Massachusetts Institute of Technology
Department of Mechanical Engineering

2.12/2.120 Introduction to Robotics – Fall 2016 Syllabus

Course Catalog

Presents the fundamentals of robot mechanisms, dynamics, and controls. Planar and spatial kinematics, differential motion, energy method for robot mechanics; mechanism design for manipulation and locomotion; force and compliance control; visual feedback. Weekly laboratories include real-time control, vehicle navigation, arm and end-effector design, and vision. Group term project requires design and fabrication of robotic systems. Students taking graduate version complete additional assignments. Enrollment may be limited due to laboratory capacity.

Prerequisites

2.003 (or 2.03 at the discretion of the student)
2.004 (or 2.04A at the discretion of the student)

Teaching Team

Lectures	Prof. Alberto Rodriguez	albertor@mit.edu	5-207d
Laboratories	Prof. Kamal Youcef-Toumi	youcef@mit.edu	3-342
Teaching Assistants	Nima Fazeli	nfazeli@mit.edu	3-070
	Kuan-Ting (Peter) Yu	peterkty@csail.mit.edu	3-070
	Ryan Fish	fishr@mit.edu	1-010
	Fangzhou Xia	xiafz@mit.edu	1-010
	Samuel Ernest Williams	sawmill@mit.edu	5-423
Undergrad Assistants	Rebecca Li	rmli@mit.edu	
	Nina Patelina	petelina@mit.edu	
Administration	Marcia Mugner	mlmunger@mit.edu	5-207

General Information

Lectures	Mondays	14:30-16:00	3-270	
	Wednesdays	14:30-16:00	3-270	
Laboratories	Thursdays	11:00-13:00	5-007	Section 1
		13:00-15:00	5-007	Section 2
		15:00-17:00	5-007	Section 3
	Fridays	09:00-11:00	5-007	Section 4
		11:00-13:00	5-007	Section 5
		14:00-16:00	5-007	Section 6
Office Hours	Mondays	16:00-17:00	1-246 (except Oct 3 in 3-270)	
	Tuesdays	16:00-17:00	5-233	

We will provide additional office hours in a need basis, especially in advance of exams. It is important to bear in mind that teaching assistants are themselves students with constraints on their time – they have their own classes to take and problem sets to do. Accordingly, except for special circumstances, they will be available for consultation during advertised office hours.

Websites
Course website: For materials.
https://robot2016.mit.edu/
Piazza: For forum, discussion, and announcements.
https://piazza.com/class/ismir4cgmlk7g4
Stellar: Mostly for grades.
http://stellar.mit.edu/S/course/2/fa16/2.12/

Lectures
There are 25 lectures, as detailed in the schedule of the course. These include five special topic lectures, with possibly guest presenters. We will provide detailed lecture notes after each lecture.

Laboratories
There are 9 lab sessions, with different sub-projects, and ending in a team project. Lab section assignment will be determined based on student's first and second preferences. We will circulate a sign-up sheet for indicating preferences during the first class, and we will finalize the assignment by that same evening. The lab semester teams should be formed by the end of the second week of classes.

Exams
There will be 2 exams, all pencil-and-paper and closed book. The dates of the exams are shown in the schedule. Each exam will be composed of multiple problems. If necessary, you will have up to one week after grading to submit a written request for re-grading.

Problem Sets
There will be 6-7 problem sets. We will typically release them by 11:59pm on Wednesdays and they will be due by the end of class the following Wednesday. The due dates are shown in the schedule. We will not give extensions, except in extraordinary circumstances supported by S^3.

We encourage collaboration in studying and on problem sets, but it is necessary for each individual to turn in all assignments. Remember that you will do much better on the closed-book quizzes if you make an effort to understand the problem sets. Note that typically the questions in the quizzes will be related to problems that appear in the Problem Sets. The use of problem set solutions from pervious terms is strictly prohibited.

Reference Textbook
Suggested (but not required) Textbook:
Asada, H., and Slotine, J.-J., "Robot Analysis and Control", Wiley 1986, ISBN 0-471-83029-1, TJ211.A79. The book was originally written for graduate-level courses. Familiarity with linear algebra is necessary to fully understand it.

Grading

Exams (2 quizzes weighted equally)	45%
Homework (6 PSets weighted equally)	20%
Laboratory and Term Project	30%
Participation	5%

Grades will be posted on Stellar.

Graduate students taking 2.120

The class meets together with 2.12. We will give one or two extra homework problems in each PSet to 2.120 students, and the two exams will include extra questions.