

Innovation & Technology Center

Summer 2026

Section I - Overview:

COURSE TITLE	MATLAB for Engineering
INSTRUCTOR	Eng. Nahed Mamdouh
CREDITS (HOURS)	5 days – total 20 hours (4 hours/day)
PRE-REQUISITES/CO-REQUISITES	Basic Engineering Mathematics
LANGUAGE	English
GRADING	Attended/Not Attended
LEARNING ENVIRONMENT	Computer Lab – Computers with MATLAB and all its toolboxes installed and licensed.
NUMBER OF PARTICIPANTS	10 – 20 Students
COURSE FEES	2400 EGP/Student

Section II - Background and Rationale:

MATLAB is a key software environment for technical computing, mathematical modeling, and control systems. This workshop develops practical computational skills through structured problem solving and engineering simulations. It covers MATLAB basics, programming logic, data visualization, and numerical analysis. Participants will also use MATLAB toolboxes and Simulink for applied tasks in statistics, signal synthesis, and computer vision.

Section III - Learning Outcomes:

1. Develop structured MATLAB scripts and functions for solving technical and engineering problems.
2. Apply data analysis techniques, statistics, and 2D/3D plotting for data visualization.
3. Use symbolic math and programming logic to synthesize and simulate real-life physical signals.
4. Model and simulate dynamic physical systems using transfer functions and Simulink block diagrams.
5. Apply basic image processing tools for computer vision tasks such as filtering and edge detection.

Section IV - Target Audience:

This workshop targets early-year engineering students with basic mathematical awareness who aim to apply MATLAB in engineering projects, data analysis, system simulation, and computer vision.

Section V - Content and Structure:

Day	Topic	Details
1	MATLAB Environment & Programming Basics	• Introduction to the MATLAB workspace and scripting. • Data types, variables, and array operations. • Control flow and programming logic. • 2D and 3D data visualization.
2	Data Analysis & Engineering Statistics	• Importing and handling engineering datasets. • Descriptive statistics and variability. • Identifying and filtering data outliers • Statistical visualization methods (Histograms, Boxplots).
3	Applied Math & Signal Synthesis	• Introduction to symbolic mathematics • Solving algebraic and differential equations. • Synthesizing periodic signals (Fourier approximations). • Visualizing complex mathematical models.
4	System Simulation & Introduction to Simulink	• Solving ordinary differential equations (ODEs) numerically. • Modeling systems using Transfer Functions. • Analyzing time-domain responses (step, impulse). • Introduction to visual system simulation using Simulink.
5	Image Processing & Computer Vision	• Digital image fundamentals and color spaces. • Image enhancement techniques (brightness, contrast). • Spatial filtering and noise reduction. • Edge detection applications. ➤ Final Mini-Project: Students will use the tools they learned to complete a hands-on engineering task.