

**5470/6440 Fall 2007 (Nonlinear Dynamics and Chaos)**

MWF 9:40-10:30AM at WBB 617

**Class Website:** [www.math.utah.edu/~borisyuk/5470](http://www.math.utah.edu/~borisyuk/5470)

**Instructor:** Alla Borisyuk

**Email:** [borisyuk@math.utah.edu](mailto:borisyuk@math.utah.edu)

**Office hours:** Wed 11:45 to 12:45

**Office location:** LCB 303, ph. (801) 585-1639

**Textbook:** *Nonlinear Dynamics and Chaos with applications to Physics, Biology, Chemistry and Engineering* by Steven H. Strogatz

**Course:** The course will follow the textbook fairly closely. I suggest that you **read the PREFACE** of the book (p. ix) to find out more about the prerequisites and the features of the book. In short: The course introduces the theory of nonlinear dynamical systems, starting with first-order ODEs and their bifurcations, proceeding with phase plane analysis, limit cycles, iterated maps, period doubling, fractals and strange attractors. Analytical and geometric methods are stressed, with special emphasis on applications. The essential prerequisites are **single-variable calculus** (including curve-sketching, Taylor series and separable differential equations), **linear algebra** (eigenvalues and eigenvectors), and basics of **complex numbers**. The scientific background for applications will be introduced as needed.

**Homework:** homework will be assigned at every lecture and posted on class website. All homework from a given week will be **due the following Wednesday at 5:30 PM**. After that it will not be accepted. Not all of the assigned problems will be graded. Many homework assignments will contain **extra-credit problems** (including exercises from additional sections of the book, computing exercises or open-ended questions). Students who successfully complete most of these will be permitted to do a project at the end of the class, instead of the final exam. **Students registered for 6440 are required to attempt extra-credit problems** – they will contribute to your homework score.

**Exams:** Midterm on October 17 in class (review problems handed out October 1, review session October 15); Final exam – December 11, 8 to 10 AM.

**Your course grade will consist of:** Homeworks (30%), Midterm (30%), Final (40%)

**Policy on attendance:** Students are expected to attend every class. If it is necessary to miss a class, it is the student's responsibility to make up the missed material.

**Special accommodations:** A student who wishes to request consideration for a disability needs to contact the Center for Disabled Student Services in Room 160 Union. This must be done before special consideration will be given in class.

**Friendly advice:**

- Ask questions!!! If lecture was unclear, homework confusing, homework grading strange, book mysterious or anything else – ask! (office hours, after class, email, phone). 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 your exercises! This is really the only way to learn or to know what questions to ask. Make sure that you look over your homework when it is returned to you, and if you still do not know why an answer is wrong, ask about it.

### **Course plan**

We will cover about one chapter a week. The tentative plan is to cover chapters 1-8 before the midterm, and chapters 9-12 in the remainder of the term. The students are expected to read the chapters as we cover them. Not every section and not every example will be covered in class, but students are encouraged (but not required) to supplement the lectures by reading of the omitted sections.