Math 463: Mathematical Modeling in Biology

Instructor:	Ruby Kim	**Class Schedule:**	Mondays 4-5:20pm in SKB2150
Email:	rshkim@umich.edu	**Lab Schedule:**	Wednesdays 4-5:20pm in EHB735
Office:	4843 East Hall	**Office Hours:**	MTh 3-4pm or by appointment

Course Description
This course introduces students to mathematical modeling in biology, physiology, and medicine. Students will learn how to formulate and analyze mathematical models that can be used to investigate complex biological phenomena. The course will consist of lectures, group discussions, and computer laboratory exercises, with Wednesday classes usually spent in the computer lab.

Prerequisites
Students are expected to have a solid foundation in differential equations (Math 216, 256, 286, 316, or equivalent) and linear algebra (Math 214, 217, 417, 419, or equivalent). Some prior experience with programming is useful but not required.

Projects
There will be one midterm project and one final project. For both projects, students will work in groups of 2-3 to address a biological problem of their interest using mathematical tools and analysis. For each project, students will submit a written report and give a 10-minute presentation. Detailed guidelines will be provided in Canvas.

Homework
There will be weekly homework sets due on Tuesdays at 11:59pm. Students are encouraged to discuss problems with each other, but the solutions handed in must be their own. Solutions should be written or typed neatly and uploaded to Gradescope in Canvas.

Participation
Active participation in classes, labs, and discussions is expected. During some classes, there will be small group activities that will contribute towards a participation grade. Laptops should only be used for note-taking or in-class activities.

Services for Students with Disabilities
If you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way the course is taught may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities (SSD) to help us determine appropriate academic accommodations. SSD (`http://www.ssd.umich.edu`) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. Any information you provide is private and confidential and will be treated as such.

Academic Dishonesty
Any act of academic dishonesty as defined in the LSA Community Standards of Academic Integrity will result in an F in the course or a zero on the item in question, subject to the determination of the instructor.

Course Grade

Homework	35%
Participation	15%
Midterm project	25%
Final project	25%

Tentative Course Schedule

Week	Topic	Due
1	Systems of ODEs	
2	Scientific Programming Basics	HW1 on Tuesday
3	Intro to Numerical Methods for ODEs	HW2 on Tuesday
4	Growth Models	HW3 on Tuesday
5	Population Dynamics	HW4 on Tuesday
6	Epidemic Models Part I	HW5 on Tuesday
7	Epidemic Models Part II	HW6 on Tuesday
8	FLEX DAYS	
9	MIDTERM PRESENTATIONS	
10	Biochemical Networks Part I	Midterm Report on Tuesday
11	Biochemical Networks Part II	HW7 on Tuesday
12	Intro to PK/PD	HW8 on Tuesday
13	Neurons, Synchronization Phenomena	HW9 on Tuesday
14	Phylogenetics and Markov Models	HW10 on Tuesday
15	FLEX DAYS	
16	FINAL PRESENTATIONS	Final Report on Wednesday

The instructor reserves the right to change the content of the course material if needed.