Math 5651: Mathematical Modeling of Biological Processes
Spring 2016

Lecture MWF 9:10-10:05 at Jennings Hall 50, 1735 Neil Ave

Instructor Avner Friedman (afriedman@math.osu.edu) and Ching-Shan Chou (chou@math.osu.edu)

Office hours Friedman: M 11:30-12:30pm at JE 372 or by appointment;
Chou: MW 3:55-5:00pm at Math Tower 412 or by appointment

Course homepage for announcements, HWs, handouts, etc. will be posted on Carmen.

Textbook: Lecture Notes on Mathematical Modeling in the Life Sciences, Springer, 2014, by Avner Friedman and Chiu-Yen Kao.

Grading Policy:

- Homework: 40% theoretical, 40% computational
- Final project and oral presentation: 20%

No credit for late homework or project. Homework problems will include both analytical problems and computational problems. General policies of academic honesty applies to this course. Theoretical problems should be submitted to Dr. Friedman on Mondays of the following week, and computational problems should be submitted to Dr. Chou on Fridays of the following week. Course projects will be announced after the spring break and students will be paired with a partner. Each group is expected to give a project presentation during lecture time near the end of the semester, and write a project report. Students are required to attend all lectures and presentations. Excessive absences without any medical or other valid documentation will result in low grades in class participation.

Important dates:

- Jan 18: MLK Day, no class
- Mar 14-18: Spring break, no classes

The instructors reserve rights to make necessary changes for the course any time during the semester. The students are responsible for keeping up with possible changes.

Week	Monday	Wednesday	Friday
1	**Friedman** Chemical Reaction Kinetics, Mass action kinetics	**Friedman** Michaelis-Menten kinetics, Hill type kinetics	**Chou** Introduction to MATLAB
2	MLK Day No class	**Friedman** Basic ODE theory (HW 3.3, 3.5)	**Chou** Root Finding
3	**Friedman** Basic ODE theory	**Chou** ODE solvers	**Chou** ODE solvers
4	**Friedman** SIR model SEIR model	**Friedman** SIR model SEIR model	**Chou** Lab for Disease model
5	**Friedman** Chemostats Competing Populations	**Friedman** Competing Populations Recap	**Chou** Eigenvalue solver Lab for Chemostat
6	**Friedman** Bifurcation Hopf Bifurcation	**Friedman** Hopf Bifurcation Recap	**Chou** Lab for Bifurcation
7	**Friedman** Neuronal Oscillations	**Friedman** Conservation Laws	**Chou** Lab for Phase plane analysis
8	**Friedman** Conservation Laws	**Chou** Numerical methods for conservation laws	**Chou** Numerical methods for conservation laws
9	**Friedman** Neurofilaments transport	**Friedman** Recap for HW	**Chou** Lab

	Spring break	Spring break	Spring break
10	**Friedman** Chemotaxis	**Chou** Lab for diffusion equation	**Chou** Lab for chemotaxis equation
11	**Friedman** Angiogenesis	**Friedman** Cancer	**Chou** Lab for Cancer
12	**Friedman** Cancer Therapy	**Friedman** Granuloma	**Chou** Lab for Free boundary problems
13	**Friedman** Project Demo	Project	Project
14	Project	Project	Project
15	Project		Final exam time used for 2 projects