## Math 5470/6440 - Chaos Theory, Spring 2019

## Lecturer: <u>Aaron Fogelson</u> Office: LCB 312, Phone: (801) 581-8150 E-Mail: <u>fogelson@math.utah.edu</u> Office Hour: Mon Noon – 1 PM Course Website: http://www.math.utah.edu/~fogelson/5470\_s19/

**Textbook**: Stephen H. Strogatz, Nonlinear Dynamics and Chaos: With Applications to Physics, Biology, Chemistry, and Engineering (Studies in Nonlinearity) 2nd ed., Westview Press; 2014. ISBN-13: 978-0813349107

**Course description:** Chaos is everywhere around us from fluid flows, weather forecasting, stock prices and fractal images. The theory of nonlinear dynamical systems uses bifurcations, attractors and fractals to describe the chaotic behavior in the real world. The course gives an introduction to chaotic motions, strange attractors, fractal geometry: We shall generally follow Strogatz's text. We will emphasize applications taken from various subjects like mathematical biology, engineering, geometry and physics.

Class time: TTh 2:00-3:20 PM in LS 101 Prerequisites: Math 2250 or Math 2270-2280 sequence 3 credit hours

Course Grade: 2 Midterms (20% each) + Quizzes (20%) + Final (40%)

**Homework and quizzes:** Homework will be assigned every lecture and posted on the class website. Unless I tell you otherwise, the homework itself will not be turned in! However, every Tuesday, at the start of the class, there will be a quiz, featuring one or two of the homework problems. The quiz will be graded.

I want to emphasize greatly that doing the homework in the timely fashion is the only way to keep up with the course, to identify where you may be having trouble, and need additional work. Math can only be learned through practice. Doing homework is your chance to learn! The quizzes will be easy if you really understand how to do the assigned problems, and impossible if you don't.

**Extra credit problems and 6440 students:** Some homework assignments will contain extra-credit problem (including exercises from additional sections of the book, computing exercises or openended questions). The extra credit problems can be turned in and will be graded. Students who successfully complete most of these will be permitted to do a **project** at the end of the class, instead of the comprehensive part of the final exam. **Students registered for 6440 are required to attempt extra credit problems** – they will contribute to your overall grade.

Exams: Exams will be closed book except that you will be allowed to bring a "cheat sheet," an

8.5" x 11" piece of paper with notes on both sides (the "cheat sheet" will not be allowed on quizzes). Your text, notes, homework papers, calculators, laptops, tablets, phones, text messaging devices, and other books will not be allowed.

**Midterms:** There will be two in-class one-hour midterm exams, tentatively, on Thursdays Feb. 21 and Mar. 28.

**Final Exam:** Th, April 25, 1:00 - 3:00 PM. Half of the final will be devoted to material covered after the second midterm exam. The other half will be comprehensive.

With any questions, please, contact me in class or by email: fogelson@math.utah.edu

## Friendly advice:

Ask questions!!! If lecture was unclear, homework confusing, homework grading strange, book mysterious or anything else – ask! (office hours, after class, email). Since ideas will build on each other throughout the semester, seek help as soon as possible.

Read your book! It has detailed explanations and more examples that can be covered in class. It is a good book – use it wisely.

Do the homework exercises! This is really the only way to learn or to know what questions to ask. I strongly encourage you to start the homework as early as possible, so that you can seek help as needed.

**ADA statement.** The University of Utah seeks to provide equalaccess to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

**Faculty and Student Responsibilities:** All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. You have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, collusion, fraud, theft, etc. Students should read the Code carefully and know you are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee. http://regulations.utah.edu/academics/6-400.php