Introduction to MATLAB

Lecturer: Rodolfo Baggio

Language

English

Course description and objectives

The course provides a gentle introduction to the MATLAB computing environment and is intended for beginning users. It is designed to give students a basic understanding of MATLAB by acquiring basic operational skills. The course consists of interactive lectures and sample MATLAB problems given as assignments and discussed in class. Concepts covered include basic use and toolboxes use, graphical representations and tips for designing and implementing MATLAB code.

Upon successful completion of this course, the student should be able to:

- Understand the main features of the MATLAB development environment
- Use the MATLAB GUI effectively
- Design simple algorithms to solve problems
- Write simple programs in MATLAB to solve scientific and mathematical problems
- Know where to find help for advanced usage

Audience

The course is open to all Bocconi students. In particular it is for:

- Undergraduate and Master of Science students with an interest in numerical computing and numerical simulations
- Students who will need MATLAB to prepare their final thesis work

Prerequisites

No prior programming experience or knowledge of MATLAB is assumed.
It is advisable to have a good familiarity with PC operations and a working knowledge of some basic application software (e.g. Excel). Basic knowledge of computer programming and an understanding of matrix and linear algebra and statistics are highly beneficial.
Important notice: The course presents the software MATLAB with its main features; therefore, it does not represent a "substitute" of a formal statistics or econometrics course, therefore the details of any statistical or econometric methods will not be discussed.

Duration

14 hours

Teaching mode

It will be possible to join the course in presence and/or in distance, by connecting remotely and following the streaming of the lesson held in the classroom.

Calendar

Lecture	Date	Time	Room	Lesson in person with groups by student ID number
1	Thu 18/02/2021	18.40 - 20.10	AS04	Odd
2	Tue 23/02/2021	18.40 - 20.10	AS04	Even
3	Thu 25/02/2021	18.40 - 20.10	AS04	Even
4	Tue 02/03/2021	18.40 - 20.10	AS04	Odd
5	Thu 04/03/2021	18.40 - 20.10	AS04	Odd
6	Tue 09/03/2021	18.40 - 20.10	AS04	Even
7	Thu 11/03/2021	18.40 – 20.10	AS04	Even

Syllabus of the course

Lecture	Topics	Book reference
1	**MATLAB basics** - The MATLAB environment - Basic computer programming - Variables and constants, operators and simple calculations - Formulas and functions - MATLAB toolboxes ***Exercises***	**Ch. 1**
2	**Matrices and vectors** - Matrix and linear algebra review - Vectors and matrices in MATLAB - Matrix operations and functions in MATLAB ***Exercises***	**Ch. 2 and 3** **(3-1 to 3-23)**
3	**Computer & MATLAB programming** - Algorithms and structures - MATLAB scripts and functions (m-files) - Simple sequential algorithms - Control structures (if…then, loops) ***Exercises***	**Ch. 5**
4	**MATLAB programming** - Reading and writing data, file handling - Personalized functions - MATLAB graphic functions - Toolbox structure ***Exercises***	**Ch. 5 and 4** **(4-1 to 4-22)**
5	**Numerical simulations** - Numerical methods and simulations - Random number generation - Monte_Carlo_methods ***Exercises***	**Wikipedia** **MATLAB help**

Lecture	Topics	Book reference
6	**Simulations and Optimization** - Numerical simulations - Simple optimization problems ***Exercises***	**Wikipedia** **MATLAB help**
7	**General review & Hands-on session** Interactive hands-on-session where the class will develop one or more MATLAB scripts that solve an assigned problem **Final exercise**	**Ch. 3** **(3-45 to 3-71)**

Software used

Matlab R2020b

Suggested bibliography

- MATLAB Primer
  it.mathworks.com/help/pdf_doc/matlab/learn_matlab.pdf
- Wikipedia
  en.wikipedia.org/wiki/Monte_Carlo_method
- MATLAB help and User's Guide
  www.mathworks.com/help/matlab/index.html
- Statistics Toolbox, Random Number Generation Functions
  www.mathworks.com/help/stats/random-number-generation.html

Useful references:

- MATLAB: more documentation
  it.mathworks.com/help/pdf_doc/matlab/index.html
- MATLAB Central (script, toolbox, blog, newsgroup)
  www.mathworks.com/matlabcentral/
- MATLAB Newsletters
  www.mathworks.com/company/newsletters.html

Available seats

This activity is limited to **60** participants. Registrations cannot be carried out once this number has been reached or after closing of the registration period