ENGR 28/CPSC 82 – MOBILE ROBOTICS
COURSE SYLLABUS

Instructor: Matt Zucker (mzucker1@swarthmore.edu)
Office hours: Hicks 219, Monday 11 AM–12:30 PM & Wednesday 1:30–3 PM
Lecture: Hicks 211, Tuesday & Thursday, 11:20 AM–12:35 PM
Labs: Hicks 301, self-scheduled; project “kickoffs” date/time TBA

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, navigation and control, optimization and learning, and robot simulation techniques. To demonstrate these concepts, we will examine mobile robots, manipulators and positioning devices, and virtual agents. Projects will focus on programming both real and simulated robots to execute tasks and to explore and interact with their environment.

Prerequisites

ENGR 019 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. Familiarity with Python in particular is useful, but not strictly necessary. I also expect you to be comfortable with linear algebra concepts such as matrices, linear transformations, dot products, transposes, inverses, eigenvectors, eigenvalues, etc.

Class resources

There is no textbook for the course; however, there will be assigned readings, and notes will be produced for the class by student scribes. At the end of each week, two appointed scribes will collaborate to make their notes available to the class by the following Tuesday. Every student will be selected to scribe at least once.

The course webpage is at http://www.swarthmore.edu/NatSci/mzucker1/e28_f2016/. This page will be regularly updated with assignments, scribe notes, and reading, so please keep aware of the materials posted there. Students will be invited to join the class user group hosted at Piazza.com. We will use it throughout the semester to communicate course announcements and answer questions. Please use Piazza for all course-related communications – this allows students to see common problems and to engage in discussions about course material.

Assignments and grading

Homework consisting of math, short answer questions, and small programming exercises will be assigned roughly weekly. Less frequently, we will have in-class quizzes, which will be announced
in advance. There will be four regularly scheduled projects involving hands-on programming of real and simulated robots, as well as an open-ended, self-directed final project.

Projects will be conducted in small groups, typically pairs of students. Due to frequent scheduling conflicts with other courses, there is no regular lab time; however, during the first week, we will form groups and arrange times to meet for short (15-30 minute) “kickoff” tutorials at the start of each new project. Other than those tutorials, project work will be self-scheduled.

Grading will follow approximately the divisions shown below:

- Homework/quizzes: 45%
- Regular projects: 35%
- Final project: 15%
- Class participation: 5%

Your participation grade encompasses involvement in class discussions, preparing thorough and readable scribe notes, and posting constructively on Piazza.

**Collaboration policy**

- Feel free to collaborate with your classmates on homework; however, you must submit your own work, and duplicating others’ assignments verbatim (especially code!) is prohibited.

- If you do discuss homework with your classmates, I expect you to disclose any such collaboration clearly in your submitted work. Err on the side of caution – it’s the best way to avoid awkward conversations about suspicious similarities between assignments.

- Cite any external sources used, including the textbook, internet, discussions with other professors, etc.

- Aside from raising technical and procedural questions on the course Piazza, do not collaborate on projects with others outside your group.

- Do not post homework or project solutions on Piazza. Questions or answers that discuss solutions too closely will be deleted.

**Late policy**

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

Late projects or absences from quizzes which have not been excused in advance may be strongly penalized. I will try to accommodate you in extraordinary circumstances, especially if you contact me ahead of time.