

Certificate Course – MATLAB

1. Course Objectives

MATLAB is considered as one of the most important tools and modern computer language, and this course enables the students to learn many of MATLAB commands and how to use them in programming to solve many problems in different mathematical subjects, especially in numerical analysis and other subjects that are connected to computer oriented mathematics.

Upon completion of the course, students will be able to do the following:

- ❖ To compute all operations involving addition, multiplication, subtraction of matrices
- ❖ To compute the inverse, trace, determinant of a matrix.
- ❖ To plot figures.
- ❖ To develop user defined functions.

2. Course Overview

MATLAB is a very popular language for technical computing used by students, engineers, and scientists in universities, research institutes, and industries all over the world. The software is popular because it is powerful and easy to use, and it has a great numbers of tools, built in functions and simulation windows which can be used for many applications in many fields.

This course covers basics of MATLAB programming including array operations, loops, execution control, writing scripts as well as functions. The total hours for the course are 40 out of which 20 hours are for theory and 20 hours are for practical sessions. Students should have a practical record. At the end of the course there will be a practical exam of 2 hours duration for 40 marks. Internals is for 10 marks based on assignment, seminar and practical record.

3. Syllabus

MODULE 1: STARTING WITH MATLAB AND CREATING ARRAYS

- Starting MATLAB, MATLAB windows
- Working in the command window
- Arithmetic operations with scalars
- Display formats
- Elementary math built-in functions
- Defining scalar variables
- Useful commands for managing variables
- Script files
- Examples of MATLAB applications
- Creating a one-dimensional array (vector)
- Creating a two-dimensional array (matrix)
- Notes about variables in MATLAB

- The transpose operator
- Array addressing
- Using a colon : in addressing arrays
- Adding elements to existing variables
- Deleting elements
- Built-in functions for handling arrays
- Strings and strings as variables
- Problems

MODULE 2: MATHEMATICAL OPERATIONS WITH ARRAYS

- Addition and subtraction
- Array multiplication
- Array division
- Element-by-element operations
- Using arrays in MATLAB built-in math functions
- Built-in functions for analyzing arrays
- Generation of random numbers
- Examples of MATLAB applications
- Problems

MODULE 3: TWO-DIMENSIONAL PLOTS

- The plot command
- The fplot command
- Plotting multiple graphs in the same plot
- Formatting a plot
- Plots with error bars
- Plots with special graphics
- Histograms
- Polar plots
- Plotting multiple plots on the same page
- Multiple figure windows
- Examples of MATLAB applications
- Problems

MODULE 4: USER-DEFINED FUNCTIONS AND FUNCTION FILES

- Creating a function file
- Structure of a function file
- Saving a function file
- Using a user-defined function
- Examples of MATLAB applications
- Problems
- Relational and logical operators
- Conditional statements
- The switch-case statement

- Loops
- Nested loops and nested conditional statements
- The break and continue commands
- Examples of MATLAB applications
- Problems

Text Book : Gilat, Amos, 2008, "MATLAB An Introduction With Applications", 3rd Ed., JOHN WILEY & SONS, INC. , USA .

Hunt, Brian R. 2001, "A Guide to MATLAB for Beginners and Experienced Users", Cambridge University Press, USA.

4. Suggested Reading

1. McMahon, David, 2007,"MATLAB Demystified", The McGraw-Hill Companies, USA.
2. Davis, Timothy A. & Sigmon, Kermit, 2007, "MATLAB Primer", 7th Ed., Chapman & Hall/CRC, USA.