Introduction to Matlab

Rafael Serrano Quintero
University of Barcelona

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1 Information

- Instructor: Rafael Serrano Quintero
- Office: 416 (Diagonal 696 Building)
- Email: rafael.serrano@ub.edu
- Website: https://rafserqui.github.io/
- Office Hours: Monday 09:00 - 11:00 (confirm by email 24 hours before)

2 Course Objectives

The goal of the second part of the course *"Introduction to Matlab and Stata"* is to learn the basics of Matlab. Students will then be able to apply the acquired knowledge to problem solving in their research projects.

3 Grading Policy

- Problem Sets (50% of the final grade). Students will get two problem sets to solve (each counts for 25%) at home. Answers must be submitted in PDF with the original code as well. The students will send me one compressed file named `SURNAME_NAME_PSX.zip` where `X` is the number of the problem set. The file must have the following structure:

```
SURNAME_NAME_PSX.zip
├── Answers
│   └── SURNAME_NAME_PSX.pdf
└── Code
    └── ...  All Matlab codes.
```

- Exam (50% of the final grade). Students will have 24 hours to complete a take-home exam with exercises similar to those of the problem sets. After the exam, students might be asked to explain their codes and/or reasoning in individual meetings.

4 Topics and Organization

Topic 1 Matlab preliminaries.

- First interactions. Script vs Command Window.
- Creating Variables. Basic Operations. Arrays and Matrices.
- Control Flow. Plots. Functions.

Topic 2 Basics of root finding, numerical differentiation and integration.

Topic 3 Basics of numerical optimization.

Topic 4 Importing and manipulating data. Polynomial fit and evaluation. Nonlinear least squares.

Table 1: Tentative Calendar

Session	**Dates**	**Type**	**Topic**
Session 01	Sep 26th	Lesson	Matlab Syntax I
At home	Sep 26th - Oct 2nd	Assignment	Problem Set 1
Session 02	Oct 3rd	Solution	Problem Set 1
		Lesson	Root finding, Numerical Differentiation, and Integration
At home	Oct 3rd - Oct 9th	Assignment	Problem Set 2
Session 03	Oct 10th	Solution	Problem Set 2
		Lesson	Optimization

5 Materials

All course materials including codes and slides are available in this public GitHub Repository. Other recommended references I have used to prepare class materials are listed below.

- Attaway, S. (2019). *MATLAB: A Practical Introduction to Programming and Problem Solving.* Butterworth-Heinemann, 5th edition — The UB provides an online copy of the 2012 version. For our purposes, it works fine.
- Judd, K. L. (1998). *Numerical Methods in Economics.* MIT Press
- Kochenderfer, M. J. & Wheeler, T. A. (2019). *Algorithms for Optimization.* MIT Press
- Peter H. Gruber — Script Solving Economics and Finance Problems with MATLAB
- Nocedal, J. & Wright, S. J. (2006). *Numerical Optimization.* Springer, 2nd edition
- QuantEcon Cheatsheet — for Matlab, Python, and Julia.
- QuantEcon Lectures. These are written for Python and Julia but many ideas port to Matlab easily.
- Jesús Fernández-Villaverde — Computational Methods for Economists