

## Course guide

### 230206 - MAE - Matlab and Its Applications in Engineering

Last modified: 25/05/2023

<b>Unit in charge:</b>	Barcelona School of Telecommunications Engineering	
<b>Teaching unit:</b>	749 - MAT - Department of Mathematics. 739 - TSC - Department of Signal Theory and Communications.	
<b>Degree:</b>	BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Optional subject). BACHELOR'S DEGREE IN DATA SCIENCE AND ENGINEERING (Syllabus 2017). (Optional subject). BACHELOR'S DEGREE IN ELECTRONIC ENGINEERING AND TELECOMMUNICATION (Syllabus 2018). (Optional subject).	
<b>Academic year:</b> 2023	<b>ECTS Credits:</b> 6.0	<b>Languages:</b> English

#### LECTURER

<b>Coordinating lecturer:</b>	Consultar aquí / See here: <a href="https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura">https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura</a>
<b>Others:</b>	Consultar aquí / See here: <a href="https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma">https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma</a>

#### PRIOR SKILLS

Standard mathematical background, Basic programming, Signal Processing

#### TEACHING METHODOLOGY

In the first part of the course, lecture notes and collection of exercises are handed out to the students. Communication between students and with the teachers is performed by means of a forum for questions and answers. The second part of the course consists of developing a final work on the student's choice.

#### LEARNING OBJECTIVES OF THE SUBJECT

Part I. Fundamentals.

1. Learn MATLAB programming language. Learn how to write efficient and reliable code in MATLAB.
2. Learn MATLAB standard libraries. Get familiar with the most commonly used MATLAB packages.

Part II. Applications.

3. Get more insight into MATLAB. Develop a whole project written in MATLAB.

#### STUDY LOAD

Type	Hours	Percentage
Hours large group	13,0	8.67
Self study	98,0	65.33
Hours small group	39,0	26.00

Total learning time: 150 h



## CONTENTS

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### Unit 1. Matlab Fundamentals and Graphics

**Description:**

Understanding MATLAB programming language. Basic management of scalars, vectors and matrices. Basic 2-D and 3-D graphics. Basic mathematical functions, including linear algebra, complex numbers and polynomials.

**Full-or-part-time:** 30h

Guided activities: 30h

### Unit 2. M-files Programming

**Description:**

Learn structured MATLAB programming, including command files and function files. Learn how to write efficient MATLAB programs.

**Full-or-part-time:** 30h

Guided activities: 30h

### Unit 3. Toolboxes

**Description:**

Familiarize with the main MATLAB toolboxes.

**Full-or-part-time:** 24h

Guided activities: 24h

### Unit 4. Graphics User Interface

**Description:**

Learn how to build a GUI application in MATLAB.

**Full-or-part-time:** 24h

Guided activities: 24h

### Final Work

**Description:**

Develop an entire MATLAB application

**Full-or-part-time:** 42h

Guided activities: 42h

## GRADING SYSTEM

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Final grade is computed according the following weights:

Part I (exercises): 30% of final grade

Part II (final work): 70% of final grade



## EXAMINATION RULES.

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In every unit in the first part of the course the student is asked to submit the solutions to the proposed exercises in the scheduled time.

The Final Work consists of

- (1) A 12-page report containing a brief theoretical introduction about the chosen subject, a description of the work done and a description of the achieved goals, including the functionalities of the MATLAB code developed.
- (2) The set of source MATLAB files.
- (3) A demo file showing the functionalities implemented.

## BIBLIOGRAPHY

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### Basic:

- Chapman, Stephen J. MATLAB programming for engineers. 6th ed. Boston, MA: Cengage Learning, [2019]. ISBN 9780357030394.
- Mathworks. Matlab toolboxes. Mathworks,

## RESOURCES

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### Hyperlink:

- <https://www.mathworks.com/help/matlab/getting-started-with-matlab.html>. Get Started with MATLAB