

ES93-06: Simple Robotics

Fall 2014

Welcome to ES93-06, Simple Robotics, for Fall 2014 within the Tufts University School of Engineering. This course is an Introduction to Engineering for first-year students.

Class Description:

Basic principles of robotics for students with minimal or no prior programming background. Fundamentals of design, building, programming, and testing. Projects employ and demonstrate common algorithms while analyzing and visualizing data from real applications. Concepts will be taught through hands-on assignments utilizing a robotics toolset and graphical programming language, and will include introductions to robot construction, event-based programming, artificial intelligence, and elementary controls.

Instructor:

Dr. Ethan Danahy: Ethan.Danahy@tufts.edu

Teaching Assistants:

Trish O'Connor: Patricia.O_Connor@tufts.edu

Jen Scinto: Jennifer.Scinto@tufts.edu

Dan Callahan: Daniel.Callahan@tufts.edu

Help Link: <http://bit.ly/ES93help>

Lab (optional): Friday, 1:30pm to 3pm: Center for Engineering Education and Outreach (CEEEO)

Office Hours: Sunday, 3pm to 4:30pm: Campus Center (in an upstairs meeting room)

Schedule:

September 3rd, 2014: first day of class

Mid-semester (sometime in Nov): individual in-class exam

December 8th, 2014: final project presentations/showcase (last day of class)

Exam block during finals: "clean-up" party

Meeting times: Monday and Wednesday, 1:30pm to 2:45pm, in SciTech 135

The general schedule in in-class sessions will be project presentations on Monday and covering new content on Wednesdays. Outside of class you will be expected to:

- Watch online video tutorials on hardware, software, etc (course content)
- Meet with your project group to design and implement solutions to weekly projects
- Document your project using text, pictures, video, etc. and upload to course website

It is expected this course, including the in-person/in-class sessions, will take an average of 10-hours per week per student to complete these tasks. If you are significantly above or below that amount, then please meet with the instructor to discuss.

Grading:

Weekly Projects (x8 total, 5% each): 40%

Final Project: 30%

Exam: 20%

Peer-grading: 10%

Total: 100%

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Exams/Projects:

Exam: The exam will be a written exam taken closed-book/closed-notes individually in class.

Projects: The course consists of multiple group projects throughout the semester, culminating with a larger final project (and showcase). Projects may include sub-projects/prototypes/milestone deliverables to complete.

Range of topics covered/discussed:

As an Introduction to Engineering, many different topics will be covered (at various levels):

Engineering: Engineering Design Process, fields of engineering, engineering education roadmap, engineering ethics

Mechanics: Structural integrity, gears/gear ratios, control theory

Electronics: Sensors, motors, computer architecture, communication protocols

Computer Science: Program flow, programming mathematical formulas, order of operations, functions, modifiers/variables, data types, data structures, loops, run time, parallel processing

Additionally, there will also be a focus on: creative thinking, problem solving, teamwork, communication, and presentations.

Course Materials:

Textbook: There is no textbook associated with this class, but rather most of the course content will be delivered through online videos you'll need to watch (links to YouTube videos will be posted on course website) on your own prior to arriving to class.

Robotics Toolset: For the hands-on projects, we will be using the **LEGO MINDSTORMS EV3** robotics kit (which will be on loan to you from Tufts, and must be returned at the end of the course). When assignments are given, details as to other acceptable materials (e.g. to supplement this kit) will be specified, and you will be required to find any not explicitly provided by the instructor.

Programming Software: We'll be using the **LabVIEW Student Edition 2014** graphical programming environment from National Instruments (price for students via Studica: \$20), which is available for both Windows and Mac OSX. You will need to purchase, download, and install this software. Additionally, you will need to install the appropriate (free) **MINDSTORMS Module from National Instruments** to enable the software to work with the provided hardware. Detailed instructions on all these processes will be posted to the course website.

Other Resources: For coordinating the class, we'll be using several additional web technologies (such as Trunk, YouTube, InterLACE, WordPress/SmartPost, Qualtrics, Tinkercad, etc; details to be provided as needed) as well documenting your projects through pictures and movies (thus, your group will need technology required to take/edit both) uploaded to the course website.

Course Website: follow link from Trunk: <http://trunk.tufts.edu>