MATLAB syllabus

Instructor: Mai Nguyen, mlnguyen@princeton.edu
Meeting time: MW, 2-3:30pm from June 10-July 29
Office hours: by appointment, very flexible

Class overview
This class is an introduction to scientific computing using MATLAB for students with little to no experience with programming or statistics. Weeks 1-4 will focus on programming fundamentals, and Weeks 5-8 will walk through a simple data analysis pipeline and touch on advanced topics. This is a highly compressed course and will not cover everything you will need to know to do your research. The goal is to cover the basics and learn "enough" to get started on figuring out what you need to do, while emphasizing best practices.

Class structure
- First 45-60 will be combination of lecture and working through class examples, optional open work session for remainder of time
- Weekly assignments (2-3 hours, maybe longer for later topics) assigned Friday, due following Tuesday. I'll provide written feedback/comments on assignments and will be available for one-one-one meetings
- Beginning Week 2, Wednesday will start with code review of previous week's assignment (either in small group breakouts or whole class together)

Week 1: June 10 and 12
- Lecture 1, Wed: Introduction to MATLAB, getting started, MATLAB as a calculator,
- Lecture 2, Fri: Variables, data types I (integer, float, string, 1 and 2D arrays), manipulating arrays I

Week 2: June 17 and 19
Note: Class will be held 3-4:30pm this week only
- Lecture 3, Wed: Functions, scope, debugging
- Lecture 4, Fri: Booleans, control flow I (if/else, switch)

Week 3: June 24 and 26
- Lecture 5, Wed: Control flow II (loops)
- Lecture 6, Fri: Plotting I, IO

Week 4: July 1
- Lecture 7, Wed: Data types II (ND matrices, cell arrays, structs), manipulating arrays II (handling ND matrices, logical operators), pathing
- Fri: no meeting for Fourth of July

Week 5: July 8 and 10

- Lecture 8, Wed: Data analysis I - Loading, cleaning, initial visualization, descriptive statistics
- Lecture 9, Fri: Data analysis II - Comparing central tendency in 1 or more groups (t-test, anova, p values)

Week 6: July 15 and 17

- Lecture 10, Wed: Data analysis III - Correlation, regression
- Lecture 11, Fri: Data analysis IV - Sharing your results, visualization, cleaning code

Week 7: July 22 and July 24

- Lecture 12, Wed: Advanced topics – TBD but possibly clustering, MDS, or PCA
- Lecture 13, Fri: Advanced topics – TBD but possibly classifiers & cross validation

Week 8: July 29

- Lecture 14, Wed: Wrap up: best practices, GitHub, how to learn more, reproducibility