Math 4541   Dynamics and Bifurcation I.   Fall 2011

Schedule: 1:35 pm - 2:55 pm TR	Classroom: Skiles 254
Office: Skiles 102A	Phone: 404-894-4750
Email: zengch@math.gatech.edu	Webpage: **www.math.gatech.edu/ ~zengch**
Office hours: 9:35--10:55 T & 3:05--4:25 R	Final schedule (tentative): Dec. 15th (Thu.) 2:50--5:40

Syllabus

Instructor: Chongchun Zeng

Prerequisites: **MATH 2403** or permission of the instructor

Participation: Attendence in classes is mandatory. Students are expected to read the materials before and/or after the classes. It is suggested that you start to work on homework problems right after they are assigned.

Text book: Differential Equations, Dynamical Systems & An Introduction to Chaos / 2nd ed. by Morris Hirsch, Stephen Smale & Robert Devaney

Topics: In this semester, we will study:

- First order equations
- Linear systems
    - Planar systems
    - Phase portraits
    - Higher dimensions
- Nonlinear systems:
    - Existence and uniqueness of solutions
    - equilibria and bifurcations
    - global nonlinear techniques
    - closed orbits and limit sets

- Applications

Grades: **1 final exam 55%, 1 midterm 33%, 6 homework assignments 12%.**

- *Exams:* The final will be 2 hours and 50 minutes. The 80-minute midterm will be given during a lecture in late Spet. which will be announced at least 9 days in advance. The exams are "closed book" and "closed notes". You will be allowed to bring with you a one page (8.5 X 11, both sides) "cheat sheet" with anything you want written on it. Please write your exam solutions in **ink** and **circle** the final answer of each problem in a box with no corrections inside. Writing exams in pencil would automatically forfeit your right to argue for credits after the exam is given back to you. There will be **no** make-up for a missed exam, except under provable impossibility to attend the exam.
- *Homework:* Homework will be assigned at the end of each lecture and then put on this webpage in the below. You may discuss the homework problems with other students *in this class,* but you should write down the solutions and complete the homework independently. The homework will be collected roughly every 2 weeks. On each collecting day, the homework is due in the classroom at the beginning of the lecture. The corresponding assignment includes all the problems assigned before that collecting day and after the previous assignments. Some selected problems from each assignment will be graded and the score will be given based on both the graded problems and the completion of the whole assignment. Due to the holiday schedules, the specific homework collecting dates are:

    9/6 (Tue.), 9/20(Tue.), 10/4(Tue.), 10/20(Thu.), 11/3(Thu.), 11/17(Thu.)

- *Letter grade:* in general, the letter grade will be given based on the total score (homework + midterm + final) in a curved fashion with the following exceptions:
1. Total score 90/100 or above will always be an **A**
2. Total score 60/100 or above will always be a **C** or higher.

Homework assignments:

Homework assignments:

- Homework Assignment #1 (due Tue. 9/6):
    - Assigned on Thu. 8/23: Chp 1. 1, 2(b)(d), 3(c), 4, 7, 10, 13, 14
    - Assigned on Tue. 8/30: Chp 2. 1(b), 2(c), 5, 6, 7, 9, 14
    - **Partial solutions of HW#1 -- Part A**
    - **Partial solutions of HW#1 -- Part B**
    - **Partial solutions of HW#1 -- Part C**
- Homework Assignment #2 (due Tue. 9/20):
    - Assigned on Tue. 9/6:   Chp 3. 1, 2(iii) (iv), 4, 6, 9, 12, 16
    - Assigned on Tue. 9/13: Chp 4. 1, 2, 5, 8
    - **Announcement: The first midterm: Thu. 9/22, covering Chapter 1 --4.**
- Homework Assignment #3 (due Tue. 10/4):
    - Assigned on Tue. 9/27: Chp 5. 2d, 4, 5de, 6, 7, 8b
- Homework Assignment #4 (due Thu. 10/20):
    - Assigned on Tue. 10/4: Chp 5.   10,.13, 15
    - Assigned on Tue. 10/11: Chp 6. 1ac, 2, 3, 5, 7, 8, 11
- Homework Assignment #5 (due Thu. 11/3):
    - Assigned on Thu. 10/20: Chp. 6   12(efi), 15
    - Assigned on Thu. 10/27: Chp. 7   1ce, 2, 4, 5, 7
- Homework Assignment #6 (due Thu. 11/17):
    - Assigned on Thu. 11/10: Chp. 8   1(i, ii, iv), 2, 3, 5, 9, 10
- Homework not to be collected:
    - Chp. 9   1bd, 3, 4, 5
    - Chpt. 9   6, 7bc, 8abd, 9