
Department of Mathematics. University of the Pacific.

Instructor: Sebastian M. Marotta
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Class meetings: Mondays, Wednesdays and Fridays 8:00 am to 9:20 am in the Classroom Building, Room 204.

Office hours: Mondays, Wednesdays and Fridays 2:00 to 3:30 pm or by appointment.

Web page: http://www1.pacific.edu/~smarotta/Spring2009/MATH193A/MATH193A.htm

Description: This is an introductory course in chaotic dynamics offered for students in all areas of science including Engineering, Mathematics, Physics, Biology, Chemistry, Economics, Computer Science and others.

We will study iteration of functions in one real and complex dimension, periodic points, recurrence, the Feigenbaum diagram, Julia and Fatou sets; topological conjugacy, sensitive dependence on initial conditions (the butterfly effect), chaotic dynamics, iterated function systems (IFS) and fractals. We will look at some of the following questions: What is nonlinear dynamics? Why can’t we predict the weather? Why can’t we measure the coast of Britain? What is the Mandelbrot set?

For students in mathematics, this course is a ‘prelude’ to real analysis. Much as linear algebra is a lead-in to abstract algebra, a course like this allow students with only a calculus background to ease into the more abstract ideas in analysis. For students in engineering and other areas, this course gives you some of the background material to study applications of nonlinear dynamics and fractals in your field of study.

It is a rigorous mathematical course where students have to understand and use a number of mathematical definitions and theorems that have an impact in contemporary mathematics. The students use also novel techniques, including carrying out a series of experiments using software that is posted on the internet.

Prerequisites: The prerequisite for this course is Calculus II or sufficient mathematical maturity.


Homework: There will be homework assigned each class. It is very important that you complete the homework assignments to fix the ideas discussed in class and textbook. It is for your benefit to be able to assess your understanding of the material by working out homework problems. If you need help solving the problems you are welcome to come to my office during my office hours and I will be happy to help you work them out. Homework assignments will not be collected.
Labs: There will be about 7 to 8 experiments assigned during the semester. To work on these labs you need access to a few web pages where you can find programs (Java Applets) that allow you to work out the experiments. Every lab involves writing a report. Your writing skills and the way you present results will be taken into account when grading the labs. You can work in groups to solve these experiments but you have to present your own work.

Grading Policy: There will be three cumulative midterms and a final exam on the following days:

1st Midterm: Friday February 6
2nd Midterm: Friday March 6
3rd Midterm: Friday April 10

Final Exam: Monday May 11, 8:00-11:00 am.

Students are expected to be active participants in class discussions every day. Quizzes may be assigned in the last few minutes of a class to assess the learning experience.

The first midterm counts 10%, the second midterm counts 15%, the third midterm counts 20% and the Final exam counts for 25% of the grade. Attendance will count for 5% and the Labs and your participation in class (including quizzes) will count for 25% of your grade. No make up examinations will be given. The course will be graded based on a standard 10-point scale: 90% and up for A- and A; 80% – 89% for B-, B and B+; etc.

Blackboard: Grades will be posted using the Pacific Blackboard Course Web Site at https://pacific.blackboard.com

Special Accommodations: If you are a student with a disability, who requires accommodations, please contact Mr. Daniel Nuss, Coordinator of the Office of Services for Students with Disabilities in Bannister Hall - Room #101, for information on how to obtain accommodations. His phone is (209)946-2879.

Records: Copies of student work may be retained to assess how the learning objectives of the course are being met.

Conduct Code: Students are expected to know and understand the provisions of the Pacific Honor Code with respect to cheating and plagiarism.