Course Type	Course Code	Name of Course	L	T	P	Credit
DSC	NCHC104	**Computational Tools for Chemical Engineers lab**	0	0	2	1

Course Objective
The objective of this course is to use MATLAB to solve various kind of equations relation to Chemical Engineering

Learning Outcomes
Upon successful completion of this course, student will: learn how to use MATLAB to solve various algebraic and ordinary differential equations. • be skilled in using MATLAB as a programming language.

Unit No.	Topics to be Covered	Practical Hours	Learning Outcome
1	A brief introduction to MATLAB	02	Working with MATLAB environment and basic syntax used for MATLAB calculation
2	Matrix Operations using MATLAB	02	Working with matrix using MATLAB environment basic matrix operations: addition and subtraction, transpose, multiplication
3	Newton-Raphson method to find roots of single variable nonlinear equation and chemical engineering case study	02	Basic programming skill to find root of a nonlinear equation using MATLAB and basic syntax used for MATLAB in writing code for Newton Raphson method
4	Find roots of single variable nonlinear equation Quasi-Newton-Raphson method and chemical engineering case study	02	Basic programming skill to find root of a nonlinear equation using MATLAB and basic syntax used for MATLAB in writing code for QNR method
5	Use of regulafalsi or false-position method to find roots of single variable nonlinear equation and chemical engineering case study	02	Basic programming skill to find root of a nonlinear equation using MATLAB and basic syntax used for MATLAB in writing code for Regula Fasli method

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6	Use of Secant method to find roots of single variable nonlinear equation and chemical engineering case study	03	Basic programming skill to find root of a nonlinear equation using MATLAB and basic syntax used for MATLAB in writing code for Secant method
7	Least-squares regression and its application for chemical engineering data analysis	03	To obtain the "best fit" curve through a set of data points basic programming skill and interactive curve fitting tools in MATLAB
8	Interpolation techniques for chemical engineers	03	Use of various interpolation methods to fill-in missing data or make predictions
9	Application of Gauss elimination method to solve a set of algebraic equations	03	To solve a set of simultaneous linear algebraic equations using Gauss elimination method on MATLAB environment
10	Application of Euler's method to solve ordinary differential equation and chemical engineering case study	03	Euler's approach to solve ordinary differential equation and MATLAB tools for solving simultaneous ODEs
11	Application of Runge-Kutta (R-K) method to solve ordinary differential equation and chemical engineering case study	03	Use of R-K method to solve ordinary differential equation MATLAB tools for solving simultaneous ODEs

Reference Books

1. MATLAB Programming for Beginners and Professionals, Irfan Turk, Createspace, 2018, ISBN: 978-1548418243

2. Understanding MATLAB: A Textbook for Beginners, S.N. Alam, S.S. Alam, Paperback