Working with MATLAB

Version: Oct 2012 (may be subject to change)

The following outline is just a rough outlook on the topics covered during the course, without this list being claimed to be exhaustive.

A complete list of references will be given during the course!

I. Block/crash course: Programming in Matlab

1. Introduction

- What is Numerical Computation?
- Getting started: MATLAB workspace and its components

2. Basics

- MATLAB as a calculator, i.e. simple calculations, variables
- How to represent numbers, functions and texts
- Save / import / export data
- MATLAB for programming
    - m-files (scripts)
    - function-files
    - Loops and Conditional Statements
    - Using the debug-mode

3. Vectors and Matrices

- A closer look on definition and related build-in functions
- Matrices and Systems of equations
- Solving linear equation systems

4. Plotting

- How to plot data, functions and surfaces
- Use of graphical user interface (GUI) and explicit code

II. Solving economic problems

1. Describing and Analysing functions - Interpolation, Extrapolation and Numerical Integration

- Splines and Curves of Best Fit
- Trapeze and Simpson's rule

2. Finding equilibria - Root Finding & Optimization

- Systems of nonlinear equations of several variables and ***fsolve***
- Iteration methods (Fixed Point Iteration, Newton method)
- MATLAB routines ***roots*** and ***fzero***
- Theory of Lagrange multiplier and ***fmincon***

3. Solving differential equations

- What are differential equations and where do they appear
- MATLAB routine ***ode23***
- Euler's Method (implicit, explicit)

4. A introduction to descriptive statistics

- Statistical quantities and Random Numbers
- Probability density functions and cumulative distribution functions
- Regressions/OLS Estimation