

CS 440 – Intelligent Systems

Syllabus – Fall 2008

Lecture: TR 7:30 – 8:45 am, MLH 310
Lab: T 1:00 – 3:00 pm, MLH 310
Professor: Dr. Holly Patterson-McNeill
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Office Hours: M-Th 9:00-10:00 am
and By Appointment

I. COURSE DESCRIPTION AND PREREQUISITES

CS440 introduces students to the fundamental concepts and techniques of artificial intelligence (AI) and information management. We will use robotics to explore the major areas of AI and the LEGO® Mindstorms NXT™ to explore robotics.

Prerequisites: CS 213 Algorithms and Data Structures or permission of the instructor.

Credit Hours: 4

II. MATERIALS AND SUPPLIES

Textbook and Supplies:

- Jones, M. T. *Artificial Intelligence: A Systems Approach*. Hingham, MA: Infinity Science Press LLC. 2008.
- Other readings as supplied by the instructor.
- Ziplock baggies as needed for sorting pieces.

Resources

- Bagnall, B. *Maximum LEGO NXT: Building Robots with Java™ Brains*. Winnipeg, Manitoba: Variant Press. 2007.
- The leJOS site. <http://lejos.sourceforge.net/>
- The Eclipse site. <http://www.eclipse.org/>
- The LEGO Mindstorms site.
http://mindstorms.lego.com/eng/New_York_dest/Default.aspx
- [Mindstorms NXT Tutorial](#)

III. GOALS AND OBJECTIVES

Goals of the Instructor:

Your constructive feedback is always welcome to help me achieve the following goals:

- To provide quality feedback to students, enabling them to gauge their progress towards achieving their goal in learning about robotics with Legos
- To facilitate an atmosphere conducive to learning about robotics with Legos for all students

Course Learning Objectives:

By the end of the course, the student should be able to:

- Use various search algorithms to solve problems
- Define terms pertaining to AI
- Use First-order logic to represent knowledge
- Build a variety of robots to perform specific tasks
- Program the Lego NXT using NXT-G and leJOS NXJ
- Integrate sensors, effectors and control

IV. IMPORTANT NOTES

Access & Accommodation Statement:

If you need course adaptations or accommodations because of a disability, if you have emergency medical information to share with me, or if you need special arrangements, please contact me immediately. I ask that you put any request in this regard in writing.

Academic Dishonesty:

In the event of academic dishonesty, those involved **will receive an "F" grade for the course** and the violation of the Student Code of Conduct will be referred to the Director of Student Life for judicial action.

As defined in the [LCSC Student Handbook](#), Academic Dishonesty is:

- Cheating** - intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise. The term "academic exercise" includes all forms of work submitted for credit hours.
- Fabrication** - intentional and/or unauthorized falsification or invention of any information or the source of any information in an academic exercise.
- Collusion** facilitating academic dishonesty - intentionally or knowingly helping or attempting to help another to commit an act of Academic Dishonesty.
- Plagiarism** - the deliberate adoption or reproduction of ideas or words or statement of another person as one's own without acknowledgment.

According to the Student Code of Conduct,

The sanctions imposed for a violation of this section of the Code are independent of, and in addition to, any adverse academic evaluation which results from the

student's conduct. The course instructor is responsible for academic evaluation of a student's work and shall make that evaluation without regard to any disciplinary action which may or may not be taken against a student under the Student Code of Conduct.

Incompletes:

A grade of Incomplete can be granted only if 80% of the course work has been satisfactorily completed (passing) and if there is a documented family or medical emergency. In addition, you must communicate with me your desire for an incomplete and you must sign the Incomplete Grade request form that includes a mutually agreed upon date of completion and a list of work to be completed. An incomplete is NOT automatically granted. I do not grant a grade of incomplete if you fail to meet any of the above criteria.

Office Hours:

Office hours are done on a first-come first-served basis. BY APPOINTMENT is just that. You must make prior arrangements to meet with me. I read my **lcsc.edu** e-mail several times daily; this is a very reliable means to contact me. My homepage contains a link to this class and its schedule of assignments. If you miss a class session, look at the class pages on the Web and BBCE to see what assignments were made.

Respect for Others:

Please demonstrate respect for the other students in this class:

- Turn off all audible pagers, cell phones and other such equipment while in the classroom.
- If you must take care of personal issues during class, please leave quietly and return quietly.
- If you must be late to class, please enter quietly, take your seat and get to work.
- If you know you must leave early, please let me know. Then leave quietly.

Computer Lab:

The computer lab (MLH310) is open two nights a week starting after Labor Day.

Important dates:

Aug 29	Last Day to Register/Add/Drop Classes Online
Sep 1	Labor Day – no classes
Sep 2	Instructor's Written Approval Required to Add Class
Sep 8	Last Day to Add Class(es) or to Drop without 'W' Grade
Oct 1	Last Day to Apply for Graduation Spring 2009
Oct 24	Midterm Grades Posted
Oct 31	Last Day to Withdraw from Class(es) or College for the Semester
Nov 3-6	Advance Registration for Spring 2009
Nov 24-28	Thanksgiving Break – no classes
Dec 16	Final Exam

The last date to drop this class without a permanent entry on your transcript is **Sept. 8**. The last date to withdraw from this course with a **W** on your transcript is **Oct. 31**. After that date, withdrawal is permitted by petition only and approval of the division chair, Dr. Matt Johnston. The division chair requires documentation of **extraordinary** circumstances that prevented you from withdrawing by the deadline.

V. METHODS OF INSTRUCTION

For the first few weeks, I utilize a lecture and lab format. Because most of our work will be on building and programming robots, the bulk of class will be on projects. I will utilize a 'Just-in-time' lecture format for this time. As you need information and have questions, then I will provide you with what you need. There will be minimal homework, most of which is assigned at the beginning of the semester. Lab attendance is mandatory and affords us the opportunity for hands-on work to test and apply material from lecture and time for project development and testing.

Tentative Weekly Schedule

Week	Topics
1	Introduction to Course and Legos, Chapter 1
2	Chapter 10: Robotics and AI
3	Chapter 2: Uninformed Search
4	Chapter 3: Informed Search
5	Chapter 5: Knowledge Representation
6	EXAM ONE
7	Switch to Java
8	Chapter of your choice
9	Chapter of your choice
10	Chapter of your choice
11	EXAM TWO
12	Project Planning and Proposal
13	Thanksgiving Break
14	Project Implementation
15	Project Testing
16	Project Presentations
17	FINAL EXAM

A detailed schedule will be revised and made available to you on BBCEe.

VI. PERFORMANCE CRITERIA FOR STUDENTS

- Demonstrate persistent and active learning through an organized approach that includes completion of activities, attending every class and lab period and bringing appropriate materials to support quality and active participation in lab activities and appropriately using available resources to aid in learning course content.

- Develop high-level modeling skills where appropriate design elements can be quickly and correctly identified.
- Professionally perform computer skills and functions when applying computer science principles through correct use of equipment and software and quality documentation of procedures such that others can easily read and assess the work performed.
- Exemplify effective communication skills as demonstrated through the use of appropriate technical language and as documented in programs and problem solutions.

Grading Breakdown for Activities Designed to Meet the Above Performance Criteria:

Evaluation Methods:

Lab Assignments:	30%
Research Paper:	10%
Project:	30%
Midterm and Final Exams @ 10%	30%
TOTAL	100%

Grading Scale (expressed as percentages):

- A >= 94
 A- >= 90 to < 94
 B+ >= 87 to < 90
 B >= 83 to < 87
 B- >= 80 to < 83
 C+ >= 77 to < 80
 C >= 73 to < 77
 C- >= 70 to < 73
 D+ >= 67 to < 70
 D >= 60 to < 67
 F < 60

Please note that you must accumulate 90% or greater for an A, 80% or greater for a B and 70% or greater for a C.

Description of Methods for Assessment and Evaluation

Lab Assignments (30%): Each week you will have activities you need to complete. As the robots you build and program become more complex, you will need more than one lab period to complete them. You will show me your working solution to the problems that you are given. The criteria for successful completion will be given with each assignment.

Research Paper (10%): There are so many wonderful examples of robots in use today. You will each pick a robot to research, write a short research paper, and present your findings to the class.

Your evaluation is based on the type of robot you choose; the degree of neatness, organization and coherence of your paper and presentation; your references and how they are incorporated into your paper and presentation; the style of your writing; and the lack of mechanical errors in your paper.

Project (30%): Toward the end of the semester, you will have had sufficient experience with the Lego Mindstorms system that you can then create something more interesting than classroom assignments. You will have to present a proposal, interim demonstration, written report and two final presentations. Your demonstration performance is based on the better of the two final presentations. The areas of performance are 1) Proposal task description, 2) Project demonstration completeness and accuracy, and 3) Project Report completeness, organization and readability . That means your evaluation is based on the completeness, organization, and practicality of your proposal, how close your final demonstration matches your proposal, and the degree of completion, organization and readability of your project report.

Midterm and Final Exams (@ 10%): There are three semester exams, two during the semester and one at final exam time. The final exam is not strictly cumulative other than the fact that some of the material will be dependent on previous material. No make-up exams will be given. If you have a serious conflict with an exam time, you must discuss it with me and take the exam early. Exams missed due to a serious illness or a family emergency (must be documented) will be dealt with on a case-by-case basis.

VIII. CS440 KNOWLEDGE TABLE

A knowledge table categorizes the content within a discipline area. The knowledge is organized and presented according to five components: concepts, processes, tools, contexts, and ways of being. The following are the knowledge components for CS440. These are the areas in which I hope to see your growth.

Concepts	robotic locomotion, sensing, and planning
Processes	learning the tools, reusing problem solutions, debugging, team work
Tools	help systems, NXT-G and Java programming languages, Lego NXT and associated parts
Contexts	communication of ideas, creating programs and robots
Ways of Being	values using technology, enjoys problem solving, professionalism