

**BIEB 143**  
Computer Modeling in Evolution and Ecology  
Spring Quarter 2014

**Instructors:** Lin Chao and Scott Rifkin

**Teaching Assistant:** Samantha Clements

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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/spr14/bieb143spring2014.html>

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

**Weekly lab reports:** Homework: Turn in program code and output (even if the program is not working) by emailing to: [ucsdbieb143@gmail.com](mailto:ucsdbieb143@gmail.com) Include a write up indicating whether program worked or not and parts of program you do not understand. If it did not work, explain what you tried and where you think that bug could be.

- 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 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. We will announce whether they will be closed. You are encouraged to keep a lab notebook with notes and copies of handouts, which can be accessed during the tests.

## Date

- 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. Predator/prey or epidemiology models
- Week 9. Evolutionary game theory
- Week 10. Evolutionary game theory (continued)