty
	Aseema.Mohanty@tufts.edu
(Cross-listed as BME115). Engineering, physics, and applications of nanophotonic structures. Wave propagation through optical waveguides, waveguide systems, and nanostructures. Optical mode theory and numerical modeling. Coupled mode theory. Design and analysis of optical modulators, resonators, interferometers, switching networks, and phased arrays. Research paper discussions about state-of-the-art nanophotonic devices and applications in telecommunications, biomedical devices, modern computing, and quantum information systems. Recommendations: EE18 or ES15 or PHY42	

146064	Nanophotonics
Subject: BME	Catalog Nbr: 0115
(Cross-listed as BME115). Engineering, physics, and applications of nanophotonic structures. Wave propagation through optical waveguides, waveguide systems, and nanostructures. Optical mode theory and numerical modeling. Coupled mode theory. Design and analysis of optical modulators, resonators, interferometers, switching networks, and phased arrays. Research paper discussions about state-of-the-art nanophotonic devices and applications in telecommunications, biomedical devices, modern computing, and quantum information systems. Recommendations: EE18 or ES15 or PHY42	

146065	Emerging Memory Systems
Subject: EE	Catalog Nbr: 0157
Semiconductor memories and non-volatile memory (NVM) devices. Memory hierarchy, coherence models for heterogeneous systems, persistent memories. Embedded memory architectures for deep neural network hardware, data types and compression. Non-von Neumann architectures, neuromorphic computing, NVM based synapse and neuron implementations. Additional topics on security, NVM implementations of physically unclonable functions and camouflaged logic, random number generators, probabilistic computing. Emerging storage media. Discussion of research papers on relevant topics. Recommendation: EE21 and EE25	

146066	The Human Side of Systems Thinking
Subject: EM	Catalog Nbr: 0225
2024 SPRG	Primary Jerome Brightman
	Jerome.Brightman@tufts.edu
Systems thinking helps leaders observe the interconnectedness of organizational variables to permanently solve chronic issues. Application of the analytical tools of systems thinking (loops, links, delays, and	

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archetypes) in combination with innovative human-centered design. Focus placed on a humanistic approach to complexity with recognition of emerging technologies as tools created by people for people

146103	3D Printing the Human Body			
Subject:		Catalog Nbr:		
BME		0176		
2024 SPRG	Primary	Vincent Fitzpatrick	Vincent.Fitzpatrick@tufts.edu	
2024 SPRG	Primary	Xiao Kuang	Xiao.Kuang@tufts.edu	
Current and emerging applications of three-dimensional (3D) printing in the field of biomedical engineering. Assessment of advantages, challenges, and limitations of 3D printing as a manufacturing process. Exploration of emerging technologies and the future potential of 3D printing for medicine. Extraction of relevant information from patient data, generation of a printable model, and successful printing of an anatomical structure or medical device.				
Recommendations: BIO 13 or BME 33				

146120	Architectural Acoustics			
Subject: ME		Catalog Nbr: 0127		
2023 SPRG		Primary	Kelsey Rogers	Kelsey.Rogers@tufts.edu
Acoustical design of rooms for music performance and speech. Fundamentals of sound waves and human hearing. Room acoustics measurement, design, and simulation, with case studies from professional practice. Group projects and class field trips. Final project in which students auralize a space under different design conditions.				
Recommendation: ES 62				

146185	Statistical Bioinformatics			
Subject:		Catalog Nbr:		
CS		0169		
2024 FALL		Primary	Donna Slonim	Donna.Slonim@tufts.edu
Computational methods and analyses in the context of bioinformatics and biomedical data. Statistical methods in bioinformatics and biomedicine, including the heterogeneous high-dimensional data that tends to arise in this context. Assessment of hypotheses and data quality, visualization, and identification of patterns, outliers, and artifacts of bioinformatics data. Probability estimation through simulation. Presentation of statistical results to specific audiences.				
Recommendations: CS 11 and (CS/Math 61 or Math 65), or graduate standing.				

146187	Master of Science Capstone Project II			
Subject: DS		Catalog Nbr: 0289		
2024 FALL		Primary	Martin Allen	Martin.Allen@tufts.edu

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Part two of a two-course, hands-on, and project-based culmination to the Master of Science in Data Science Online program. A continuation of the work started in DS 288, culminating in a complete analysis of the problem chosen in DS 288 as well as a final paper describing the analytic process and decisions and/or recommendations indicated by the data. To be taken in the last term of the Master of Science in Data Science Online degree.

146190	Probability for Machine Learning
Subject: ES	Catalog Nbr: 0201
(Cross-listed as UC DIS201) A foundational understanding of important concepts in probability as they relate to machine learning. Random variables, probability densities, expectation, variance, covariance, bias, Bayes' theorem, regularization, entropy, and applications in practical approaches to regression, classification, and clustering.	

146191	Matrix Methods for Machine Learning
Subject: ES	Catalog Nbr: 0202
(Cross-listed as UC DIS202) Basic linear algebra operations and their use in approximations underlying machine learning, with applications to solving regression, classification, and clustering problems.	

146192	Introduction to Bayesian Modeling
Subject: ES	Catalog Nbr: 0211
(Cross-listed as UC DIS211) Concepts and practices of Bayesian modeling. Models with conjugate priors, illustrating with the Beta-Binomial and Gamma-Poisson models. Markov Chain Monte Carlo (MCMC) and variational inference (VI) methods for Bayesian inference. Semi-conjugate models, including Bayesian linear regression, Bayesian mixture models, and Bayesian hidden Markov models. Models for which there are not conjugate priors, such as Bayesian logistic regression, Bayesian multiclass regression, a racially polarized voting model, and Bayesian deep learning.	

146193	Deep Learning in PyTorch
Subject: ES	Catalog Nbr: 0212
(Cross-listed as UC DIS212) An introduction to the PyTorch deep learning software library, from implementing basic machine learning models to implementing cutting-edge deep learning methods. Training various deep learning architectures, including image classifiers. Using PyTorch data management tools. Best practices for writing maintainable and reusable PyTorch code.	

146254	Introduction To Biophotonics
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Subject:	Catalog Nbr:
MSE	0151
(cross-listed as EE 151 and BME 151) Basic concepts in electromagnetism and light matter interactions, including optical properties, absorption, near-infrared, light scattering and fluorescence spectroscopy, microscopy, optical coherence tomography and photodynamic therapy and their relevance to human disease diagnostic and therapeutic applications.	

146255	Entrepreneurial Internship			
Subject:	Catalog Nbr:			
ENT	0198			
2024 FALL	Primary	Carol Denning	Carol.Denning@tufts.edu	
2024 FALL	Primary	Jill Parlee	Jill.Parlee@tufts.edu	
2024 FALL	Primary	Elaine Chen	Elaine.Chen@tufts.edu	
Under the guidance of a faculty member, students apply concepts learned in the classroom and acquire new skills as they address real life challenges while working as an intern at a company. Internships typically involve students serving in a functional role with an entrepreneurial focus, such as product management, entrepreneurial marketing and sales.				

146256	Nonprofits, Philanthropy, and Impact				
Subject:		Catalog Nbr:			
ENT		0142			
2024 FALL		Primary	Usha Pasi	Usha.Pasi@tufts.edu	
(Cross-listed as CVS 180) Nonprofits are a valued engine for community engagement and innovation across the country. This complex sector is built on the desire to do good through scalable, sustainable organizational strategies that deliver impact. Study of successful nonprofits and the connection between nonprofits, philanthropy, and impact. Grantmaking strategy and award.					

146257	Computer Aided Product Design			
Subject:	Catalog Nbr:			
ES	0019			
2024 SPRG	Primary	Gian Calise	Gian.Calise@tufts.edu	
2024 SPRG	Primary	Golriz Kermani	Golriz.Kermani@tufts.edu	
Introduction to 3D Computer Aided Design (CAD) software with emphasis on the fundamentals of engineering design. Mechanical parts, assemblies, and product design. Reading and creating engineering drawings, including orthographic and isometric views. Dimensioning. Additive manufacturing. Applications in mechanical engineering and human factors engineering. Students may not receive for both ES18 and ES19.				

146258	Iterative Methods for Machine Learning			
Subject:	Catalog Nbr:			

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EE	0143				
	2024 SPRG	Primary	Usman Khan	Usman.Khan@tufts.edu	
(Cross-listed as CS 144) Design and analysis of modern machine learning methods with emphasis on convex and nonconvex problems, and centralized, federated, and distributed computational architectures. Topics include convergence, complexities, contractions, fixed point theorems, and perturbation techniques; gradient descent and stochastic gradient descent in addition to accelerated methods including Polyak and Nesterov momentum, minibatching, and variance reduction. State of the practice methods will be covered including Adagrad, Autogard, Adam, sgdm with applications in image classification and document clustering. Recommendations: MATH 70 and CS 11					

146296	Planning Your Career Pathway				
	Subject:	Catalog Nbr:			
	ENT	0184			
	2024 FALL	Primary	Malakia Silcott	Malakia.Silcott@tufts.edu	
(Cross-listed as TGI 114) Exploring the skills and knowledge needed across an individual's career. Planning for internships and placements, preparing for a job search and gaining the skills and confidence for interviewing and starting a job. Students will develop the skills and knowledge needed to plan for a successful and fulfilling career.					

146297	Graduate Engineering Co-op				
	Subject:	Catalog Nbr:			
	EE	0404			
	2024 FALL	Primary	Karen Panetta	Karen.Panetta@tufts.edu	

146358	Societal Aspects of Design: Integration, Innovation, and Impact				
	Subject:	Catalog Nbr:			
	EE	0185			
	2024 SPRG	Primary	Ronald Lasser	Ron.Lasser@tufts.edu	
(Cross-listed as CVS 149 and ENT 109) Multi-disciplinary perspective of innovative technology-based design process for societal, community influence, and civic engagement. Elements and principles of design from product development process and societal value systems thinking, thought and emotion, ethics and responsibility. Experiments to explore bias, failure, and iteration, reflection for self-discovery and innovation. Articulation and expression via written, oral and pre-recorded audio and video presentations showing measurable impact of solutions as societal benefits.					

146359	Use-Related Risk Management				
	Subject:	Catalog Nbr:			
	ENP	0111			
	2024 SPRG	Primary	Sami Durrani	Sami.Durrani@tufts.edu	

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Analysis of potential harm caused by user interaction of technology in various domains including medical, consumer, industrial products. Fundamentals of use error (human error). Identifying opportunities for use error and their likelihood and potential to cause serious harm or death. Methods for identifying root causes of use errors. Residual risk analysis. Rationales for product design acceptance in view of residual risk and societal tolerance for risk. Applications to human factors engineering, biomedical engineering, mechanical engineering, software development, and industrial design. Governmental expectations and industrial standards on risk management. Focus placed on medical technology. Prior coursework in human factors engineering preferred but not necessary.

146360	Transition to Competence for Technology Leadership		
Subject:	Catalog Nbr:		
TGI	0220		
Leadership responsibility in the dynamic and changing world of the tech-sector. Confidence and mindset needed to transition from individual contributor to leader with responsibility for the development and well-being of the team.			

146361	Introduction to Making				
Subject:		Catalog Nbr:			
ENT		0164			
2024 FALL		Primary	Elaine Chen	Elaine.Chen@tufts.edu	
2024 FALL		Primary	Thomas Van de Velde	Thomas.Van_De_Velde@tufts.edu	
Exploratory course for beginners that teaches practical, hands-on skills to make working prototypes of your products. Make physical things, make them work, and integrate them with electronics/software. Common fabrication techniques including foamboard, 3D printing, laser cutting, electronics, and Arduino programming. Demonstration of hands-on skills and entrepreneurial spirit in an individual final project.					

146392	Mastering Money: Developing Financial Literacy			
Subject:	Catalog Nbr:			
ENT	0181			
2024 SPRG	Primary	George Blount	George.Blount@tufts.edu	
(Cross-listed as TGI 111) Introduction to sound money management in personal and professional finance. Creation of greater financial awareness, and development of financial vocabulary. Financial requirements across life stages including student finances, purchasing the first home planning, and investing for life events and a comfortable retirement. Basic business finances, such as budgeting, accounting statements, and taxation.				

146393	Communication Skills for Personal and Professional Life		
Subject:	Catalog Nbr:		
ENT	0182		

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2024 SPRG	Primary	Holly Tarnower	Holly.Tarnower@tufts.edu
(Cross-listed as TGI 112) Development of effective communications skills across a range of personal and professional scenarios, interpersonal communication, networking, and best practices in both verbal and non-verbal communications. Written communication skills for developing formal reports, drafting emails, and using social media.			

146394	Essentials of Marketing for Personal and Business Success		
Subject: ENT	Catalog Nbr: 0183	2024 SPRG	Primary Michelle Tempesta Michelle.Tempesta@tufts.edu
(Cross-listed as TGI 113) Practical examination of marketing from startups to nonprofits, including opportunities to gain hands-on, applicable experience, emphasizing the mindset and skillset to apply marketing principles. Consumer behavior, market research, audience targeting and segmentation, positioning, digital marketing, and the elements of the marketing mix. Importance of personal branding and the application of marketing principles in professional settings.			

146395	Living a Life with Purpose		
Subject: ENT	Catalog Nbr: 0185	2024 SPRG	Primary Jane Seminara Jane.Seminara@tufts.edu
(Cross-listed as TGI 115) Holistic view of a human life. Work-life balance, mindfulness, personal ethics, physical and mental health, setting achievable and meaningful goals, and developing the skills of personal effectiveness. How to contribute to global society with an ethical mindset and cultural sensitivity.			

146396	Preparing New and Aspiring Leaders		
Subject: ENT	Catalog Nbr: 0180	2024 SPRG	Primary Jayne Nucete Jayne.Nucete@tufts.edu
(Cross-listed as TGI 110) Theory and practice of leadership. Development and application of leadership skills across a range of contexts including startups, corporations, and nonprofits. Focus placed on developing self-awareness in preparation for the initial leadership position.			

146407	Developing Leaders in a Civic Context		
Subject: ENT	Catalog Nbr: 0170		
(Cross-listed as CSHD 180 & CVS 170) Integration and application of concepts from adult development and learning, leader and leadership development, and organizational behavior to build capacity for social change. Development of effective strategies for individuals, teams, and organizations to address complex challenges. Prerequisites: CSHD 0001 or PSY 0001, or instructor permission.			

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146411	Software Engineering for Regulated Industries			
Subject:	Catalog Nbr:			
EE	0150			
2024 FALL	Primary	Khaled ElMahgoub	Khaled.ElMahgoub@tufts.edu	
Fundamentals of software engineering for regulated industries. Identifying user needs, mapping user needs to requirements, processing software design, coding, verification, and validation. Emphasis on quality and documentation to meet regulatory standards. Hands-on experience with tools used in developing high-quality software products.				
Recommendation: CS 15 or CS 40				

146412	Digital Signal Processing			
Subject:	Catalog Nbr:			
ME	0136			
2024 FALL	Primary	Brian Tracey	brian.tracey@tufts.edu	
2024 FALL	Primary	Jordan Rosenthal	Jordan.Rosenthal@tufts.edu	
(Cross-listed as EE 125 Discrete signals and systems, digital simulation of analog systems. Z transforms, recursion equations, finite-order systems. Fourier transforms, line spectra and Fourier series, discrete Fourier series and Fast Fourier Transforms (FFT). Sampling and interpolation, mean-square approximations. Nonrecursive and recursive filters. Selected topics on algorithms, design and applications of digital signal processing. Fall.				

146427	Digital Design Verification			
Subject:	Catalog Nbr:			
CS	0147			
2024 FALL	Primary	Joel Grodstein	Joel.Grodstein@tufts.edu	
(Cross-listed as EE 165) Verification of digital hardware designs at the Register-Transfer Level (RTL) using System Verilog. Types of verification: formal vs. simulation-based; random vs. targeted; full-chip vs. unit-level; pre-silicon vs. post-silicon. Standardized frameworks: Universal Verification Methodology (UVM). Assertion-based checking, equivalence checking. Prerequisites: EE 25 or EE 126 or graduate standing.				

146428	Distributed Machine Learning and Control			
Subject:	Catalog Nbr:			
CS	0143			
(Cross-listed as EE 130) Design and analysis of distributed machine learning and stochastic optimization methods from the perspective of dynamical systems that comes from signal processing and control theory. Topics include: state-space models, state transformations, canonical forms, graph theory, fixed-point theorems, Perron Frobenius theorem, contraction maps, convex and nonconvex functions, stochastic optimization, first and second order methods, accelerated first order methods including heavy-ball and Nesterov momentum, and variance reduction techniques. Python-based programming for machine learning				

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tasks using real datasets including deep learning problems.

Pre-requisites: MATH 51, MATH 70, COMP11, and (EE24, MATH165 or ES56) or graduate standing

Recommended: EE 105

146437	Ethics for AI, Robotics, and Human-Robot Interaction			
Subject: CS		Catalog Nbr: 0239		
2024 SPRG		Primary	Matthias Scheutz	Matthias.Scheutz@tufts.edu
Technical challenges of endowing autonomous artificial agents with normative principles that will allow them to operate successfully in human societies. Algorithmic approaches in artificial agents (rule-based, utility-based, behavior-based, etc.) and their links to philosophical foundations of the main ethical theories (virtue ethics, deontology, utilitarianism). Conceptual and mathematical analysis of assumptions underlying each algorithmic approach as well as implementation in agent-based simulations. Functional and performance tradeoffs of the algorithms and their implications for autonomous robots and AI systems. Mathematical and computational challenges of the different proposals for "implicit" and "explicit" ethical agents, including inverse reinforcement learning, verification-based approaches, and model checking.				

146438	Immersive Experience: Product Managment			
Subject:		Catalog Nbr:		
EM		0278		
2023 FALL		Primary	Samuel Liggero	Samuel.Liggero@tufts.edu
This one credit elective course is an immersive synchronous experience that will be held over one weekend. The course will consist of a series of lectures, discussions and workshops with an overarching theme of Product Management across multiple disciplines and industries with an emphasis on future trends in Technology. This deep-dive educational experience will also offer networking and social engagement opportunities for students, faculty and staff. There will be Team-Building activities including business case analysis, role-playing, scenario planning and other group work.				

146439	Engineering Head Start			
Subject: EN		Catalog Nbr: 0005		
2024 SUMR		Primary	Nicole Batrouny	Nicole.Batrouny@tufts.edu
Preparation for mathematics and natural sciences required in Engineering. Algebraic manipulation. Trigonometric, exponential, and logarithmic functions. Function composition and manipulation. Plotting. Vectors and vector operations. Units and unit analysis. Requires consent of the instructor Credit may not be applied toward any Major Requirement in the School of Engineering.				

146440	Tufts Abroad Program		
Subject:	Catalog Nbr:		
ENT	0340		

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2023 SPRG	Primary	Susan Sanchez-Casal	susan.sanchez_casal@tufts.edu
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146609	Assistive Design			
Subject: ME		Catalog Nbr: 0141		
2024 SPRG		Primary	Daniel Hannon	Dan.Hannon@tufts.edu
2024 SPRG		Primary	Gary Leisk	Gary.LEISK@tufts.edu
Application of user-centric design tools, knowledge elicitation, client interviews and measurements, ideation, fabrication of physical artifacts, user testing of solutions with individual clients having a disability. Classroom presentations, feedback sessions with expert panel, thorough documentation of design tools/process used.				

146650	Iterative Mthd Machine Learng			
Subject: CS		Catalog Nbr: 0144		
2024 SPRG		Primary	Usman Khan	Usman.Khan@tufts.edu
(Cross-listed as EE 143) Design and analysis of modern machine learning methods with emphasis on convex and nonconvex problems, and centralized, federated, and distributed computational architectures. Topics include convergence, complexities, contractions, fixed point theorems, and perturbation techniques; gradient descent and stochastic gradient descent in addition to accelerated methods including Polyak and Nesterov momentum, minibatching, and variance reduction. State of the practice methods will be covered including Adagrad, Autogard, Adam, sgdm with applications in image classification and document clustering. Recommendations: MATH 70 and CS 11				