EECS4421/EECS5324

Introduction to robotics

2024

General

Collapse all

Class lectures begin on Thursday the 5th of September at 8:30am. Laboratories start the week of September 9th. Almost all classes will be taught in person at the time and location described by the Registrar. One or two classes may be taught asynchronously in a flipped fashion. Details of these events will be announced through eClass.

The textbook of this course is the 3rd edition of Computational Principles of Mobile Robotics by Dudek & Jenkin. It is available through your favourite bookstore and at Amazon.

Prior to the first lab (aka the second week of classes) you must have completed WHMIS I training. (You almost certainly did this already if you are in Engineering, but if you did not, or cannot remember if you did it, now would be a really good time to refresh your understanding of health and safety policy/procedures.)

You should be aware of the critical dates in the term. You can find them on the registrar's web page.

Lectures & Lab Hours

- Lecture: Tuesday/Thursday 8:30-10:00 In person. Later in the term some lectures may be provided in a flipped format. If/when this occurs an announcement will be made through eClass. Lectures are held in CC (Calumet College) 108.
- Labs: Labs are scheduled by the registrar. You must attend the lab session in which you are scheduled. It will not be possible to pass the course without attending your labs. Labs are held in LAS (Lassonde Engineering Building) 1004.

Instructor

- Michael Jenkin
- Office: Sherman 1028 (NW of Tait Mackenzie Bldg).
- Email: jenkin@yorku.ca. Note: emails must contain EECS4421 or EECS 5324 in the subject line.
- Office hours: Tuesdays 10-11.

Required Textbook

- Computational Principles of Mobile Robotics by G. Dudek and M. Jenkin. 3rd edition.

Additional Required Readings

- Additional readings are provided in each week of the course (see the Moodle course description).

Hardware/Software

- This course uses ROS 2 Humble Hawksbill running under Ubuntu 20.x and Python 3. The department will provide this environment. You may find it beneficial to have a locally available version of this infrastructure. It runs quite well in an appropriate virtual machine.
- This course will require you to develop software to drive real robots in the lab.

Course Learning Outcomes

1. Explain the basic terms and key concepts between mobile robots and robot arms.
2. Analyze the forward and inverse kinematics of mobile robots and robot arms.
3. Analyze the effects of noise in robotic navigation.
4. Use techniques to reduce the effects noise in robotic navigation.
5. Develop software to solve problems in robotics.

Deadline Policy

- You are allowed to miss an evaluation deadline only under extraordinary circumstances.
- There are NO make up assignments. The weight of a missed item will with proper documentation will be transferred to the other assignments..
- Unless otherwise specified, all assessments in this course are expected to be individual work of the students who submitted the work. Plagiarism and cheating are not tolerated. Note that many assessments are collaborative. For such work the complete list of collaborators must be provided when the work is submitted.
- Students who enrol in the course late are responsible for all material and all evaluations prior to their enrolment in the course.

Marking Scheme

Each piece of work will be assigned a percentage grade. Grades will be combined using the weighting table given below

- 4 assignments @ 20% = 80%
- 10 labs @ 2% = 20%

Students enrolled in 5324 can expect an extra open ended question in a number of the assignments.

Conversion of your final numeric grade out of 100 to a letter grade will be accordance with the departmental standard.

Academic Honesty

- **Follow these links to familiarise yourselves with Senate's expectations regarding Academic Integrity, but also with many other Senate policies, in particular, with those about Academic Accommodation for Students with Disabilities, Religious Accommodation and Repeating Passed or Failed Courses for Academic Credit.**

Basic Course Organization

This course consists of three hours of lectures and two laboratory hours per week.

Readings. Each week has assigned readings. You are expected to have completed the assigned readings prior to the lecture.

Lectures. Almost all of the lectures will be held in person at the time and location specified by the Registrar.

Laboratories. Starting the second week there are structured labs each week. There will be TA's to help you with the labs.

Eclass. Eclass will be used to provide updates to the class outside of the lecture/lab structure. You should refer to Eclass regularly. Grades will be posted on Eclass. You are responsible for ensuring that your grades as posted on Eclass are correct. Note: After grades have been posted for 14 days they will not be considered for adjustment.

EClass material

- Slides are on Eclass. Grab a copy as a pdf and review them before class and makes notes on them in your favorite manner.
  - Mostly BW to save your printer (if you print them)
  - Full page format chosen as people have asked for that.
- Textbook
  - There is a chapter to read every week.
- Groups
  - The limited lab size/class size/hardware availability means parts of the course will be in groups, parts will utilize simulation, etc.

A bit about me..

- Michael Jenkin (jenkin@yorku.ca)
- At York since 1987
- At Samsung as a Visiting Professor 2019-2023 (off and on)
- Co-founder of Independent Robotics (IR)
- 300+ publications, 9+ patents/patent pending
- I work in robotics, computer vision and virtual reality
- Current projects include
  - Underwater and on surface robot design, control and interaction.
  - Human-robot interaction for de-escalation
  - Human performance in unusual environments (0g, underwater, etc.)


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Basic questions

- What do you want out of the class?
- What is a robot and why should robotics be studied separately of <insert other topic>?
- What would you like robots to do and is it practical to make them do (whatever that task is) within the structure of this course?