UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

Course guide
230696 - MLAB - Matlab: Fundamentals And/Or Applications

Last modified: 11/04/2025

Unit in charge:	Barcelona School of Telecommunications Engineering
Teaching unit:	739 - TSC - Department of Signal Theory and Communications.

Degree:	MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Optional subject).
	MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Optional subject).
	MASTER'S DEGREE IN ELECTRONIC ENGINEERING (Syllabus 2022). (Optional subject).

Academic year: 2025   **ECTS Credits:** 5.0   **Languages:** English

LECTURER

Coordinating lecturer:	JOSE ANTONIO LAZARO VILLA
Others:	

PRIOR SKILLS

Linear Algebra, Signal Processing

REQUIREMENTS

No requisit

TEACHING METHODOLOGY

Lecture notes and collection of exercises are available in pdf in the virtual campus. We use a forum for questions and answers in the virtual campus. Solutions of the proposed exercises are also available. In the first part of the course the student solves a set of proposed exercises for training. In the second part of the course the student develops and presents a final work.

LEARNING OBJECTIVES OF THE SUBJECT

Part I. Fundamentals.
The objectives are:
1. Present MATLAB and SIMULINK.
2. To get the basic knowledge necessary to work with both packages with complete autonomy.
Part II. Applications.
The objectives are:
1. To get more insight into MATLAB and SIMULINK, while presenting and developing more advanced applications,...
2. Each student will work in a subject of their own interest.

STUDY LOAD

Type	Hours	Percentage
Self study	86,0	68.80
Hours large group	26,0	20.80
Hours small group	13,0	10.40

Total learning time: 125 h

CONTENTS

(ENG) Unit 1. Matlab Fundamentals

Description:
Matlab fundamentals

Specific objectives:
Introduction to the software

Related activities:
Exercises 1

Full-or-part-time: 11h 40m
Guided activities: 3h 20m
Self study : 8h 20m

(ENG) Unit 2. Matlab Graphics

Description:
Using Matlab Graphics

Related activities:
Exercises 2

Full-or-part-time: 11h 40m
Guided activities: 3h 20m
Self study : 8h 20m

(ENG) Unit 3. M-file Programming

Description:
M-file programming

Specific objectives:
Learn how to produce scripts and functions

Related activities:
Exercises 3

Full-or-part-time: 11h 40m
Guided activities: 3h 20m
Self study : 8h 20m

(ENG) Unit 4. Graphics User Interface

Description:
Using GUIs

Specific objectives:
Generate GUIs with Matlab

Related activities:
Exercises 4

Full-or-part-time: 11h 40m
Guided activities: 3h 20m
Self study : 8h 20m

(ENG) Unit 5. Simulink

Description:
Introducing Simulink and Stateflow

Specific objectives:
To simulate systems with Simulink

Related activities:
Exercises 5

Full-or-part-time: 11h 40m
Guided activities: 3h 20m
Self study : 8h 20m

(ENG) Unit 6. Hand-on projects with ARDUINO, RASPBERRY PI, FPGAs

Description:
Laboratory projects based on SIMULINK and/or MATLAB with ARDUINO, RASPBERRY and FPGAs

Specific objectives:
Learn the basics of programming with SIMULINK / MATLAB and Hardware-in-the-loop

Related activities:
Practices in the Laboratory of the Subject using ARDUINO, RASPBERRY and/or FPGAs

Full-or-part-time: 10h
Practical classes: 4h
Laboratory classes: 6h

(ENG) Unit 7. Advanced projects with ARDUINO, RASPBERRY PI, FPGAs

Description:
Development of your own laboratory projects based on SIMULINK and/or MATLAB with ARDUINO, RASPBERRY and FPGAs

Full-or-part-time: 14h
Laboratory classes: 6h
Self study : 8h

ACTIVITIES

Guided Laboratory Practices on examples of projects based on SIMULINK and/or MATLAB with ARDUINO, RASPBERRY and FPGAs

Description:
Laboratory projects based on SIMULINK and/or MATLAB with ARDUINO, RASPBERRY and FPGAs

Specific objectives:
Learn the basics of Hardware programming with SIMULINK and / or MATLAB

Material:
ARDUINO, RASPBERRY and FPGAs

Delivery:
Practice Report

Full-or-part-time: 10h
Practical classes: 4h
Laboratory classes: 6h

Develop of a Final Work

Description:
Development of your own laboratory projects based on SIMULINK and/or MATLAB with ARDUINO, RASPBERRY and FPGAs

Delivery:
Final Work Report
Video of performance

Full-or-part-time: 14h
Laboratory classes: 6h
Self study: 8h

GRADING SYSTEM

Exercises: 30%
Final work: 70%

EXAMINATION RULES.

Final work consists of
(1) A document containing:
(1.1) A brief theoretical introduction about the chosen subject (this can be any related to your thesis, your job, or other interests), and
(1.2) two solved exercises about the chosen subject as well as their solution steps and MATLAB code.
(2) The set of MATLAB files (*.m, *.mdl,...) that solve the two proposed exercises.
(Several final works from previous courses will be available in the virtual campus in order to show the required extension and difficulty)

BIBLIOGRAPHY

Basic:
- Mathworks. Matlab toolboxes. Mathworks,
- Dormido, S. I, II, III Congreso de usuarios de MATLAB. Madrid: UNED, 1995.