

BIEB 143
Computer Modeling in Evolution and Ecology
Spring Quarter 2020

Instructors: Lin Chao and Scott Rifkin

Instructional Assistant: Adam Conn

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Class time: 9-1 Wednesdays and Fridays

Prerequisites: BIEB 150

Text: Readings and assignments to be posted on the class webpage which is accessible through Canvas or below.

Attendance: The time to get help with the assignments is during class on Wednesdays and Fridays and during Adam's office hour. The recordings will be available outside of class time, but the 1:1 will not be, and this help will be more critical as the course progresses.

Quizzes: Unless announced differently, there will be a quiz every Wednesday at 9:05 AM through Canvas. These will generally be short answer where you are asked to interpret code.

Class webpage: You can access the course webpage with the assignments through the link on the Canvas course page.

Grading: The final grade will be based on total based on lab reports on weekly exercises (graded A,B,C,D,F) and quizzes (including unannounced quizzes) (graded out of 10 points). The lab reports and quizzes are each worth 50% of your grade.

Weekly lab reports: Homework: Email your homework to: ucsdbieb143@gmail.com We will give you instructions for what you need to turn in for each homework. Usually it will be the homework code and output in a specific format. We will sometimes ask you to write a discussion of what the output of your program means. If your program does not work, please turn in an explanation of where you think the problem is and the steps you took to try to solve it. This may help you get some partial credit.

- This is a course for students who want to improve their ability to use quantitative, mathematical, and statistical models in biology by learning to use and write computer code. Students will be developing their own programs instead of using programs prepared by software developers.
- A degree of familiarity with and desire to work with mathematical reasoning is required.
- This is not a course for students who already know how to program well. Only basic beginning code writing will be taught. All programming will be in the language R.
- The exercises implemented in this laboratory course build heavily on exercises assigned previously in the class. The completion of weekly assignments and lab reports will be required and students are advised to prepare themselves to meet these deadlines.
- Quizzes and exams are planned to be generally open notebook but not open computer (but some may be closed notebook). You are encouraged to keep a lab notebook with notes and copies of handouts, which can be accessed during the

tests if they are open notebook.

Topic schedule (subject to change)

- Week 1. Introduction to programming in R.
- Week 2. Generating random distributions by Monte Carlo methods
- Week 3. Simulating a Poisson process
- Week 4. Epidemiology models part 1 - no spatial structure
- Week 5. Epidemiology models part 1 (continued)
- Week 6. Epidemiology models part 2 - dynamics on a 2D grid
- Week 7. Epidemiology models part 3 - dynamics on a network
- Week 8. Epidemiology models continued
- Week 9. Evolutionary game theory
- Week 10. Evolutionary game theory (continued)