

Robot Dynamics and Control

Prof. Katie Byl

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ECE 194D, Spring 2011

This is a **new course in robotics**, focusing on controlled dynamics for motion control of a robotic system, with an emphasis on robot locomotion. The course emphasizes hands-on experience and problem-solving skills, and labs will use a variety of NXT Lego robot systems to explore both challenges in dynamics, such as underactuation and actuator limitations, and practical issues in sensor filtering and real-time control.



Lego robots: “Legway” inverted pendulum, 3-wheeled omni-directional robot, edge-balancing suitcase, and acrobat.

Course Outline:

- Velocity kinematics: The Jacobian
- Individual joint control: PD, PID, state space
- Forward dynamics: Lagrangian eqns of motion
- Inverse dynamics: Multi-variable control
- Force control: Mechanical impedance

Additional Topics:

- Underactuated dynamics
 - Conservation of momentum
 - Ground contact models
 - Complementary filtering
 - Introductory system ID
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Prerequisites: ECE 130C – or – ME 155A (concurrent enrollment allowed)

Lecture: Tues. / Thurs. 2-3:15pm, in PHELP 1431

Lab: 3 hrs/wk (To Be Arranged, first week of class), in HFH 3120A

Grading: Homework, labs, mid-term, and a final project.

To enroll: Contact Jaima Dillard (jaima@ece.ucsb.edu) or Prof. Byl (katiebyl@ece.ucsb.edu) to obtain an add code for :

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