Course Description

This course addresses the problems of controlling and motivating robots to act intelligently in dynamic, unpredictable environments. Major topics will include robot design, perception, kinematics and inverse kinematics, navigation and control, optimization and learning, and robot simulation techniques. To demonstrate these concepts, we will be looking at mobile robots, robot arms and positioning devices, and virtual agents. Labs will focus on programming robots to execute tasks and to explore and interact with their environment.

Instructor Information

Prof. Matt Zucker
Office: Hicks 219 – office hours: Tuesday 2:00 PM - 4:00 PM
Phone: (610) 328-8636
Email: mzucker1@swarthmore.edu

Class wizard: TBA

Meeting Times

Lecture: Martin 213, Tuesday & Thursday, 11:20 AM - 12:35 PM
Labs: self-scheduled (see below)

Prerequisites

ENGR 015 or CPSC 035. MATH 027 or 28(S) is strongly recommended. In practice, I expect you to understand elementary programming concepts, including basic loops, functions, and array processing. I also expect you to be comfortable with linear algebra concepts such as matrices, rotations and translations. We will also cover some basic concepts in probability.

Textbook

There is no textbook for the course; however, there will be assigned readings, and notes will be produced for the class by student scribes (see below).
Assignments and grading

Homework consisting of math, short answer questions, and small programming exercises will be assigned weekly. There will be several larger projects/labs which are both more open ended and more programming intensive, and a self-directed final project. Projects and labs will be completed in small groups. The course has two midterm exams as well as a final exam. Grading will follow approximately the divisions shown below:

- Homework: 20%
- Projects/labs: 35%
- Midterm exams: 2 x 15%
- Final exam: 15%

Labs and projects

Labs and projects will be conducted in small groups, typically of three students. Due to scheduling conflicts with other courses, there is no regular lab time; however, during the first week, we will form lab groups and arrange times to meet for short (typically 30-45 minutes) tutorials at the start of each new lab or project. Other than those tutorials, labs will be self-scheduled.

We will also have a longer final project at the end of the semester. Your group will prepare a short oral presentation about your project for the last week of class.

Scribes

Each week, we will have two assigned student scribes. Scribes collaborate to take notes and make them available to the class the following Tuesday. Volunteering as scribe earns credit for a future homework assignment of your choosing (it can not be applied retroactively, however).

Collaboration policy

- Homework should be completed individually.

- Projects and labs should be completed in groups of two or three.

- Although you may discuss the homeworks and labs with your other classmates, I expect that the work you turn in is your own.
• If you do discuss your solutions with your classmates, I expect you to disclose any such collaboration clearly in your writeups and/or reports. Err on the side of caution – it’s the best way to avoid awkward conversations about suspicious similarities between assignments with no attribution of credit.

• Cite any external sources used, including the textbook, web sites, discussions with other professors, etc.

Late policy

Homework will generally be assigned on Thursday, and due at the start of class the following Thursday. An assignment may be turned in up to four days late (i.e. the following Monday) for half credit. Students get two free late turn-ins without penalty.

Due to the group nature of the work, labs and projects will be strongly penalized for lateness.

I will do my best to accommodate you in extraordinary circumstances. Bear in mind that advance notice of such circumstances is always better.

Webpage and mailing list

The course webpage is at http://www.swarthmore.edu/NatSci/mzucker1/e28/. This page will be regularly updated with assignments, projects and reading. You are expected to be responsible for checking for webpage updates in a timely fashion.

You will be automatically subscribed to the course mailing list, which you are also responsible for checking. Throughout the semester, we will use the list to communicate about course information and technical help for programming. The mailing list should not, however, be used to share solutions to homework assignments, projects, or labs. If you’re unsure about whether to post something, feel free to email me first.