DALHOUSIE UNIVERSITY
Faculty of Computer Science

CSCI-1108 --- Introduction to Experimental Robotics
Course Syllabus

Instructor Information

Instructor:	Lubna Eljabu	**Office:**	
e-mail:	lb294118@dal.ca	**Hours:**	
Class Time:	Wednesday/ Friday 04:05-05:25 pm	**Location:**	Chemistry 125
Head TA	Jenna Cogswell	**e-mail:**	jenna.cogswell@dal.ca
TA: B01	Moses Tong	**e-mail:**	moses.tong@dal.ca
TA: B01	Xue Rong	**e-mail:**	rn356837@dal.ca
Lab Time	Tuesday/ Thursday 4:05-5:25 pm	**Room:**	Goldberg 134
TA: B02	Alakh Jawa	**e-mail:**	alakhj@dal.ca
TA: B02	Hammad Rizwan	**e-mail:**	hammad.rizwan@dal.ca
Lab Time	Tuesday/ Thursday 4:05-5:25 pm	**Room:**	Goldberg 143
TA: B03	Asil Naqvi	**e-mail:**	a.naqvi@dal.ca
TA: B03	Ashish Ojha	**e-mail:**	ashish.ojha@dal.ca
Lab Time	Tuesday/ Thursday 1:05-2:25 pm	**Room:**	Goldberg 134
Course Homepage:	https://dal.brightspace.com/		

Important Dates

- September 19th — Last day to register for courses
- October 2nd — National Day for Truth and Reconciliation (no classes), University closed
- October 4th — Last day to drop course without a "W".
- October 9th — Thanksgiving, University closed.
- October 18th — Midterm Exam: In class (1.5 hours).
- November 2nd — Last day to drop course with a "W".
- November 13th – 17th — Reading Week (no classes or labs), University open.
- December 1st — Last day of classes and Robotic projects due.
- December 8th – 19th — Final Exam (3 hours) – to be scheduled by registrar.

Course Description

This is a hands-on introduction to robotics and problem solving in uncertain environments. Students will learn about the challenges that robotic systems face when interacting with the world around it and the challenges that we face in designing and programming the robots. Students will investigate both the hardware and software aspects of robotics and learn how to apply the empirical method to model the robot and its environment. Students will program robots to solve a variety of tasks and report their findings in technical and laboratory reports.

Classes will be structured with lectures as well as labs. Students are expected to prepare for each lab on their own, through readings provided by the instructor. Students will work in groups in the lab on a tutorial to reinforce the concepts covered in the readings. The TAs will be on hand to guide the students through the labs and provide assistance when needed. A summary discussion will be held at the end of each lab to reinforce the fundamental ideas learnt during the lab.

Class Format and Course Communication

- Content will be delivered via a combination of lectures and interactive group exercises.
- Course announcements will be posted to Brightspace. It is the student's responsibility to check their Dal e-mail on a daily basis. To access your Dal e-mail see:
  https://www.dal.ca/dept/its/o365/services/email.html

Learning Outcomes

- Work in a team on a shared project.
- Program a robotic system to accomplish tasks of moderate complexity.
- Use sensors and actuators in a robotics application.
- Review differential drive kinematics for Thymio II robot.
- Use states and transitions to model the behavior of a robotic system.
- Apply various techniques to identify and recover from faults.
- Explain the application of uncertainty and linear regression to robotics.
- Identify some of the challenges in robotics and mechanisms for overcoming these challenges.
- Formulate a hypothesis about the characteristics of a robot's sensor or actuator that can be answered by a controlled experiment.
- Implement a controlled experiment to characterize a robot's sensor or actuator.
- Analyze the data from a controlled experiment with a robot's sensor or actuator and formulate a linear model of the sensor or actuator.
- Describe factors that may adversely affect the controlled experiment of a robot's sensor or actuator.

Evaluation Criteria

- Lab Submissions (15%)
  - 10 structured labs each worth 1.5%.
  - Each lab has a post-lab quiz or group report due prior to the following lab.
- Lecture Quizzes (10%)
  - 4 quizzes in total. Quizzes are closed book.
  - Typically ~20 minutes held during lecture time.
  - Quizzes cover material from the previous weeks lecture and recent labs.
- Midterm Exam (20%)
  - To be held during class on Wednesday, October 18th .
  - The midterm covers lectures and lab tutorials 1 through 8.
  - The midterm is *closed book*.
- Robotics Project (15%)
  - It is a group project (the size of the groups and the project TBD).
- Final Exam (40%)
  - The final exam will be scheduled by the university between December 8th -19th.
  - The final exam will cover all material in the course and be 3 hours long.
  - The final is *closed book*.
  - An average of 50% on the final exam is required to pass the course.

Notes

- The grade conversion scale in Section 17.1 of the Academic Regulations, Undergraduate Calendar will be used.
- The projects require group work. It is expected that all members of each group contribute approximately equally to their project. Failure to attend labs or contribute to teamwork can result in a mark of 0 for project and lab grades. At the submission of each project, group members will each fill out a confidential peer evaluation, outlining their opinion of their fellow group members' contributions.
- This is predominantly a lab-based course. **Lab attendance is mandatory.** Attendance will be taken. If a student fails to attend greater than **20% of labs without sufficient justification, they will receive an**

F in the course. If labs must be missed for sufficient reasons such as illness, please take the appropriate steps to notify your TA and your group members, and to complete and submit the appropriate self-declaration of absence form.

Midterm and Final Exam Requirements

- Photo ID is required
- The midterm and final exam are closed book unless otherwise instructed.
- No dictionaries, notes, cell phones, PDAs, talking slide rulers, or other electronic aids allowed.

Required Texts and Resources

- There is no required text for this course.
- The lecture slides will be posted on the learning management system (Brightspace).
- Additional assistance is available from the Student Learning Centre (2nd floor, Goldberg CS Building).

Responsible Computing Policy

Usage of all computing resources in the Faculty of Computer Science must be within the Dalhousie Acceptable Use Policies (http://its.dal.ca/policies/) and the Faculty of Computer
Science Responsible Computing Policy. For more information please see https://www.cs.dal.ca/downloads/fcs_policy_local.pdf

Use of Plagiarism Detection Software

All submitted code may be passed through a plagiarism detection software, such as the plagiarism detector embedded in Codio, the Moss (https://theory.stanford.edu/~aiken/moss/) Software Similarity Detection System, or similar systems. If a student does not wish to have their assignments passed through plagiarism detection software, they should contact the instructor for an alternative. Please note, that code not passed through plagiarism detection software will necessarily receive closer scrutiny. https://cdn.dal.ca/content/dam/dalhousie/pdf/dept/university_secretariat/policy-repository/OriginalitySoftwarePolicy.pdf

Academic Standards

Failure to properly attribute sources in your work will be treated as an academic standards issue and points may be deducted for not following citation requirements. For example, forgetting to quote text taken from other sources, failure to include in-text citations, or a failure to include required information in the citations or references. Please see the resources on proper citation provided by the Dalhousie Writing Center (https://dal.ca.libguides.com/c.php?g=257176&p=5001261).

Please note that if it appears that the error was made with intent to claim other people's work as your own such as a lack of both citations and references, an allegation of plagiarism will be submitted to the Faculty Academic Integrity Officer, which could result in consequences such as a course failure.

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Student Health and Wellness

Taking care of your health is important. As a Dalhousie student, you have access to a wide range of resources to support your health and wellbeing. Students looking to access physical or mental health & wellness services at Dalhousie can go to the Student Health & Wellness Centre in the LeMarchant Building. The team includes: registered nurses, doctors, counsellors and a social worker. Visit **dal.ca/studenthealth** to learn more and book an appointment today.

Students also have access to a variety of online mental health resources, including telephone/texting counselling and workshops/training programs. Learn more and access these resources at d**al.ca/mentalhealth**.

Culture of Respect[1]

Every person has a right to respect and safety. We believe inclusiveness is fundamental to education and learning. Misogyny and other disrespectful behaviour in our classrooms, on our campus, on social media, and in our community is unacceptable. As a community, we must stand for equality and hold ourselves to a higher standard.

What we all need to do:

1. **Be Ready to Act:** This starts with promising yourself to speak up to help prevent it from happen- ing again. Whatever it takes, summon your courage to address the issue. Try to approach the issue with open-ended questions like "Why did you say that?" or "How did you develop that belief?"
2. **Identify the Behaviour:** Use reflective listening and avoid labeling, name-calling, or assigning blame to the person. Focus the conversation on the behaviour, not on the person. For example, "The comment you just made sounded racist, is that what you intended?" is a better approach than "You're a racist if you make comments like that."
3. A**ppeal to Principles:** This can work well if the person is known to you, like a friend, sibling, or co-worker. For example, "I have always thought of you as a fair-minded person, so it shocks me when I hear you say something like that."
4. **Set Limits:** You cannot control another person's actions, but you can control what happens in your space. Do not be afraid to ask someone "Please do not tell racist jokes in my presence anymore" or state "This classroom is not a place where I allow homophobia to occur." After you have set that expectation, make sure you consistently maintain it.
5. **Find or be an Ally:** Seek out like-minded people that support your views, and help support others in their challenges. Leading by example can be a powerful way to inspire others to do the same.
6. **Be Vigilant:** Change can happen slowly, but do not let this deter you. Stay prepared, keep speaking up, and do not let yourself be silenced.

University Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and the Senate. https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&loaduseredits=False

Territorial Acknowledgement

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

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[1] Source: Speak Up! © 2005 Southern Poverty Law Center. First Printing. This publication was produced by Teach- ing Tolerance, a project of the Southern Poverty Law Center. Full "Speak Up" document found at: http://www.dal.ca/dept/dalrespect.html. Revised by Susan Holmes from a document provided April 2015 by Lyndsay Anderson, Manager, Student Dispute Resolution, Dalhousie University, 902.494.4140, lyndsay.anderson@dal.ca www.dal.ca/think.

Dalhousie acknowledges the histories, contributions, and legacies of the African Nova Scotia people and communities who have been here for over 400 years.

Internationalization

At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." https://www.dal.ca/about-dal/internationalization.html

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect. As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. (read more: http://www.dal.ca/dept/university_secretariat/academic-integrity.html)

Accessibility

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion please contact: https://www.dal.ca/campus_life/academic-support/accessibility.html for all courses offered by Dalhousie with the exception of Truro.

Conduct in the Classroom — Culture of Respect

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

Diversity and Inclusion — Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). (read more: http://www.dal.ca/cultureofrespect.html)

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Con- duct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—per- haps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. (read more: https://cdn.dal.ca/content/dam/dalhousie/pdf/dept/university_secretariat/policy-repository/Code%20of%20Student%20Conduct%20rev%20Sept%202021.pdf)

Fair Dealing Policy

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. (read more: https://www.dal.ca/dept/university_secretariat/policies/academic/fair-dealing-policy-.html)

Originality Checking Software

The course instructor may use Dalhousie's approved originality checking software and Google to check the originality of any work submitted for credit, in accordance with the Student Submission of Assign- ments and Use of Originality Checking Software Policy. Students are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of their work, and must inform the in- structor no later than the last day to add/drop classes of their intent to choose an alternate method. (read more: https://cdn.dal.ca/content/dam/dalhousie/pdf/dept/university_secretariat/policy-re- pository/OriginalitySoftwarePolicy.pdf)

Student Use of Course Materials

These course materials are designed for use as part of the CSCI courses at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading material to a commercial third party website) may lead to a violation of Copyright law.

Learning and Support Resources

Please see https://www.dal.ca/campus_life/academic-support.html

- General Academic Support — Advising
  https://www.dal.ca/campus_life/academic-support/advising.html
- Fair Dealing Guidelines
  https://libraries.dal.ca/services/copyright-office/guidelines/fair-dealing-guidelines.html
- Dalhousie University Library http://libraries.dal.ca/