

COMP 551: Advanced Robotics Lab Syllabus

1 Course Description

This course is a hands-on introduction to the key concepts of robotics. Each student will use a small mobile robot to learn about sensors, computation, digital communications, and embedded software design. The course will have four take-home labs using this robot platform. The course website is:

<http://www.clear.rice.edu/comp551/>

2 Prerequisites

Programming experience is required. We use Python and C for the homework labs. We will not be writing complex code, but you will need to know how to get moving and debug your software. Aside from the programming demands, all interested senior and graduate students are welcome.

3 Topic Overview

The curriculum covers basic robotics, and hands-on lab activities. Topics include:

1. Course overview, robots of yesteryear
2. Sensors and Pose
3. Actuators
4. Feedback Control
5. Braitenberg vehicles, FSMs, Behavior-Based Control
6. Communications
7. Consensus and Agreement
8. Distributed Algorithms
9. Coverage Control
10. Multi-Threaded Programming
11. State estimation

4 Text

None is required. The book "Probabilistic Robotics" by Thrun, Burgard, and Fox will be useful for the last third of the course.

5 Robot

We will distribute a r-one (pronounced "are-one") robot to each student to use for the homework assignments. These robots are yours for the semester. Handle them with care. We will give each of you a sophisticated storage container for your robot. Not only will this help keep the robots fresh, but it will protect them from harm in your backpacks.

6 Computers

You will need a computer to complete the robot programming assignments in this course. The best solution is for you to use your own laptop or workstation in your lab. Please talk to me if you do not have a laptop so that we can arrange access.

7 Staff

The course staff and office hours will be posted on the website. Please email questions to the entire staff: engi551-staff@rice.edu. This will ensure the quickest response from the correct person.

8 Meeting Times

Lecture: Tuesday & Thursdays, 2:30-3:45, Keck 107.

Office Hours: After class most lectures, Friday 1-2pm. See website for updated hours.

9 Collaboration

We encourage working in groups to think through the problems, and to get help in debugging your software. However everything you hand in, especially your programs, must be your own work. You must identify the people you worked with at the top of your assignments. We take the Rice Honor Code very seriously, misrepresenting your work will be dealt with harshly. It's not worth it, just do your best, and hand in your work.

10 Grading

There will be four homework lab assignments, each worth 25% of the final grade. There will be no tests or final.

- Problem sets (4): 25% each

Each of these four problem sets (a.k.a. homework) will have a lab check-off that will require you to demonstrate some behavior on your robots. Homework is due at the beginning of class on the due date. Late homework will not be accepted. All answers must be on a separate sheet of paper, and we strongly prefer typed assignments.

11 Class Participation Points

The class is much more fun when there is more class participation. Show up, read the papers, ask questions, participate in the discussion. It will make the 75 minutes go by much faster.

12 Students with Disabilities

Any student with a documented disability seeking academic adjustments or accommodations is requested to speak with the instructors during the first two weeks of class. All such discussions will remain as confidential as possible. Students with disabilities will also need to contact Disability Support Services in the Allen Center.

13 Miscellaneous

The official course color is Dark Royal Blue: http://en.wikipedia.org/wiki/Royal_blue. I like it. I find it calming and sophisticated. Just like robots.