Matlab for Biologists
Bio 410/510 Winter 2022

Lecture: Mon 9:00-9:50am, Columbia 44
Lab: Weds 9:00 – 12:50pm, Huestis 112

Instructor:
Cristopher Niell
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Office hrs: Thurs 2-3pm, LISB 214

GEs:
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Office hrs: Fri 11am-noon, LISB 200

Description
Scientific programming is an essential skill for biological research in the 21st century. This course will provide an introduction to programming, using the Matlab environment, for students with none to minimal previous experience. We will use focus on tools and applications relevant to biology, but the skills will be applicable to a wide range of scientific endeavors. Furthermore, the basic programming knowledge should greatly facilitate learning other languages such as python or R. However, it should be noted that this course is meant to be a practical “how-to” introduction, rather than the theoretical foundation that would be provided in a computer science course.

Each week, new concepts will be introduced in a lecture on Monday which will include direct demonstration of the use in Matlab. “Lecture notes” will be provided, which consist of the Matlab script generated through the course of the lecture. On Wednesday, there will be a lab session to work through problems that will be provided, during which Prof Niell and GE Abe will be available to provide guidance. The lab will be preceded by a short lecture including a review of the week’s concepts and an outline of the lab problems.

Requirements
Homework – After each Wednesday lab session I will distribute a homework set consisting of 1-3 programming problems, as well as occasional written questions. These should be completed and returned by 9am on the following Monday. Programming problems should be submitted as Matlab scripts.
Exams – There will be two exams, which will be in a similar format to the homework assignments, but will be completed during Wednesday lab sections.

Grading
Homework 35%
Midterm 25%
Final Exam 40%
Schedule

Jan 3 Lecture: Variables and mathematical operations
Jan 5 Lab: Computations and plotting

Jan 10 Lecture: Data input/output
Jan 12 Lab: Data input/output

Jan 17 No class: MLK holiday
Jan 19 Lab: Control structures

Jan 24 Lecture: Creating functions
Jan 26 Lab: Functions

Jan 31 Midterm review
Feb 2 Midterm exam

Feb 7 Lecture: Statistics
Feb 9 Lab: Statistics

Feb 14 Lecture: Image processing
Feb 16 Lab: Image processing

Feb 21 Lecture: Dynamical processes
Feb 23 Lab: Dynamical processes

Mar 28 Lecture: Analyzing real data
Mar 2 Lab: Analyzing real data

Mar 7 Overview
Mar 9 Final Exam