

PhD in Information Technology and Electrical Engineering Università degli Studi di Napoli Federico II

Module Title: Matlab Fundamentals

Lecturer: Prof. Agostino De Marco, Ing. Stefano Marrone, Ing. Francesco Orefice
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Bio: Agostino De Marco graduated in Aerospace and Astronautical Engineering from the University of Naples Federico II in 1996 and obtained a PhD in Naval Engineering in 2001. He has taught Flight Mechanics and associated courses since 2003, including Flight Dynamics, Aerodynamics, Applied Aerodynamics, Computational Aerodynamics and Numerical Methods for Engineering. He has taught for expert users at various Italian institutions and aeronautical industries (such as Accademia Aeronautica, Alenia/Selex, Piaggio, OAN, Protom). He is currently a member of the DAF Group and holder of the chairs of Flight Mechanics and Flight Dynamics and Simulation at the Polytechnic School of the University of Naples Federico II. He was a member of the design group of the STOL ultralight aircraft called "Easy-Fly". From 2002 to 2005 he was coordinator of the design and development group of an advanced flight simulation laboratory at the University of Naples. Among other skills, Prof. De Marco is a deep expert in computer programming. He is expert in (C, C++, Python, Java, Matlab), software engineering and object oriented programming, grid generation, CAD, website developer (HTML, CSS, Javascript, PHP, Drupal, Joomla). He is official developer of the open-source flight dynamics model called JSBSim (www.jsbsim.org), which is the standard model used for flight simulation software called FlightGear (www.flightgear.org).

Location: Aula Seminari DIETI (ex Softel), palazzina 3a sede via Claudio, primo piano

Dates:

Date	Time	Lesson
20 Feb. 2020	15.30 – 17.30	1
26 Feb. 2020	15.30 – 17.30	2
27 Feb. 2020	10.30 – 12.30	3
2 Mar. 2020	10.30 – 12.30	4
5 Mar. 2020	10.30 – 12.30	5
9 Mar. 2020	15.30 – 17.30	6
12 Mar. 2020	10.30 – 12.30	7
16 Mar. 2020	10.30 – 12.30	8
19 Mar. 2020	10.30 – 12.30	9
23 Mar. 2020	10.30 – 12.30	10

NB: Dates and locations are only tentative and could be subject to changes.

Summary

The course is intended to prepare student for the [“MATLAB Certificate Associate”](#). To this aim, students will be guided on the concepts and aspects of the MATLAB language and environment. Each lesson is 2H long and will both feature theoretical and practical aspects. Since the core of the course will be [MATLAB Fundamentals](#), students are required to create the [Unina – Matlab account](#) and to bring a laptop. It is mandatory to register by using the following [link](#).

Contents

Lesson 1: Become familiar with the main features of the MATLAB integrated design environment and its user interfaces. Get an overview of course themes.

Lesson 2: Enter MATLAB commands, with an emphasis on creating variables, accessing and manipulating data in variables and creating basic visualizations. Collect MATLAB commands into scripts for ease of reproduction and experimentation.

Lesson 3: Perform mathematical and statistical calculations with vectors. Use MATLAB syntax to perform calculations on whole data sets with a single command. Organize scripts into logical sections for development, maintenance, and publishing

Lesson 4: Use matrices as mathematical objects or as collections of (vector) data. Understand the appropriate use of MATLAB syntax to distinguish between these applications.

Lesson 5: Import data as a MATLAB table. Work with data stored as a table.

Lesson 6: Extract and analyze subsets of data that satisfy given criteria.

Lesson 7: Organize table data for analysis. Represent data using appropriate native MATLAB data types.

Lesson 8: Perform typical data analysis tasks in MATLAB, including importing data from files, preprocessing data, fitting a model to data, and creating a customized visualization of the model.

Lesson 9: Create flexible code that can interact with the user, make decisions, and adapt to different situations.

Lesson 10: Increase automation by encapsulating modular tasks as user-defined functions. Understand how MATLAB resolves references to files and variables. Use MATLAB development tools to find and correct problems with code.

ECTS Credits: 2

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