

UNIVERSITY OF CALIFORNIA SANTA CRUZ
COMPUTER ENGINEERING

CE 8 – Robot Automation: Intelligence through Feedback Control
(a.k.a. Introduction to Autonomous Systems)

Course Syllabus

Instructor

Prof. Bill Dunbar, E2 325, xt. 9-1031, dunbar@soe.ucsc.edu
Location/Time: E2 180, T H 12-1:45 PM
Office hours: H 10-12:00 PM

URLs

- Course web site: <http://www.soe.ucsc.edu/classes/cmpe008/Fall108/>.
- We will make extensive use of **web forum**: <http://forums.soe.ucsc.edu/> for class assignments and discussions. Click on CMPE 8 for our course. Click on “Register” at the top right of the page to set up an account.

Course Description

Introduction to dynamical systems, feedback control, and robotics. Fundamental concepts in dynamical systems, modeling, stability analysis, robustness to uncertainty, feedback as it occurs naturally, and the design of feedback-control laws to engineer desirable static and dynamic response. Course includes an introduction to Matlab and programming in Matlab. Students will also learn about a robotic platform, its sensors, and eventually how to design and implement a feedback controller to make the robot autonomously follow a curved path.

Prerequisites

Enrollment is unrestricted. **NOTE:** This course is intended for first-year undergrads.

Grading

Homework: 10%, Participation: 5%, Lab Attendance: 10%, Quizzes: 40%, Midterm: 15%, Final: 20%.

Teams of 3 students will be responsible for **group assignments** (part of each homework set), and all members of the group will receive a *common grade*. I will not grade this course on a curve; therefore, it will not hurt you to help someone who has a lower grade than you. *Participation* is very important in this class (that’s why it’s 5% of your grade). The best way to ensure you get all 5% is to: 1) come to class on time and be prepared by having completed all assignments to that point, 2) volunteer for in-class exercises when they arise, and 3) play an active and cooperative role on your team.

Homework Policy

Generally due every other Thursday - due dates will be posted on the web page. Collaborations are encouraged and feel free to consult anyone, particularly me and those in your team. However, all solutions handed in for credit must reflect your own understanding of the material.

Text

We use a reader, co-authored by me. All course material will be made freely available on the course web site in the form of PDF documents and Matlab m-files (you will learn what an m-file is when you need it - don't worry).

Exams

In-class midterm and final exams will be given.

Course Outline

Week	Topic	Reference
1	Introduction to course	CSM paper
2	Introduction to Matlab	Chapter 2
3	Discrete-time dynamics	Chapter 3
4	Introduction to modeling and simulation	Chapter 4
5	Introduction to modeling and simulation, cont'd	Chapter 4
6	Introduction to feedback control	Chapter 5
7	Robot: simulation and experiments	Chapter 6, handouts
8	Robot: line following and robot following control logic	Handouts
9	Autonomous freeway vehicle control	-