UC Santa Cruz, Baskin School of Engineering

Introduction to Dynamical Systems and Applied Dynamical Systems

Winter 2014, AMS 114/214, Classes: Mon-Wed-Fri 2:00-3:10pm

Office hours: Mon-Wed 3:30-4:30pm

Classroom: Engineering 2 Room 194

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The course introduces continuous and discrete dynamical systems. Topics include: fixed points, stability, limit cycles, bifurcations, transition to and characterization of chaos, fractals. Examples are drawn from sciences and engineering. The course concludes with selected topics. Students will learn through hands-on experience; therefore, the course will be homework intensive. Please regularly check the course webpage for updates.

Tenative week-by-week course plan:

Week 1: Introduction
Week 2: Flow on 1D
Week 3: Bifurcations
Week 4: 2D flows/Liner Systems/Linearization
Week 5: Review and Midterm
Week 6: Limit Cycles and Bifurcations
Week 7: Describing Functions
Week 8: Chaos and Fractals
Week 9: Selected topics
Week 10: Selected topics

Literature: My lecture notes will be used as the basis for the course and the exams. The notes will be posted on this web page under the link "Course Material"[1]. To follow the course and for further reference, the required textbook is: S.H. Strogatz, Nonlinear Dynamics and Chaos: With Applications to Physics, Biology, Chemistry and Engineering, Westview Press

Additional required readings for graduate students: H. K. Khalil, Nonlinear Systems, Prentice Hall; S. Sastry, Nonlinear Systems: Analysis, Stability and Control, Springer; and M. Vidyasagar, Nonlinear Systems Analysis, SIAM.

Prerequisites: The course relies on a working knowledge of matrix algebra, calculus, differential equations and physics. The knowledge of MATLAB is assumed.

[1]Please note that students may be disciplined for selling, preparing, or distributing the course lecture notes for any commercial purpose, whether or not they themselves have taken the notes.

Homework needs to be computer typed using the font size 12pt and clearly showing the student's name. It should be in the form of a full report with all results and figures commented. Students should e-mail me their homework as a .pdf by the deadline; those in my mailbox, slipped under my office door, etc. will not be considered. No late homework will be accepted under any circumstances.

Final grade will be based on your homework, one midterm exam, the final exam, and class attendance above 70% (homework 25%, midterm 30%, final 40%, attendance 5%). Please bear in mind that your grade will be heavily based on the quality and completeness of problem solutions, and not only on correctness. Bring your student ID to every exam.

For DRC students: If you qualify for classroom accommodations because of a disability, please get an Accommodation Authorization from the Disability Resource Center (DRC) and submit it to me in person outside of class (e.g., during office hours) within the first two weeks of the quarter. Contact DRC at 459-2089 (voice), 459-4806 (TTY), or http://drc.ucsc.edu for more information on the requirements and/or process.

Academic integrity: By enrolling in the university, students are automatically agreeing to abide by policies, including those on academic misconduct. Academic integrity and scholarship are core values that should guide our conduct and decisions as members of the UCSC community. Plagiarism and cheating contradict these values, and so are very serious academic offenses. Penalties can include a failing grade in an assignment or in the course, or suspension or expulsion from the university. Students are expected to familiarize themselves with and follow citation practices (http://nettrail.ucsc.edu/ethics/index.html) and the university's Rules of Conduct regarding student conduct and discipline: http://www2.ucsc.edu/judicial/handbook.shtml.