

ME 4524 / ECE 4704

ME 4524 **Robotics and Automation**
ECE 4704 **Principles of Robotic Systems**

Prof. A.J. Kurdila

Class 3.30pm-5pm, Tues. – Thurs (15T)
 Surge 104

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Office Hours

 MWF 8-9, 4-5
 TuTh 8-9, 4-5

Teaching Assistant TBD

Course Summary

The purpose of this course is to familiarize the student with the fundamentals of modeling and control of robotic systems. This course begins with an introduction to the mathematical background required in modeling and control of robotic systems. The presentation of material quickly turns to a detailed study of three dimensional kinematics. Particular focus is given to the representations of angular orientations and angular rates in three dimensional motion of rigid bodies. Properties of SO3, rotation matrices, angular velocity and angular acceleration in three dimensional motion of rigid bodies is studied in detail. The Denavit Hartenberg Representation of kinematics, and its role in forward kinematics is presented. Representations of problems in inverse kinematics, and their solution, are subsequently studied. In the last portion of the class, principles of analytical dynamics are introduced to derive the equations of motion of robotic systems. Several methodologies are introduced for the control of robotic systems including independent joint control, PD control, and Lie Algebraic methods for feedback linearization.

Texts:

Required Text: *Dynamics and Control of Robotic Systems*
 Kurdila, Leonessa, Vignola

Recommended Texts: *Robot Modeling and Control,*
 Spong, Hutchinson and Vidyasagar

A Mathematical Introduction to Robotic Manipulation
 Murray, Li, Sastry

Grading

Class Participation/Projects	25%
Homework and Exercises	25%
Midterm(2)	25%
Thurs February 24, 2011	Midterm 1
Thurs April 14, 2011	Midterm 2
<u>Final</u>	<u>25%</u>
Saturday, May 7, 2011 7.45am-9.45am	
	100%

Note :

1. All exams will be scheduled in the evening.
2. Each exam will be designed for two hours. Exam time will be four hours.

Summary of Semester Schedule:

January 17, 2011	MLK Holiday
January 18, 2011	Classes Begin
Thurs February 24, 2011	Midterm 1
February 28, 2011	Last Day to Drop Without Grade Penalty
March 5, 2011	Spring Break Begins
March 13, 2011	Spring Break Ends
Thurs April 14, 2011	Midterm 2
May 4, 2011	Classes End
May 6, 2011	Exams Begin
Saturday, May 7, 2011 7.45am-9.45am	Final
May 11, 2011	Exams End