CS148
Building Intelligent Robots

Introductory Missive *1 Sep 2004*

CS148 will meet Tuesdays and Thursdays from 9–10:20am. Lecture sessions for CS148 will meet in Lubrano (CIT472). For lab sessions, the class format will be more informal, with labs and demonstrations of students work in the MSLab (CIT 167).

CS148 will consist of two tracks:

- Standard track: Students in the standard track will be using the LEGO Mindstorms kits throughout the course. Since these resources are limited, this track will be limited to 26 students, with one kit to each pair of students. Standard track enrollment will be determined by a lottery weighted towards seniors and concentrators; to be eligible to enter the lottery you must attend the first class and fill out the form you will receive there.
- Advanced track: Students in the advanced track will be the Player/Stage/Gazebo robot simulation package for labs and a platform of the (approved) choice for projects. Because Player/Stage/Gazebo is simulation software, enrollment in the advanced track can be expanded based upon the direction of the instructor. Additionally, the advanced track will place greater emphasis on project design and implementation.

The current syllabus is available on the course web page, `www.cs.brown.edu/courses/cs148`. Labs and projects will be posted there as they are assigned, so check the web page and the course newsgroup, `brown.cs.cs148`, often. The web page is the primary source of information, however, and any important announcements posted on the newsgroup will also be posted on the MOTD page.

Course Staff (`cs148tas@cs.brown.edu`)

Professor	Chad Jenkins (`cjenkins`)
Head TA (`cs148headtas@cs.brown.edu`)	Kate Tsui (`ktsui`)
Teaching Assistants	Chris Kern (`ekern`) Evan Shapiro (`edshapir`)

Class Format

As stated above, CS148 will have both lecture and lab sessions. Lab sessions will be devoted to a demonstration of the previous week's project, and the second half will be a lab focusing on new material.

Prerequisites

CS 4 or CS 15/16 or CS 17/18.

Labs and Projects

Labs and projects for CS148 will begin during the second week of the semester.

0.0.1 Standard Track

The standard track will consist of six labs given over six weeks. The lab handout, which you will receive the lecture beforehand, will tell you what to do to prepare for the lab, in addition to describing the requirements for both the lab and the project. The lab should be finished by the end of the lab session, and the accompanying project, along with a writeup describing your work, will be due before class one week later.

The midterm project will last two weeks and be due in the beginning of November. The final, an open-ended project, will go out in early November and be due at the end of the semester.

In addition to the labs and projects themselves, you will be required to turn in writeups of your work which are due at the same time as your projects.

0.0.2 Advanced Track

The advanced track will consist of four labs given over four weeks. The lab handout, which you will at the beginning of the lab session, will provide instuctions and requirements for both the lab and the project. The lab should be finished by the end of the lab session, and the project, along with a writeup describing your work, will be due before class one week later.

The advanced track includes a single longer-term project, consisting of design, proposal, and implementation of a substantial robotics project. Additionally, advanced track students will be required to peer-review other advanced track proposals. Proposals for advanced track projects will be due in mid-October followed by peer reviews due in late October. An advanced track proposal must be approved, or "greenlit", by the instructor. An initial project demonstration will be required during mid-November. The project will conclude with a final demonstration and the submission of a conference-style paper at the end of the semester.

Writeups

The project reports will be due at 10 PM the night the project was due. Each handout will contain the details of what the report should contain. **If you do not hand in a writeup, you will receive no credit for the entire project.** If you hand in a late writeup, you will receive credit for the physical part of the project, but not the writeup part. (Your maximum grade for the project in this situation is 50%.)

Collaboration Policy

Students in the standard track will work in pairs for all of the labs and projects. Unless there are exceptional circumstances, you will work with the same person all semester. For the final, your team may choose to work with another team if you want to do an especially extensive project requiring two RCX bricks. There will be more details about this as the final approaches.

Students in the advanced track will work as individuals for labs. You will be allowed to team with other advanced track students for proposing a class project. The size of such collaborations can vary based on the scope of a proposed project. A single proposal will be submitted for a collaborating group with specific mention to each individual's contribution. Each student within a project collaboration, however, must submit their own paper at the conclusion of the project.

No collaboration is allowed on the project writeups—not even with your partner. You are encouraged to take notes and make diagrams while you're building and programming your robots, but each partner's writeup must contain their own thoughts and ideas and are to be written up individually.

While working on a project, collaboration with other groups is allowed up to but not including sharing of code or written design documentation.

Any usage of material, ideas, or concepts other than your own must be explicitly cited in your submission and will not count as central to your submission.

Grading

The standard track grade distribution is as follows:

6 labs and projects	30%
midterm project	35%
final project	35%

The advanced track grade distribution is as follows:

4 labs and projects	20%
project proposal	10%
proposal peer review	10%
initial demonstration	10%
final presentation	25%
project paper	20%
class participation	5%

Grading of all assignments will be interactive as you will not want to take your robot apart for the next assignment before its been graded. Therefore it is important that you finish your projects on time. Projects will be graded at the beginning of class one week later. Grading for the midterm and final will be covered in the handouts.

Late Policy

Labs should be completed during lab time, but if you are unable to do so, you must finish up during TA hours on the same day. If you must miss lab because of sickness or a conflict, you must let the TAs know before 5 PM the day before the lab. You will then be able to makeup the lab during TA hours the following week. You must finish the makeup lab before the next lab. You will be allowed one "unexcused absence" from lab. After that, if you miss a lab without notifying the TAs with a legitimate reason[1] beforehand, you will receive no credit for the lab.

You will be allowed one 'late day' on your projects. After you use your one late day, a missed project means no credit. You must request the late day by 5 PM the day before the due date.

Late midterm and final projects will not be accepted.

Demo Days

You have to attend the Midterm Competition and the Final Project Demo Day on 11/2 and 12/7[2] respectively. Attendance is mandatory on both of these days, and will be factored into your midterm and final grades. If you have a conflict on one of these days, you must let the course staff know well in advance.

brickOS

The LEGO Mindstorms kits come with a visual programming tool called RIS. You are welcome to play around with this if you would like, but for the course we will be using a more traditional C-based programming language: brickOS. More information will be presented during the first classes, and the second lab focuses on brickOS.

LEGOs

On 9/13, standard track students will be given a LEGO kit which includes:

- RCX brick
- two motors
- three light sensors
- two touch sensors
- two rotation sensors
- infrared port and cable
- four short wires

[1] Medical problem, special event for another course, etc.
[2] Dates subject to change.

- two long wires
- LEGO plier
- starting set of batteries (6 AA, 1 9V)
- a plastic container for storing your robot

Because of the difficulty of keeping track of the smaller LEGO pieces, you will not be able to take these home except when they are part of your robot.

You will not receive a grade for the course until you return your kit at the end of the semester.

Hours

Hours will be held in the Lego Lab (CIT 472).

LEGOs will be available for use at anytime. Students may use the nodes in the Lego Lab as long as no TA is holding hours and wants a node. If during hours, the Lego Lab gets too crowded, hours will be held in the Mac Lab on the second floor of the CIT.

The schedule is available the course web page. Please let us know if the current times don't work or if more hours on certain days would be better. We don't want to be holding hours when no one can take advantage of them, so feedback (sent to `cs148tas@cs.brown.edu`) would be appreciated.

Lego Lab (CIT 472)

You will be able to get a key to the Lego Lab early in September. We will notify you in class and on the web site when the keys are available. You will be required to pay a refundable $25 deposit to the CS Department to get a key. **You will not receive a grade for the course until you return your key at the end of the semester.**

Everybody will have access to the Lego Lab so its in everyone's best interest to keep the lab neat and clean. This includes returning the legos you don't use to their correct bin after you are done building your robot. The bins have been painstakingly organized by your TAs, so please do not place pieces in the wrong drawers.

Do not keep more pieces than you need in your kit. Some parts are heavily used, and when these parts run out, it is very frustrating to those who need them. Please clean out your kit after each project.

Recommended Books

- Martin: *Robotic Explorations: A Hands-On Introduction to Engineering*, Prentice-Hall, 2001.
- Craig: *Introduction to Robotics: Mechanics and Control*, Addison-Wesley, 1989.
- Matarić: *The Robotics Primer*, pending publication, 2004.