

## **Matlab for Biologists**

### Bio 410/510 Spring 2023

**Lecture:** Tues 9:00-9:50am, Friendly 225

**Lab:** Thurs 10:00 – 1:50pm, Esslinger 116

#### **Instructor:**

Cristopher Niell

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Office hrs: Mon 2-3pm, LISB 214

#### **GEs:**

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Office hrs: Fri 2:30-3:30pm, LISB 216

#### **Description**

Scientific programming is an essential skill for biological research in the 21<sup>st</sup> century. This course will provide an introduction to programming, using the Matlab environment, for students with none to minimal previous experience. We will 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 Tuesday 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 Thursday, there will be a lab session to work through problems that will be provided, during which Prof Niell and GE Hulsey-Vincent 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 Thursday 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 Tuesday. 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 Thursday lab sections.

#### **Grading**

Homework	35%
Midterm	25%
Final Exam	40%

## Schedule

Apr 4 Lecture: Variables and mathematical operations

Apr 6 Lab: Computations and plotting

Apr 11 Lecture: Data input/output

April 13 Lab: Data input/output

April 18 Lecture: Control structures

April 20 Lab: Control structures

April 25 Lecture: Creating functions

April 27 Lab: Functions

May 2 Midterm review

May 4 **Midterm exam**

May 9 Lecture: Statistics

May 11 Lab: Statistics

May 16 Lecture: Image processing

May 18 Lab: Image processing

May 23 Lecture: Dynamical processes

May 25 Lab: Dynamical processes

May 30 Lecture : Analyzing real data

Jun 1 Lab: Analyzing real data

Jun 6 Overview

Jun 8 **Final Exam**