



FORMAT FOR COURSE CURRICULUM

Course Title: MATLAB Programming

Course Level: UG

Course Code: CSIT332

Credit Units: 4

L	T	P/S	SW/F W	TOTAL CREDIT UNITS
3	-	2	-	4

Course Objectives:

This course provides an aggressively gentle introduction to MATLAB and emphasizes on systematic development of algorithms and programs. Course includes:

1. Interactive lectures with students doing sample MATLAB problems in real time.
2. Iteration, functions, arrays and vectors, strings, recursion, algorithms, object-oriented programming, and MATLAB graphics.
3. Problem-based MATLAB assignments are given which require significant time on MATLAB.

Pre-requisites:

Familiarity with using Windows applications, and with the use of a scientific calculator. No previous programming experience is required.

Course Contents/Syllabus:

	Weightage (%)
Module I : Introduction to Programming and MATLAB Environment	25%
Components of a computer, Working with numbers, Machine code, Software hierarchy, MATLAB Windows, On-line help, Input-output, File types, Platform dependence, A First Program, Expressions, Constants, Variables and assignment statement, Arrays,	
Module II: Graph Plots, Procedure and Functions	25%
Basic plotting, Programming in MATLAB Using Built-in Functions, Command Line Functions, Inline functions, Generating waveforms, Sound replay, load and save, Arguments and return values, Formatted console input-output, String handling, Creating, Saving, and Executing a Script File and Function File	
Module III : Control Statement and Text Manipulation	25%

Conditional statements: If, Else, Elseif, Repetition statements: While, For, Writing to a text file, Reading from a text file, Randomising and sorting a list, Searching a list	
Module IV: Graphical User Interface and Applications	25%
Attaching buttons to actions, Getting Input, Setting Output, Application- Linear Algebra, Curve Fitting and Interpolation, Data Analysis and Statistics Numerical Integration (Quadrature), Ordinary Differential Equations, Nonlinear Algebraic Equations Graphics	

Student Learning Outcomes:

After completing this course, student will be able to:

- Demonstrate the use of procedural statements--assignments, conditional statements, loops, function calls--and arrays.
- Design code, and test small MATLAB programs
- Describe classes, subclasses, properties, inheritance, and overriding used in MATLAB.
- Demonstrate basic sorting and searching algorithms.
- Apply basic vector computation.

Pedagogy for Course Delivery:

The course will be delivered in lecture mode and hands on experience on MATLAB will be provided to students. Lab practical is also incorporated to enhance the learning of course for the students. Besides this faculty is free to adopt any teaching methodology for making class learner centric.

List of Experiments:

1. Write a program to assign the following expressions to a variable A and then to print out the value of A.
 - a. $\frac{3+4}{5+6}$
 - b. $2\pi^2$
 - c. $\sqrt{2}$
 - d. $(0.0000123 + 5.67 \times 10^{-3}) \times 0.4567 \times 10^{-4}$
2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius.
3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:
 - a. 2, 4, 6, 8, 10

- b. $1/2, 1, 3/2, 2, 5/2$
 - c. $1, 1/2, 1/3, 1/4, 1/5$
 - d. $1, 1/4, 1/9, 1/16, 1/25$
4. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [0.6 1.2 0.5 1.3] ; while the numbers of each product are [3 2 1 5]. Use MATLAB to calculate the total bill.
 5. The sortrows(X) function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.
 6. The “identity” matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the eye() function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[1 2; -1 0] the identity matrix I=[1 0; 0 1] is generated. That is A*B=I.
 7. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2).
 8. Draw a target made up of three circular rings of radius 1, 2 and 3. The formula for the co-ordinates of a circle are:
 - $x = r.\cos(\theta)$
 - $0 < \theta < 2\pi$
 - $y = r.\sin(\theta)$
 - $r > 0$
 9. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks the same length as the concatenated strings, and (iii) the reversed concatenation. For example:
 - i. Enter string 1: Mark
 - ii. Enter string 2: Huckvale
 - iii. Mark Huckvale
 - iv. *****
 - v. elavkcuH kraM
 10. where the square brackets mean take the integer part, modulo 7 means the remainder when divided by 7, and
 - i. d = day of the month (e.g. 1 to 31)
 - ii. m = month number with March=1, ..., December=10, January=11,
 1. February=12. Assign January and February to previous year.
 - iii. c = century number (e.g. 19)
 - iv. y = year in century (e.g. 97), but remember January and February
 11. The result is the day of the week, with 1=Sunday. Write a function dayofweek ([dayofweek.m](#)) which takes a vector of three numbers representing the day, month and year in conventional notation, and returns a string containing the name of the day of the week. For example (attack on Pearl Harbour):
 - i. dayofweek([7 12 1941])
 - ii. ans=
 1. Sunday
 12. Write a program that asks for a series of numbers, ending in the value 0, and calculates the sum and the mean. For example:
 - a. Enter a number (end in 0) : 5
 - b. Enter a number (end in 0) : 6
 - c. Enter a number (end in 0) : 7
 - d. Enter a number (end in 0) : 8
 - e. Enter a number (end in 0) : 0
 - f. 4 numbers entered. Sum=26. Mean=6.5.
 13. Test your function by sorting a list of random numbers. (Hint: you will need a while loop inside a for loop).

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total (%)
75	25	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Mid Term	Assignment	Viva	Attendance	
Weightage (%)	10	10	5	5	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment					End Term Examination		
Components (Drop down)	Mid Term	Lab Record	Continuous Performance	Viva	Attendance	Experiment	Viva	Total
Weightage (%)	10	10	10	5	5	40	20	60

Text & References:**Text Books:**

- Essential MATLAB for scientists and engineers" by Brian D. Hahn, Arnold, ISBN 0-7506524-0-3, 2001,
- MATLAB & Simulink Student Version Release 14, ISBN 0-9755787-2-3, 2004.
- MATLAB Student Version Release 13, ISBN 0-9672195-9-0, 2001.

Reference Books:

- Getting Started with MATLAB by Rudra Pratap , OXFORD University Press, 2002.
- MATLAB Programming by Y. Kirani Singh, PHI Publications, 2007.

Any other Study Material:

- <http://www.phon.ucl.ac.uk/courses/spsci/matlab/>
- <http://www.cs.cornell.edu/courses/cs1112/2013sp/syllabus.html>