Tufts University | School of Engineering

EN1: Applications in Engineering

Tufts Intro to Engineering Section Descriptions

Fall 2024

Document last updated: June 19th, 2024

Tufts School of Engineering (SoE) *First Year Courses* Website:
https://sites.tufts.edu/soefirstyear/

Tufts UNIVERSITY | School of Engineering

Overview

Applications in Engineering (EN1): 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.

Please reach out to the ***individual instructors*** if you have questions regarding details of a particular section of EN1. Otherwise, please reach out to your ***assigned Tufts Academic Advisor*** for general academic advice.

Notes on Registration:

- To facilitate registration for high-demand courses, Tufts has a "***Pre-Registration Eligible***" status on certain courses. Check the documentation on registration for details of when and how you register for courses.
- Every section of EN1 has seats specifically reserved for A&S students. After everyone has a chance to register, all EN1 seats will *open up* for all first-year students to select, and empty seats will either (a) automatically filled by the waitlist or (b) become open/available for any/all first-year students.
- If you are on the waitlist for an EN1 section, you can still sign up for another (open) section, and be automatically swapped if you get off the waitlist
  - This is called a ***"Future Swap" (Add then Drop)*** and requires careful implementation in SIS
  - **Follow these instructions to do this properly.** A mistake will lose your spot on the waitlist.

Tufts UNIVERSITY | School of Engineering

EN1 Sections (Fall 2024)

Section 01: Intro to Renewable Energy (Thomas Vandervelde, ECE)

Section 02: Coffee Engineering (Matthew Panzer and Kyongbum Lee, ChemE)

Section 03: Engineering for the Customer (Eli Cushner, Gordon Institute of Engineering Management)

Section 08: Simple Robotics (Ethan Danahy, CS)

Section 09: Community-Centered Engineering (Greses Pérez, CEE)

Section 10: Engineering in the Kitchen (Emily Carlson, ECE)

Section 13: Impact of Self-Driving Cars (Harold Miller-Jacobs and James Intriligator, ME/HF)

Section 14: Frontiers in Reproductive Health Engineering (Juan Gnecco, BME)

Section 15: Sci-Fi Bioengineering (Nisha Iyer, BME)

Section 16: Bridges and Resilient Cities (Betsy Kirtland, CEE)

Section 17: Intro to Nanoscience (Paul Simmonds, ECE)

Section 18: Exploring Computer Science (Diane Souvaine, CS)

Section 19: Wind Energy: Extreme Engineering & Societal Impacts (Dan Kuchma, CEE)

Section 01: Intro to Renewable Energy

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Electrical and Computer Engineering
- Lecture Class Number: #82852
- Lecture Times: Tu, Th 3:00PM - 4:15PM

Description:

We will examine renewable energy generation technologies with a critical eye; including, the examination of the way the media portrays energy technologies. We will explore the renewable energy technology of today as well as future prospects. We will look at the natural resource requirements of energy systems as well as their environmental and economic impacts. While going off the grid sounds like a great idea, it is a complex problem to be solved. Solar and wind energy sources require a lot of land; additionally, they are not constant with time, and efficient energy storage technology does not exist. Labs will give the student a hands-on sense for the energy generation process and its complexity.

Tom Vandervelde
tvanderv@ece.tufts.edu

Tom Vandervelde is the Department Chair of Electrical and Computer Engineering and the Director of the Graduate Materials Science and Engineering Program, which is part of the Tufts Interdisciplinary Advanced Materials (TIAMAT) Center. He also holds secondary appointments in the Department of Mechanical Engineering and the Physics and Astronomy Department. His research group The Renewable Energy and Applied Photonics Laboratories (REAP Labs). His research focuses on how light interacts with matter, with an emphasis on new materials and devices for energy generation and waste energy harvesting.

Section 02: Coffee Engineering

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Chemical and Biological Engineering
- Lecture Class Number: #83019
- Lecture Times: Tu, Th 1:30PM - 2:45PM
- Required Lab (#83056): Fr 1:30PM - 2:45PM

Description:

What agricultural commodity is produced at a scale of over 20 billion pounds per year globally? Coffee beans! This course provides an introduction to several (bio)chemical engineering concepts, including: mass and energy balances, process flow diagrams, driving forces for molecular motion, and some organic/physical chemistry, all discussed in the context of coffee production and brewing. Additional topics include: coffee economics, caffeine biology and metabolism, data representation/statistics, and pressure-driven flow.

Matthew Panzer
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Kyongbum Lee
kyongbum.lee@tufts.edu

Matthew Panzer is a professor in the Department of Chemical & Biological Engineering. His current research is focused on the design of polymer-supported, ion-dense gel electrolytes for energy storage, sensing, and other applications.

Kyongbum Lee is the dean of Tufts University School of Engineering and professor in the Department of Chemical and Biological Engineering. His current research studies how the metabolites produced by gut bacteria impact human health.

Section 03: Engineering for the Customer

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Gordon Institute of Engineering Management
- Lecture Class Number: #82919
- Lecture Times: Tu 6:00PM - 9:00PM

Description:

What do Amazon, Broadway, and Dunkin' Donuts have in common? They deliver great customer experiences. These experiences are anything but random; they are carefully designed and engineered. Through team projects, class discussions, and guest speakers, we will analyze physical products, user-interfaces, service experiences, and the leadership skills needed to bring it all together. You will leave this course with a mindset and toolset to focus on the customer as you continue your engineering journey at Tufts.

Eli Cushner
eli.cushner@tufts.edu

Eli Cushner is the Senior Manager of Knowledge Management & Learning at Paytronix Systems. He brings his experience in leadership, customer experience, and technical project management to the classroom. Eli completed his undergraduate studies at Tufts University in Human Factors Engineering, Entrepreneurship, and Engineering Management. Eli received his Master of Science in Engineering Management (MSEM) from the Tufts Gordon Institute. Eli teaches "Management of Innovation" and "Engineering for the Customer" through the Tufts Gordon Institute. In his spare time, Eli is a sleight-of-hand magician and incorporates magic into class each week.

Section 08: Simple Robotics

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Computer Science
- Lecture Class Number: #82893
- Lecture Times: Mo, We 10:30AM - 11:45AM
- Required Lab (#82918): Fr 10:30AM - 11:45AM

Description:

Introduction to robot construction, programming, event-based programming, artificial intelligence, and elementary controls. Basic principles of robotics for students with minimal or no prior programming or building background. Hands-on projects emphasizing engineering design using a LEGO-based Robotics platform.

Ethan Danahy
ethan.danahy@tufts.edu

Ethan Danahy is a Research Associate Professor at the Center for Engineering Education and Outreach (CEEO) with secondary appointment in the Department of Computer Science at Tufts University. Having received his graduate degrees in Computer Science and Electrical Engineering from Tufts University, he continues research in the design, implementation, and evaluation of different educational technologies. Ranging from software and hardware to interfaces and environments, he explores how these tools can improve interactive educational pedagogies through supports aimed at learners in K-12 through university classrooms. With particular attention to engaging students in the STEAM content areas, he focuses his investigations on enhancing creativity and innovation, supporting better documentation, and encouraging collaborative learning.

Section 09: Community-Centered Engineering

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Civil and Environmental Engineering
- Lecture Class Number: #82905
- Lecture Times: Mo, We 3:00PM - 4:15PM

Description:

The goal of engineering is to develop solutions for a diverse population and to do so engineers need to meaningfully engage with the communities they serve. This course offers an experiential opportunity to learn with communities about how engineering starts and ends with people. Students in this course will partner with local K-12 students to engage in engineering design with cross-generational teammates and explore mentorship opportunities. Along the way, students will learn different approaches to understand people and technologies. Through this course, students will use their knowledge to co-design community-relevant engineering activities and products for young students, including games, STEM activities, and other products that focus on the community. Students will develop an understanding of people from different backgrounds and how they interact with engineering design activities. These experiences will prepare them with useful skills for future projects and research experiences, such as working with external partners and transforming ideas into solutions and products through rapid iteration. In learning about who we are as engineers and the communities we interact with, students will explore questions about what it means to be an engineer and who can become one. No prior experience is necessary.

Greses Pérez
greses.perez@tufts.edu

Greses Pérez is an engineer, learning scientist and educator. Her scholarship specializes in the interdisciplinary study of language and cognition for students who experience a cultural and linguistic mismatch between the practices of their communities and those in engineering and science. Her mission is to expand who is heard and can contribute to the disciplines as society demands professionals with backgrounds as diverse as the challenges we face.

Section 10: Engineering in the Kitchen

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Electrical and Computer Engineering
- Lecture Class Number: #82928
- Lecture Times: Tu, Th 3:00PM - 4:15PM
- Section website: http://www.ece.tufts.edu/en/1EK/

Description:

In this course, we will explore engineering through the lens of food and kitchen gadgets. During the semester, we will disassemble every electrified food-preparation device we can get our hands on, learn how they work, and use our newfound skills to build a few of our own. Along the way, you'll analyze and design basic electrical circuits, program microcontrollers to take measurements and respond to them, log data to answer questions about cooking, and connect the Things you build to the Internet. We'll also explore some of the complex social and ethical issues at the intersection of technology and food: does a cloud-connected refrigerator make us more efficient, or more lazy, or does it just result in more e-waste? And what responsibility do engineers have when working with something so deeply human as food?

Emily Carlson
steven.bell@tufts.edu

Emily Carlson is an Assistant Teaching Professor in Electrical and Computer Engineering. Her interest in solar cells and optics led her to join the Renewable Energy and Applied Photonics Lab at Tufts University during her PhD where she designed, simulated, and fabricated optical elements to improve the efficiency of thermophotovoltaics (solar cells that use heat to generate electricity).

Section 13: Impact of Self-Driving Cars

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Mechanical Engineering/Human Factors
- Lecture Class Number: #82880
- Lecture Times: Mo, We 10:30AM - 11:45AM

Description:

There is no question about it – Self-Driving Cars will be here; the only dilemma is when! This class will examine all aspects of this coming revolution. We will address the questions of:

- What are the advantages and disadvantages of self-driving cars?
- What are the technologies that will enable this to happen?
- How are the engineering complexities being addressed?
- Who are the key players in the world?
- What impact will this revolution have on our way of life?
- What are the social, ethical, urban, environmental, and legal implications of this revolution?

We will examine these topics through lectures, guest speakers, and student presentations. The aim of the course is to not only examine the engineering principles involved in self-driving cars but to also examine the societal implications as we move forward with this technology.

Harold Miller-Jacobs
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James Intriligator
james.intriligator@tufts.edu

Hal Miller-Jacobs has been a Human Factors Engineer for many decades, working on a variety of projects, including building the first infotainment system user interface for General Motors. On the adjunct faculty teaching in the Psychology Department at Tufts, he is driving his second Tesla and can't wait for full self-driving to become legal.

James Intriligator earned his Ph.D. in cognitive neuroscience from Harvard University and then did a postdoc in neurology. After five years running think-tanks and innovation centers, he returned to academia and merged his technology, business, and scientific expertise at Bangor University (Wales, UK) creating Europe's leading consumer psychology master's programs and co-developed several multidisciplinary design programs. He came to Tufts in 2016 to run the Tufts Human Factors Engineering program and enjoys creating psychologically informed human-machine systems.

Section 14: Frontiers in Reproductive Health Engineering

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Biomedical Engineering
- Lecture Class Number: #83593
- Lecture Times: *time TBD*

Description:

Reproductive tissues are some of the most dynamic, multifactorial, and complex systems of the human body and, as such, remain some of the most poorly understood. *Frontiers in Reproductive Health Engineering* is an introductory course that explores how big picture themes in the discipline of biomedical engineering (BME) can help to demystify, destigmatize and advance the way we understand women's reproductive health and its diseases. The goal of the course is to expose first year students to both the basic principles of engineering and the fundamentals of the reproductive biology through a series of didactic lectures, group discussions, demos and invited guest speakers that span the current state of technology, the existing needs, and the future of reproductive health.

Juan Gnecco
juan.gnecco@tufts.edu

Juan Gnecco's research vision lies at the interface of reproductive biology and tissue engineering to understand the immune-endocrine mechanisms driving both reproductive physiology and disease pathogenesis. He developed the first microphysiological systems (MPS) model of the perivascular endometrium and deployed this model to illuminate the inflammatory effects exerted by environmental toxicants on the female reproductive tract.

Section 15: Sci-Fi Bioengineering

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Biomedical Engineering
- Lecture Class Number: #82935
- Lecture Times: Tu, Th 3:00PM - 4:15PM

Description:

Where does science fiction meet biological reality? Using classic and contemporary sci-fi films as a framework for inspiration and discussion, this course will survey the practicalities of once imaginary technologies including gene editing, chimeric animal research, artificial organs, rapid vaccines, neural interfaces, and more. As we dissect fact from fiction, students will grapple with global and interstellar bioengineering challenges, regulations, and ethics as they exist now and may exist in the near future.

Nisha Iyer
nisha.iyer@tufts.edu

Nisha Iyer's research interests are at the intersection of developmental biology and regenerative medicine, using stem cells to understand and advance neural repair. She has developed clinically translatable methods to derive regionally and phenotypically specified hindbrain, spinal cord, and peripheral tissues from human pluripotent stem cells. Her lab focuses on using human pluripotent stem cells to determine how regional and phenotypic specificity drives neural circuit formation, degeneration, and regeneration in the spinal cord.

Section 16: Bridges and Resilient Cities

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Civil and Environmental Engineering
- Lecture Class Number: #82936
- Lecture Times: Tu, Th 6:00PM - 7:15PM

Description:

We will use the semester to understand the interaction of bridge design for resilient cities. Bridges play a significant role in urban design as they connect populations and often provide a significant architectural contribution to the cityscape. As a major component of a transportation network, bridges also play an essential role in creating resilient cities and ensuring that transportation networks remain functional in an emergency. We will study bridges in three major cities to learn about engineering design, city planning, and natural hazards with a focus on the creation of resilient cities. Students will learn the basics of bridge engineering, will be introduced to geospatial mapping, and will learn about what makes communities resilient.

Betsy Kirtland
betsy.kirtland@stantec.com

Betsy Kirtland, PE is an award winning Structural Engineer at Stantec on the Bridge Design Team in Boston. She is a part-time lecturer in the department of Civil and Environmental Engineering, teaching a class for freshman about the basics of bridge design and the importance of resilience in civil engineering.

Section 17: Intro to Nanoscience

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Electrical and Computer Engineering
- Lecture Class Number: #82937
- Lecture Times: Tu, Th 1:30PM - 2:45PM

Description:

In the Introduction to Nanoscience course we explore what happens when we make things incredibly small. We will see that as we as approach length scales of a few tens of nanometers, the properties and behavior of objects fundamentally changes as we enter the strange but powerful quantum world. We will investigate the foundations of nanoscience through the lens of both naturally occurring and artificially designed nanomaterials, looking at their applications in modern technology. We will collaboratively investigate nanoscale phenomena and their impact on engineering solutions. Course content will explore the world of nanotechnology from a multidisciplinary perspective and discover its potential to revolutionize society by offering future solutions to big engineering problems.

Paul Simmonds
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Paul Simmonds is an Associate Professor in the Department of Electrical and Computer Engineering. His research lies at the convergence between electrical engineering, condensed matter physics, and materials science. Specific research interests include the synthesis of novel semiconductor nanostructures, spintronics, high mobility electron transport, and the integration of dissimilar materials. His work has applications in a wide range of areas from quantum information science and advanced infrared optoelectronic devices, to low-power electronics.

Section 18: Exploring Computer Science

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Computer Science
- Lecture Class Number: #83061
- Lecture Times: Tu, Th 10:30AM - 11:45AM
- Select Lab:
  - #83566: Mo 9:00AM - 10:20AM
  - #83568: F 9:00AM - 10:20AM

Description:

Basic principles of computer science for students with minimal or no prior programming background. Fundamentals of design, coding, and testing computer programs. Fundamental algorithms for sorting and searching. Programming projects employ and demonstrate common algorithms. Projects analyze and visualize data from real applications. This sampling of various topics will give the student a taste of not only what constitutes computer science, but also a deeper understanding of mankind's most powerful tool. The course will prepare the student to take CS 11 in a subsequent semester, if so desired. ***Note:*** *Section 18 should* ***NOT*** *be taken in the same semester as CS 11.*

Diane Souvaine
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Diane Souvaine's research in computer science spans the fields of computational geometry, design and analysis of algorithms, and computational complexity. In addition to being a professor in Computer Science (with secondary appointment in Mathematics), Dr. Souvaine has served as Vice Provost for Research, Senior Advisor to the Provost, and Chair of the Department of Computer Science at Tufts. Dr. Souvaine is dedicated to increasing diversity and advancing women and underrepresented groups in STEM and works to enhance pre-college education in mathematics and computational thinking.

Section 19: Wind Energy: Extreme Engineering & Societal Impacts

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Civil and Environmental Engineering
- Lecture Class Number: #83647
- Lecture Times: Tu, Th 3:00PM - 4:15PM

Description:

The wind energy resource is enormous, and it could power a fully electrified world many times over. The costs of wind energy have fallen to be less than the costs from petroleum-based energy sources. The reduction in costs is primarily due to the growing size of wind turbines which in offshore wind farms can have 500 ton generators and 120m long blades supported on 200m tall towers/foundations. This course will provide a first look at the physics, engineering challenges, and societal impact of wind energy. Topics in physics will include aerodynamics, hydrodynamics, mechanics, and hurricanes. Topics in engineering will include structural design, fabrication, installation, and infrastructure (ports, vessels, electrical grid). Topics on Societal Impacts will include climate change, economics, and energy policy, as well as energy justice and environmental impacts.

Dan Kuchma
dan.kuchma@tufts.edu

Dan Kuchma is a professor in Civil and Environmental Engineering with research interests in the design and behavior of reinforced and prestressed concrete structures subject to complex states of stress. Some of his recent activities involve investigating the behavior of structural concrete designed by the strut-and-tie method as well as the shear design of high-strength concrete bridge girders.

For more information…

Tufts UNIVERSITY | School of Engineering

Visit the Tufts SoE First Year Website: https://sites.tufts.edu/soefirstyear/

Visit the Tufts course listing at SIS: https://go.tufts.edu/sis

Visit the School of Engineering and individual department webpages:

https://engineering.tufts.edu/

Reach out to members of the SoE Undergraduate Advising Teams:

https://go.tufts.edu/EngineeringAdvising

Check out the Engineering Degree Sheets for different engineering majors:

https://go.tufts.edu/EngineeringDegrees

Tufts UNIVERSITY | School of Engineering

PREVIOUS SECTIONS (DELETE)

Section 05: Enhancing Human Movement Capabilities

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Mechanical Engineering
- Lecture Class Number: #82952
- Lecture Times: Tu, Th 12:00PM - 1:15PM

Description:

This course examines how wearable technology and customized game environments can be designed to improve targeted aspects of human movement skill. Fundamental engineering topics, including dynamics simulation, feedback control, biomechanical models, robot kinematics, are introduced. A final team project features hands-on skills in using sensors and actuators, coding for experiments, and visualizing real-time data.

Hoda Koushyar
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Hoda Koushyar is an Assistant Teaching Professor within the Department of Mechanical Engineering. Her research interests are in biomechanics, applied mechanics, materials characterization, and engineering education. Dr. Koushyar has been an instructor at Tufts since 2017 and has taught thermodynamics and biomechanics courses.

Section 04: The Craft of Computer Science Research

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Computer Science
- Lecture Class Number: #80584
- Lecture Times: Mo, We 3:00PM - 4:15PM

Description:

While it might be obvious why we need research in biology or history, Computer Science research is necessary to reinvent the field and to drive discoveries across many disciplines. This course will teach you the foundations of research. Students will work with a faculty mentor and a student group on a research project. Research topics include machine learning, computer security, quantum computing, human-robotics interaction, computational biology, computational geometry, and others. The course will cover topics including identifying and formulating research problems, reading and evaluating research papers, literature searching, self-guided learning, designing research studies, and data analysis. Students will practice working in a team, goal setting, activity logging, and communicating with others. This is a non-coding class. No prior coding or CS experience is required. Student groups are expected to develop a research proposal by the end of the semester and to be well-prepared to participate in future Computer Science research experiences.

Soha Hassoun
soha@cs.tufts.edu

Soha Hassoun is a professor in, and a past chair of, the Department of Computer Science at Tufts University. She holds secondary appointments in the Department of Electrical and Computer Engineering and the Department of Chemical and Biological Engineering. Hassoun was an integrated circuit designer with Digital Equipment Corporation's Microprocessor Design Group, and worked as a consultant to several EDA companies, including Mentor Graphics and Carbon Design Systems. Her current research interests include developing algorithmic solutions to facilitate designing integrated circuits, and understanding the impact of new technologies such as double-gate devices, carbon nanotubes, and 3-D integration on design. Her other research includes computational methods for systems biology and metabolic engineering, including pathway analysis, modularity analysis, and pathway synthesis.

Section 10: Engineering in the Kitchen

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Electrical and Computer Engineering
- Lecture Class Number: #80633
- Lecture Times: Mo, We 3:00PM - 4:15PM
- Section website: http://www.ece.tufts.edu/en/1EK/

Description:

In this course, we will explore engineering through the lens of food and kitchen gadgets. During the semester, we will disassemble every electrified food-preparation device we can get our hands on, learn how they work, and use our newfound skills to build a few of our own. Along the way, you'll analyze and design basic electrical circuits, program microcontrollers to take measurements and respond to them, log data to answer questions about cooking, and connect the Things you build to the Internet. We'll also explore some of the complex social and ethical issues at the intersection of technology and food: does a cloud-connected refrigerator make us more efficient, or more lazy, or does it just result in more e-waste? And what responsibility do engineers have when working with something so deeply human as food?

Steven Bell
steven.bell@tufts.edu

Steven Bell is an Assistant Teaching Professor in Electrical and Computer Engineering. His research interests include camera systems, embedded systems, and tools for making hardware design more productive. He is also researching how students learn digital design, leading towards ways to make computer engineering more accessible and understandable in the classroom.

Section 05: Critical Thinking in Engineering (and beyond)

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Mechanical Engineering
- Lecture Class Number: #83516
- Lecture Times: Mo, We 10:30AM - 11:45AM

Description:

The ability to critically examine issues is important in engineering practice – particularly when controversial issues are involved (such as alternative energy sources, etc.). Its importance stretches beyond engineering: in a democratic society, the opinions of people affect the decision-making process, and these opinions should be based on critical examination of various claims and statements. The course will involve projects whereby students will be required to examine various issues, using internet sources, and make convincing brief presentations.

Mark Kachanov
mark.kachanov@tufts.edu

Mark Kachanov is a professor in Mechanical Engineering whose research is focused on micromechanics of materials and its applications to various materials systems, as well as on piezoelectrics. Much of his work is carried out in cooperation with industry. Broad research topics include the micromechanics of materials; microstructure-property connections; applications to coatings, geo-materials, and bone; and piezoelectric and nano-electromechanics.

Section 14: Enhancing Human Movement Capabilities

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Mechanical Engineering
- Lecture Class Number: #85054
- Lecture Times: Tu, Th 12:00PM - 1:15PM

Description:

This course examines how wearable technology and customized game environments can be designed to improve targeted aspects of human movement skill. Fundamental engineering topics, including dynamics simulation, feedback control, biomechanical models, robot kinematics, are introduced. A final team project features hands-on skills in using sensors and actuators, coding for experiments, and visualizing real-time data.

Felix Huang
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Felix Huang is a lecturer in the Mechanical Engineering Department at Tufts University. His major research interests include human motor control, robotic rehabilitation for stroke survivors, expert skill training for surgery, and control design of haptic devices. Prior to Tufts, he was previously a research scientist and research assistant professor at the Shirley Ryan AbilityLab (formerly the Rehabilitation Institute of Chicago) and at Northwestern University's Department of Physical Medicine and Rehabilitation.

Section 07: Remote Exploration with Roomba

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Mechanical Engineering
- Lecture Class Number: #83488
- Lecture Times: Mo, We 10:30AM - 11:45AM

Description:

Using the iRobot Create 3 robot platform, we will build and program robots to do things like dance, soccer penalty kicks, remotely controlled exploration, and a robotic jousting tournament. Along the way, students will learn asynchronous coding (in Python and ROS) as well as fabrication techniques such as 3D printing, laser cutting, and water jet cutting. Through building crazy robots, students will get an overview of engineering: the different disciplines, the role of math and science, different educational pathways, etc. Weekly robotics challenges will highlight student ingenuity, creativity, and innovation.

Chris Rogers
chris.rogers@tufts.edu

Chris Rogers' current research work falls into four areas: (1) manufacture of musical instruments, (2) engineering education, (3) educational robotics, and (4) education outreach. The first is mainly aimed at optimizing existing manufacturing processes and the other three look at ways of understanding how students think and then using that knowledge to develop new educational technologies and work with teachers and schools in the use of these technologies.

Section 05: Innovation in Biomedical Eng

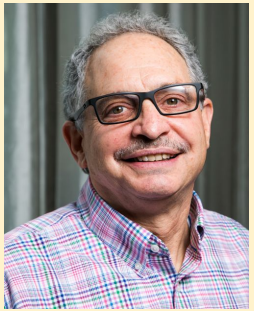
Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Biomedical Engineering
- Lecture Class Number: #83515
- Lecture Times: Tu, Th 9:00AM - 10:15AM

Description:

The course focuses on current topics in biomedical engineering related to the discipline, perspectives on technology impact in society, and concepts and problem-solving teamwork by the students. The goal is to utilize big picture themes to gain insight into the current state of technology related to human health and well-being in the future. Primary goals are 1) to expose students to science and technology involved in the field of biomedical engineering, 2) to look into the future with problem solving and impact on human health and society; and 3) to work in teams to challenge limitations and future opportunities empowered by the field of biomedical engineering.



David Kaplan
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Fiorenzo Omenetto
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David Kaplan is the chair of the Department of Biomedical Engineering and also holds faculty appointments in the School of Medicine, the School of Dental Medicine, the Department of Chemistry, and the Department of Chemical and Biological Engineering. His research focus is on biopolymer engineering to understand structure-function relationships, and studies related to self-assembly, biomaterials engineering, and functional tissue engineering/regenerative medicine.

Fiorenzo Omenetto is a professor of Biomedical Engineering at Tufts University and holds secondary appointments in the Department of Physics and the Department of Electrical Engineering. He has proposed and pioneered the use of silk as a material platform for advanced technology with uses in photonics, optoelectronics, and nanotechnology applications and is co-inventor on a number of disclosures on the subject.

Section 14: Electricity Inside You

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Electrical and Computer Engineering
- Lecture Class Number: #85185
- Lecture Times: Mo, We 4:30PM - 5:45PM
- Section website: http://www.ece.tufts.edu/en/1EIY/

Description:

Forget the Terminator – we ordinary humans are already electrically powered! In this course, we'll learn what bioelectricity is. We'll learn its applications to medicine, both today (pacemakers, electrical pain relief and more) and in the potential future (regenerative medicine). Mainly, we'll spend lots of time building and programming embedded-computing hardware that acts as bioelectrically-controlled prosthetics, cardiac monitors, and more.

Joel Grodstein
joel.grodstein@tufts.edu

Joel Grodstein has degrees in electrical engineering and computer science. He has spent almost 30 years working in the computer industry for Intel, HP, Compaq and Digital Equipment Corporation as a CPU designer, silicon debugger, and CAD-tool developer. He's now enjoying his second career teaching classes that cover computer architecture and design, VLSI, parallel and high-performance computer programming, and applications of computing to biology.

Section 02: Music & Art of Engineering

Tufts UNIVERSITY | School of Engineering

Section Information:

- Department: Electrical and Computer Engineering
- Lecture Class Number: #83111
- Lecture Times: Tu, Th, Fr 12:00PM - 1:15PM

Description:

This course is a hands-on introduction to the fields of electrical and computer engineering. Because many engineers, mathematicians, and scientists are musicians, it makes sense to use music as the context for understanding the science of sound, electronics, and computers. We will study how electrical signals are used to represent sounds, and how these signals can be created and modified using both electronic circuits and computers. In the first half of the course, students will learn to design circuits and then use electronic instrumentation to probe how these circuits work. In the second half of the course, we will use computers and MATLAB to synthesize and modify sound. At the end of the course, groups of students will apply their newly acquired knowledge to design and build a musical project.

Jeffrey Hopwood
jeffrey.hopwood@tufts.edu

Jeffrey Hopwood has worked primarily in the fields of plasma processing and plasma source design. His current research interests include microplasma-based environmental sensors and novel plasma processes for the fabrication of nanoscale devices. Other research interests are plasma etching and deposition processes for integrated circuit fabrication, ionized physical vapor deposition (I-PVD), and plasma deposition of super-hard coatings.