TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW:PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides aconcise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected toachieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	Chemical Engineering Department
3.Course title/code	Computer Programming (II)
4.Programme (s) to which it contributes	CHE.221
5.Modes of Attendance offered	Fall
6.Semester/Year	2 semester/year
7. Number ofhourstuition(total)	4
8. Dateof production/revision of this Specification	1/6/2016
9. Aimsof the Course	
To introduce chemical engineering students to modern calculating tools used in the practice of engineering by: 1. Being able to construct plots, fit data, and use built-in functions in MATLAB. 2. Demonstrating an ability to create small structured programs in a MATLAB programming environment. 3. Understanding how user written functions interact with MATLAB Numerical Methods routines.	

10·Learning Outcomes, Teaching, Learning and Assessment Method

A-Knowledge and Understanding

A1. Each student should develop the confidence necessary to successfully solve Mathematical problems with a computer.
A2. To be able to formulate and write structured code in MATLAB.
A3. To understand the foundation behind the basic numerical methods for Matrix manipulations.
A4. Should be able to solve sets of linear and nonlinear equations using numerical methods as well as in-built MATLAB functions.
A5. Should be able to apply numerical methods and MATLAB functions to differentiate and integrate a function or a set of discrete points.
A6. Should be able to apply explicit and implicit numerical methods and MATLAB functions to integrate single and multiple sets of initial value problems.

B. Subject-specific skills

B1. Understanding of basic MATLAB arithmetic operators, matrix manipulation, and plotting routines.
B2. Familiarity with MATLAB Solver as a tool for finding solutions to algebraic non-linear equations and optimization of simple mathematical models to scientific data.
B3. Ability to plotting, and fitting scientific data.
B4. Ability to translate structured algorithms into working MATLAB scripts and functions.
B5. Knowledge of MATLAB's ability to solve numerical problems with built-in functions such as fzero.

Teaching and Learning Methods

Lectures, Tutorials, Example Classes, Informal and formal teamwork , Weekly homework problems, Labrotary examinations.

Assessment methods

Homework assignments, Mid-term exams, Class quizzes, Final Exam, labroatory examination

C. Thinking Skills

C1.An ability to apply effective, creative and innovative solutions, both independently and cooperatively, to current and future problems.
C2. Solve computer program problems through logic.

Teaching and Learning Methods

Lectures, Tutorials , Example Classes , Informal and formal teamwork , Weekly homework problems.

Assessment methods

Homework assignments, Mid-term exams, Class quizzes, Final Exam, labroatory examination

D.General and Transferable Skills(other skills relevant to employ ability and personal development).

D1.Work together in same-discipline teams to solve engineering problems.

D2.Speed intuitive, predictability and evaluate information and ideas in the handling of computer programming issues

11.Course Structure

Week	Hours	ILOs	Unit/Moduleor TopicTitle	Teaching Method	Assessment Method
1st semester					
1 2	4 4	Introduction to MATLAB	• Starting MATLAB, MATLAB windows • Menus and the toolbar • Working in the command window • Arithmetic operations with scalars • Display formats • Elementary math built-in functions • Useful commands for managing variables • Script files and the Editor Debugger	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
3 4	4 4	Symbolic Math	• Symbolic objects, and symbolic expressions • Changing the form of an existing symbolic expression • Calculus • Representing a function • Solving algebraic equations • Differentiation • Integration • Limits • Solving an ordinary differential equation	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
5 6	4 4	One-dimensional array (vector)	• 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	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
7 8	4 4	Two-dimensional array (matrix)	• 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 • Gaussian elimination • Solving simultaneous algebraic	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)

9	4	Mathematics 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 • Solving Algebraic Equations • Special Matlab functions for Arrays (length, sum, min, max)	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
10	4				
11	4	Polynomials	• Curve fitting • Interpolation • Extrapolation	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
12	4				
13	4	Script files	• Input to a script file • Output commands • The save and load commands • Importing and exporting data	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
14	4				
15	4	Chemical Engineering Applications	• Using matlab in solving some chemical engineering problems (Thermodynamics, Material Balance)	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
2nd semester					
16	4	Relational and logical operators	• if-elseif-end • < less than • > =greater than or equal • greater than • = = equal • < =less than or equal • ~ =not equal	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
17	4				
18	4	Loops	• For-end • While-end • Using Loops for solving iterative equations	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
19	4				
20	4	Functions	• Creating a function file • Structure of a function file • Local and global variables • Saving a function file • Using a user-defined function • Examples of simple user-defined functions • Comparison between script files and function files • Function functions • Sub-functions	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
21	4				

22	4	Two-dimensional plot	• The plot command • Using the plot Command • Line styles, Markers, and Colors • Adding Grids, Labels, Text, or a Legend • Customizing Axes • The fplot command • Plotting multiple graphs in the same plot • Multiple figure windows • Formatting a plot • Plots with special graphics • Histograms • Polar plots • Manipulating Plots and Sub-plotting	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
23	4				
24	4	Three dimensional plot	• Engineering examples on three dimensional plot	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
25	4	Introduction to Numerical analysis	• Numerical solution of algebraic equations	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
26	4	Differential Equations	• Numerical solution of multi simultaneous differential equations.	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
27	4	Partial differential equations	• Numerical solution of partial differential equations.	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
28	4	Numerical Analysis applications in Chemical Engineering	• Solving chemical engineering problems (vapor liquid equilibrium, Boiling point Dew point)	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
29	4	Solving advanced chemical engineering problems	• Material and Energy Balances • Fluid Flow Applications • Simulation of Chemical Process • Simulation of Chemical Process With Chemical Reaction • Simulation of Separation Processes	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)
30	4	Discussions	• Discussion student projects	Lectures, Tutorials, Practical Applications	partial test (Oral questions, multiple choice ,alternative response)

12.Infra structure	
Required reading: ·CORETEXTS ·COURSEMATERIALS ·OTHER	o Lecturers o MATLAB for Engineers, 2ed, Holly Moore, Pearson/Prentice-Hall. o Other support books :- • RudraPratap: Getting started with MATLAB 7, Oxford Press (Indian edition),2006. • Mayers and Seider, Introduction to Chemical Engineering and Computer Calculations, Prentice Hall, 1984. • Sergey E. Lyshevski,"Engineering and Scientific Computations Using MATLAB", A JOHN WILEY & SONS, INC., PUBLICATION, 2003. • Textbook: Applied Numerical Methods with MATLAB, Steven C Chapra
Special requirements(include for example workshops, periodicals, IT software, websites)	• Original Matlab Software CD 2013
Community-based facilities (include forexample, guest Lectures, internship,field studies)	-

13. Admissions	
Pre-requisites	Before undertaking this module the student should have undertaken the following: • Basic Principles of chemical engineering I • Mathematics I • Coputer programming I
Minimum number of students	40
Maximum number of students	60