COMP 4500, Mobile Robotics I, Spring 2018
Syllabus

General Information
> Prof. Holly Yanco
> Olsen 206
> holly@cs.uml.edu

Course web page
> http://www.cs.uml.edu/~holly/teaching/4500/spring2018/

Lectures
> Thursdays 9:30-10:45, Olsen 102

Labs
> Tuesdays 9:30-10:45 (Section 801), Olsen 302
> Tuesdays 12:30-1:45 (Section 802), Olsen 302

Office Hours
> Mondays   1:30 to   3:00   Olsen 206
> Tuesdays   10:45 to 12:15   Olsen 302
> and by appointment

Course Description
> In this course, you will learn about robotics, with a focus on autonomous mobile robots, through a series of lectures and labs. Topics include sensors, locomotion, deliberative, reactive, and hybrid control architectures, computer vision, application domains, and current research. In the labs, you will build and program your own robots in teams. After the initial set of labs, you will design, build and program a robot for a term project. A public demonstration of the projects will be held at the end of the term.

Course Outcomes
> At the completion of this course, students will be able to:
>
> 1. Work in teams to design, build, program, and test robot systems for a variety of tasks (ABET 3b, 3c, 3d, 3i).
> 2. Identify and utilize the sensors and programming strategies needed to solve problems in robotics (ABET 3a, 3b, 3i).
> 3. Understand open problems in robotics and ways that such problems could be solved (ABET 3b, 3h).
> 4. Demonstrate and describe their work in a public setting (ABET 3f).
> 5. Identify and discuss ethical issues in the area of robotics and society (ABET 3e, 3g).

Readings
> There is no textbook for the course. Readings will be distributed in class. Many will not be available on the course web site due to copyright issues. If you miss a class, you are responsible for getting a copy of the handout from a classmate or from me during office hours.

Grading

Assignments and Labs	40% (Deductions will be taken for poor attendance)
Midterm Exam	20%
Project:	40%

Collaboration Policy

Labs will be done in groups of two students each. You may choose your own partners, but I reserve the right to regroup people as the term progresses. For the labs, I expect that each person will do his or her own equal share of the work. To learn, you'll need to actually build and program the robots, not watch another person do it.

You should write your own assignments as well as any written components of the labs. You may discuss the questions with your classmates, but you must write them up individually. Exams are also to be an individual proposition.

Robots

In the lab, you'll be building and programming robots. We will be using the Wallaby robot controller. Our robot bases will be built out of Lego (and anything else you'd like). Each two person team will be given a robot kit with the processing boards, sensors, and motors for use during the term; the lab contains large bins of Lego as well as a variety of other parts such as Vex and K'Nex.

Lab

The lab is in Olsen 302. Each group will have their own area with a computer on it for building and programming their robots. Note that the lab is shared this semester with two lab sections for this course and it is also used by the Robotics Club (which you can join), so desks must be left clear and ready for anyone to use. When you are not working in the lab, you should put your robot and parts in the box provided to you and then put the box on the storage rack.

The lab's door has an ID lock, so you will have 24 hour access (ID access should be live by Thursday 2/1). While some time in class is set aside for working on your robot, you should expect to spend additional time in the lab to work on your labs and project. The Robotics Club meetings are scheduled for Wednesday and Thursday nights from 7-10pm, so the room will not be available for lab work during those times.

Please keep your workspace and the lab neat. Do not leave trash lying around, on tables or the floor. You may eat in the lab, but this policy will be changed if people do not clean up after themselves.

Undergraduate Project Sequence

For Computer Science majors, COMP.4500 Mobile Robotics I can be grouped with any of:
- COMP.4510 Mobile Robotics II (usually offered every other fall, due again Fall 2019)
- COMP.4200 Artificial Intelligence
- COMP.4220 Machine Learning

Schedule
For lectures (Thursdays), go to Olsen 102. For labs (Tuesdays), go to Olsen 302.

Th 1/25 Lecture Class overview

T   1/30 Lab   Intro to the robot kit; building your first robot platform
Th   2/1 Lecture Sensors, motors and robot morphologies

T   2/6 Lab   Sense and avoid
Th   2/8 Lecture Braitenburg vehicles

T   2/13 Lab   Braitenburg vehicles
Th 2/15 Lecture Robot control architectures; Robot learning

T   2/20 No class Monday schedule
Th 2/22 Lecture SLAM and path planning

T   2/27 Lab   Wall following
Th 2/29 Lecture Projects; Computer vision

T   3/6 Lab   Servo motors and sonars
Th   3/8 Lecture Guest lecture: Adam Norton, UML NERVE Center, Robot Testing

T   3/13 No class Spring Break
Th 3/15 No class Spring Break

T   3/20 Lab   Vision, part I
Th 3/22 Lecture Guest lecture: Abraham Shultz, UML Robotics Lab, Swarm Robotics

T   3/27 Lab   Vision, part II; **Project proposals due**
Th 3/29 Lecture Autonomy

T   4/3 Lab   Project
Th   4/5 Lecture Human-robot interaction

T   4/10 Lab   Project
Th 4/12 Lecture Guest Lecture: Joe Jones, Franklin Robotics

T   4/17 Lab   Project; **Mid-project check**
Th 4/19 **Exam**   Covers material through 4/12; in lecture room

T   4/24 Lab   Project
Th 4/26 Lecture Robot ethics
F   4/27 Botball set up (volunteer opportunity)
S   4/28 Botball tournament and Botfest exhibition (volunteer opportunity)

T   5/1 Lab   Project
Th   5/3 **Final project presentations** (Olsen 3rd floor lobby)

T   5/8 **Project reports due** by noon by email
Note: There is no final exam in this project course.