

MATH/BIOL-UA 255: Mathematics in Medicine and Biology
Fall 2022
Tuesday/Thursday 3:30-4:45 in WWH 312
Recitations: Fridays 2-3:15 in WWH 317

Instructor: Ondrej Maxian (om759@nyu.edu)

Office Hours: Mondays 1–3 PM in WWH 1003 (or by appointment)

Course webpage: <https://cims.nyu.edu/~om759/MathMedBio/index.html>

Teaching Assistant: Gaunchun Li (gl1705@nyu.edu)

TA Office Hours: Tuesdays 9–11 AM (tentative)

Prerequisites: Calculus I, Principles of Biology

Course description: Intended primarily for premedical students with interest and ability in mathematics. Topics of medical importance using mathematics as a tool: control of the heart, optimal principles in the lung, cell membranes, electrophysiology, countercurrent exchange in the kidney, acid-base balance, muscle, cardiac catheterization, computer diagnosis. Material from the physical sciences and mathematics is introduced as needed and developed within the course.

Course objective: To familiarize you with the basics of biophysical modeling and writing first principles models of physical systems. By the end of this course you should be able to take a physical system and identify quantities of interest, then write and solve the equations governing those quantities.

Text: Hoppensteadt and Peskin, *Modeling and Simulation in Medicine and the Life Sciences*, 2nd ed. Available for free to you here: <https://link.springer.com/book/10.1007/978-0-387-21571-6>

Course grades: Weekly homework assignments = 25%
Exams = 65% (Your lowest will weigh 15%, other two will weigh 25% each)
Class participation = 10%

Homework: Assigned each Tuesday, due the following Tuesday at the start of class. Late homework will be assessed a 5% penalty each day.

Exams: Two in-class midterms and final exam
Midterm 1: Tuesday 10/04
Midterm 2: Tuesday 11/08

Course schedule:

Week 1: 09/01	2.1, 2.2
Week 2: 09/06, 09/08	2.2 –2.6
Week 3: 09/13, 09/15	1.1–1.5
Week 4: 09/20, 09/22	1.5 – 1.8
Week 5: 09/27, 09/29	1.9 – 1.11
Week 6: 10/04, 10/06	Exam 1 , 4.1 – 4.2
Week 7: 10/13	4.2 – 4.3 (NO CLASS Tuesday 10/11)

Week 8: 10/18, 10/20 4.4 – 4.6
Week 9: 10/25, 10/27 5.1 – 5.2
Week 10: 11/01, 11/03 5.2, 3.1 – 3.2
Week 11: 11/08, 11/10 **Exam 2**, 3.2 – 3.4
Week 12: 11/15, 11/17 3.4 – 3.5
Week 13: 11/22 Infectious disease modeling (NO CLASS Thursday 11/24)
Week 14: 11/29, 12/01 TBD
Week 15: 12/06, 12/08 TBD
Week 16: 12/13 TBD