Class schedule: Math 4500, Spring 2022

- **Week 1: 1/12–1/14**. Course overview for half of Thursday. Then a lecture on the Part 1, Section 1 nodes.

  Summary & key ideas. We introduced a variety of simple models from the sciences, with a focus on exponential growth and decay. Then we modified them to get more complicated models such as the logistic model and falling objects with air resistance.

  To do: Read over the hand-written notes and formulate any questions you may have.

- **Week 2: 1/17–1/21**. Class canceled Tuesday (snow). One-hour lecture Thursday on the second part of the Part 1, Section 1 nodes. Specifically, more on the logistic equation and incorporating an extinction threshold. Also modifying Newton's law of cooling to incorporate non-constant ambient temperatures. Also discussed (informally) disease dynamics.

  To do: Read over the hand-written notes and formulate any questions you may have. Look at the website for the Mathematical Contest for Modeling (MCM). Listen to the RadioLab Patient Zero podcast episode (optional, but fun!). Start working on HW 1, due next Thursday.

- **Week 3: 1/24–1/28**. Two lectures on population dynamics, difference equations, cobwebbing, the discrete logistic map, bifurications, chaos, and linearization.
  To do: Finish HW 1 (basic models) , due Thursday. Read over the notes posted and formulate questions.

- **Week 3: 1/31–2/4**. Two lectures on models of structured populations, and predator-prey models.

  To do: Finish HW 2 (difference equations and the logistic map) , due Thursday.

- **Week 5: 2/7–2/11**. One lecture on predatory-prey models, and one lecture on modeling infectious diseases: the SIR model.

  To do: Finish HW 3 (models of structured populations), due Thursday.

- **Week 6: 2/14–2/18**. Two lectures on modeling infectious diseases: the SIR model with demography, linearization, infection-induced morality, related models (SI, SIS, SIRS, and SEIR).

To do: Finish HW 4 (models of interacting species), due Friday.

- **Week 6: 2/21–2/25**. Two lectures on modeling biochemical reaction networks, and cellular automata.

  To do: Finish HW 5 (infectious disease modeling), due Friday.

- **Week 8: 2/28–3/4**. Two lectures on agent-based models, NetLogo, and the lactose operon in E. coli.

  To do: Finish HW 6 (biochemical reaction networks), due Friday.

- **Week 9: 3/7–3/11**. Two lectures on ODE and Boolean models of the lactose operon in E. coli.

  To do: Finish HW 7 (cellular automata and agent-based models).

- **Week 10: 3/14–3/18**. One lecture on basic Boolean models of the lactose operon in E. coli, through the *Part 2, Lecture 4* slides. Midterm 1 Thursday.

  To do: Work on HW 8 (Boolean models), due Tuesday after break.

- **SPRING BREAK: 3/21–3/25**.

- **Week 11: 3/28–4/1**. Two lectures on Boolean models of the *lac* operon, tentatively covering advanced Boolean models and bistability (Part 2, Lectures 5 and 6).