Spring 2011 Syllabus - ME 539: Actuator Dynamics (3 credits)

CATALOG DESCRIPTION
Robots and automated systems move using many different methods of actuation, including electric motors, hydraulic systems, and pneumatic systems. While the motions of the robot are largely controlled through software, the physical system can impose significant constraints. These constraints are not only speed or force limits; all physical systems have passive dynamics, such as inertia or compliance. Passive dynamics can either limit the performance, or enhance it. This course covers various actuation methods, and how to utilize passive dynamics for a specific task. Examples include robotic manipulation tasks, robot-human interaction, CNC Machines, or legged locomotion.

PREREQUISITES
Graduate Standing, or with approval of instructor

INSTRUCTOR
Prof. Jonathan Hurst
Rogers 422
jonathan.hurst@oregonstate.edu

TEACHING ASSISTANT

CLASS MEETINGS
Lecture: Section 001 CRN 12273 Covell 221 Monday and Wednesday 4:00 – 4:50 PM
Labs: Section 014 CRN 16139 Rogers 330 Tuesday and Thursday 8:00 – 9:50 AM

TEXTBOOKS (OPTIONAL)
Wilson, D, How to Survive a Robot Uprising, Bloomsbury, 2005; www.robotuprising.com

ELECTRONIC FILE ACCESS
Files, grades, and announcements will be posted on Blackboard

COURSE LEARNING OUTCOMES
1. Describe the operation and dynamic model of actuation methods, including brush and brushless electric motors, hydraulics, and pneumatics.
2. Calculate the physical performance limits of an actuator for a particular task.
3. Create an actuator, and experiment at the limits of its performance.

Other things we’ll discuss:
1. Software control in cooperation with passive dynamics; strategies

GRADING
Presentations (3): 5% each
Actuator Demonstration: 20%
Actuator Analysis: 30%
Homework Assignments: 20%
Midterm Exam: 15%
Other: 10%

LAB POLICIES
• Follow the Reasonable Person Principle

STATEMENT REGARDING STUDENTS WITH DISABILITIES
Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

LINK TO STATEMENT OF EXPECTATIONS FOR STUDENT CONDUCT: http://oregonstate.edu/admin/stucon/achon.htm