

SPRING 2019

SYLLABUS

<i>Course title</i>	Modeling in Mathematical Biology
<i>Course number</i>	MAP 4484/5489
<i>Schedule, Room</i>	MWF 6 , Lit 125
<i>Instructor</i>	Maia Martcheva maia@ufl.edu http://people.clas.ufl.edu/maia/
<i>Office hours</i>	WF 3rd period or by appointment
<i>Office</i>	Little Hall 469

Goals: To introduce students to mathematical modeling in biology. Develop elementary skills to form, analyze and simulate one dimensional and two dimensional mathematical models of biological systems.

Textbook: There is no appropriate textbook available.

Topics:

- (1) Review of basic relevant concepts of MAP 2302.
- (2) One dimensional ODE models of growth, analysis, simulations and fitting to data.
- (3) One dimensional difference models, analysis and conclusions.
- (4) One dimensional delay models, analysis and conclusions.
- (5) 2x2 systems. Predator-prey dynamics. Mathematical techniques for analysis of 2x2 systems.
- (6) 2x2 system models of epidemics. Analysis, simulations and fitting to data.
- (7) 2x2 models of chemostat. Analysis and simulations.
- (8) Modeling excitable systems.

Prerequisites: MAP 2302 and MAS 3114 (or MAS 4105). Access and some familiarity with Mathematics and Matlab will be necessary and useful.

Requirements:

- (1) There will be 2 tests
 - Midterm – **February 27, 2019, in class.**
 - Final – **April 10, 2019, in class.**
- (2) There will be frequent open-notes in-class quizzes.
- (3) Students will be expected to attend class.
- (4) There will be a project, assigned after Midterm, and completed in groups of 4-5 students.
- (5) We will use Mathematica and Matlab for computation. Having access to the software will be necessary and useful.
- (6) Students will be expected to make presentations on the project. Each team will present their solution to the project. Presentations will be approximately 20 mins each, in class, from April 12 to April 24, 2019.

Expected Student Learning Outcomes: At the end of this course, students will be expected to have achieved the learning outcomes in content, team work and critical thinking:

Content: Students demonstrate elementary competence in the terminology, concepts, and methodologies used within the discipline. Students will acquire a basic knowledge in one dimensional well-known population models of different type – ODE, discrete and delay equations. Students will learn to analyze models with general parameters and simulate them with specific parameters. At the end of the class students are expected to know how to formulate, analyze and simulate two dimensional predator-prey, epidemic, chemostat problems, and models of excitable systems.

Team work: Students work together in groups of 4-5 on research-like project, using tools obtained in the class. Students learn to communicate ideas and reasoning clearly and effectively in the team and to the entire class at a level appropriate to the discipline and this class. Every team will have the chance to present and defend their results of the project. Class discussion is expected to occur during student presentation. Achievement of this learning outcome will be assessed through student discussions during presentations of arguments on the project. Project grades will assess how well each team defends its results to an audience of peers.

Critical Thinking: Students analyze information carefully and logically from multiple perspectives, using discipline-specific methods. Students will grade each others' quizzes and provide feedback to peers as well as interpret others' criticism of their work. Students will critically evaluate project results of other teams. Achievement of this learning outcome will be assessed by collecting and assessing students' classifications of other project results.

Grading: Grades will be based on (1) Tests; (2) Quizzes; (3) Project and its presentation.

- Midterm – 100 points
- Final – 100 points
- Quizzes – 100 points

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- Total: 300 points

Additional grading policies:

- (1) Class letter grades are based on a curve. Approximate minimal cutoffs are:
 - A – 270 points or higher
 - B – 240 points or higher
 - C – 210 points or higher
 - D – 180 points or higher
- (2) All team members of the winning project will receive 10 points each.
- (3) 5 quizzes will be graded for a total of 100 points. All quizzes will be graded by classmates.
- (4) In case of planned absence of a test, you may take the test beforehand. In case of an emergency, if a test is missed, a make up may be approved and administered within one week of the regular exam.

Special Accommodations:

Students requesting classroom accommodations or special arrangements during examinations must first register with the Disability Resource Center

<https://disability.ufl.edu/>

The DRC will provide documentation. The student must then present this documentation to instructor to meet the requesting accommodation. This should be done as early in the semester as possible.

Academic Honesty:

Students are expected to know and follow the Code of Student Conduct. In particular, students must refrain from cheating, not make their work available for cheating, give due credit and citation for any quoted work, and make only fair use of copyrighted materials and software. You are expected to take exams and quizzes on your own and complete the project within your team. The university has a policy on academic honesty, which should be followed.

U Matter We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu (or see <http://www.umatter.ufl.edu/>) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Course Evaluation:

Students are invited to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>