

**University of Guelph
School of Engineering
Robotic Systems, ENGG*4460
Fall, 2009**

Instructor: Hussein Abdullah

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Teaching Assistants: Rami Alhamad

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Text:

J. J. Craig (2005) Introduction to Robotics Mechanics and Control (Third Edition). Pearson
Prentice Hall, ISBN 0201-54361-3.

Schedule:

Lectures: MACK 231

Tuesday 10:00 AM - 11:20 AM

Thursday 10:00 AM - 11:20 AM

Labs/Tutorials: ROOM ENG 2199

Section 0101: Tuesday..... 02:30 PM - 05:20 PM

Section 0102: Thursday 02:30 PM - 5:20 PM

Course Description:

This course is designed as a senior undergraduate course for the School of Engineering. The goal of this course is to provide students with comprehensive approach, background, and skills to apply robotics technology to real world engineering applications and problems. The course covers modeling, design, planning, control, sensors and programming of robotic systems.

Course Objectives:

- To appreciate the interdisciplinary nature of robotics and understand the fundamentals of robotics technology.
- To be able to describe and analyze the major elements and classifications of robotic systems.
- To develop forward and inverse kinematics relations for simple and complex robots.
- To be able to calculate the effect of differential motions and forces using the Jacobian techniques.
- To view different robot programming languages and learn how to program a robot manipulator to achieve successful tasks.
- To appreciate the role of sensors and feedback control.
- To understand the role and contribution of robotics in industrial environment.
- To be able to design systems where a robot arm is a main component.

Those students who successfully pass the course will gain a comprehensive background, appreciation, and understanding of robot systems requirements and components – from both aspects of hardware and software.

Grade Evaluation:

Assignments (3)	10%
Laboratories (3)	20%
Midterm	30%
Final exam	40%

Material to be Covered:

	Topic	Week
1.	Course introduction and outline	1
2.	Fundamentals of Robotics	1
3.	Robot Programming	2
4.	Spatial Description and Transformations	3,4
5.	Forward Manipulator Kinematics	5-6
6.	Inverse Manipulator Kinematics	7
7.	Jacobians: Velocities and Static Forces	8,9
8.	Trajectory Generation	10
9.	Manipulator Dynamics and Control	11,12

Lab1: week 2-4, **Lab 2:** week 5-7, **Lab 3:** week 8-10.

Student Responsibilities

- Attend lectures and labs in order to obtain all the course material that you are responsible for.
- Check announcements page on a regular basis.
- Submit assignments on time.
- Regularly, check your marks on the course web page and make sure they are up to date.
- Submission of assignments for re-marking must be done within a week of being returned.

Important Notes:

- Labs and tutorials start the week of **September 14, 2009**.
- The midterm test is scheduled for **Thursday, October 29, 2009, time: 10:00am, location: (TBA)**.
- The final exam is scheduled for **December 17th, 2009 (11:30AM - 01:30PM)**, Location **(TBA)**.
- Communications regarding this course will frequently involve the course web page and e-mail. Students are responsible for checking the course website and the university email account for all instructions and announcements. This must be done at least once every week.
- The **final lab mark** for each member of a group depends on **his/her performance** within the group.

Late Assignment/Missed Test Policy:

Generally, when you find yourself unable to meet a course requirement such as an assignment or a test as a result of compassionate, illness or physiological reasons, a formal explanation must be made in writing to the instructor and (where possible) proper documentation must be provided. This should be done prior to an exam or assignment (if possible) or as soon as possible but definitely within a week after the exam or assignment due date.

If no explanations are provided, exams receive a grade of zero and assignments/lab reports are subject to the following deductions:

- 25% will be deducted if the assignment is up to 24 hours late,
- 50% will be deducted if the assignment is 24 to 48 hours late,
- No assignments will be accepted after that.

University Policy on Academic Misconduct:

Academic misconduct, such as plagiarism, is a serious offence at the University of Guelph. Please consult the Undergraduate Calendar 2008-2009 and School of Engineering programs guide, for offences, penalties and procedures relating to academic misconduct.

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Disclaimer:

The instructor reserves the right to change any or all of the above in the event of appropriate circumstances, subject to the University of Guelph Academic Regulations.