Math 415 - Amir Assadi, Department of Mathematics (ahassadi@wisc.edu)
Catalogue Title: **Appplied Dynamical Systems and Chaos Theory**

Descrptive Title: Modeling complex dynamics in biological systems with term projects in current topics in biological and behavioral sciences and social networks) .
Lectures: TuTh 2:30p-3:45pm

Registration info for Math 415 is found at URL:
http://timetable.doit.wisc.edu/cgi-bin/TTW3.navigate.cgi?20052+opensects/d600c415A1.html

The text books (will be also on Math Department's Reserve) are:

1) Mathematics for Dynamic Modeling, by Edward Beltrami, Academic Press ISBN 0-12-085555-0
2) Modeling Differential Equations in Biology, by Clifford Taubes, Prentice Hall, ISBN 0-13-01732

Prerequisites: Math 320 or equivalent (or consent of instructor for graduate students and advanced undergraduates majoring outsice Engineering and the Physical Sciences).
This course begins with a 4-week review of basic Matrix Theory and Solution of First Orde Linear Systems of Ordinary Differential Equations. The textbook (2) is meant to help the students whose mathematics background differs from Math 320 to catch up by readings from a biology-friendly exposition, to catch up with the rest during the first month. Then I w primarily use (1) as the main course of lectures on dynamical systems theory, and use (2) for assignment of reading and class discussion, as well as a source for course projects.

The course has no HW or Exam requirements for Graduate Students, and advanced undergraduates majoring outside the Physical Sciences (consent of instructior is necessa within the first two weeks), such as biological, behavioral and social sciences. All other undergrads will follow the grading requirements alike. The grading of the course for undergraduates will be based on a combination of exams based on topics of (1) that are covered in the course, HW and class projects.

The course encourages a primarily project-based approach to understanding of mathematics. To help the students without any programming background, I will provide some hands-on tutorials for using MATLAB for computation, and provide help on a case-by-case basis for the final project. The course is very likely to meet in a computer lab for a least one-half of the times, and hands-on problem solving for modeling will be encourage during certain class hours.

Project topics for the course from biomedical and life sciences are welcome, and a limited number of research topics from social networks and economics could also receive mentor as part of final project for graduate students and advanced undergraduates majoring in behavioral/social sciences.