

BIEB 143
Computer Modeling in Evolution and Ecology
Spring Quarter 2015

Instructors: Lin Chao and Scott Rifkin

Teaching Assistant: Josh Kenchel

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Location: York 1310

Lecture times: 10:00 – 10:50AM

Lab times: 11:00AM -2:00PM

Prerequisites: BIEB 150 or BIEB 100.

Text: Readings to be posted on the class webpage.

Class webpage:

<http://labs.biology.ucsd.edu/rifkin/courses/bieb143/spr15/bieb143spring2015.html>

Grading: Final grade will be based on total based on weekly exercises, lab report, quizzes (including unannounced quizzes), and a final exam (practical).

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. 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 and desire to work with mathematical reasoning will be required.
- This is not a course for advanced students in computer science. 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 a few 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 (might be modified depending on class progress)

- Week 1. Introduction to programming in R.
- Week 2. Generating random distributions by Monte Carlo methods
- Week 3. Simulating a Poisson process
- Week 4. Estimating the probability of fixation
- Week 5. Artificial selection on neural networks
- Week 6. Artificial selection on neural networks (continued)
- Week 7. Debugging
- Week 8. Epidemiology models
- Week 9. Evolutionary game theory
- Week 10. Evolutionary game theory (continued)