



Jordan University of Science and Technology
Faculty of Engineering
Chemical Engineering Department

ChE 202: Numerical Methods for Chemical Engineers

3 credit hour, 3 contact hour lecture, 3 credit hour math.

Instructor

Instructor: Rowaida Zoumot

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Textbooks & References

A. Textbook

	Textbook 1
Title	Applied Numerical Methods with Matlab for Engineers and Scientists
Author(s)	Chapra, S.C
Publisher	McGraw Hill
Year	2008
Edition	3 rd

B. References

1. Gerald, C.F. and Wheatley, P.O. (1999). Applied Numerical Analysis. 6th ed., Addison-Wesely Publisher. QA297.G47
2. Higham, D.J. and Higham, N.J. (2000). MATLAB Guide. QA297.H5217.
3. Hanselman, D.C, (2001). Mastering MATLAB 6. QA297.H293.
4. S. Rao, S., (2002). Applied Numerical Methods for Engineers and Scientists. TA345.R36.
5. Steven C. Chapra, Raymond P. Canale, ' Numerical methods for engineers ' Seventh edition. New York McGraw-Hill Education, [2015]

Specific Course Information

A. Course Catalog: Introduction to MATLAB, Round-Off and Truncation Errors, Roots of Equations: Bracketing, Bisection, Newton-Raphson, Numerical Solution of Simultaneous Linear Algebraic Equations: Matrix Inversion, Gauss-Seidel, Numerical Solution of Nonlinear Equations, Linear and Nonlinear Regression Analysis, Numerical Integration, Numerical solution of Ordinary Differential Equations

B. Prerequisites or co-requisites

MATH203, MATH201, NE114

**C. Required/Elective or Selected Elective
Required**

Objectives and Outcomes*

1. Students should be able to solve numerical problems and program using using MATLAB [1, 6]
2. Students will demonstrate basic numerical methods for solution to problems of root finding, linear systems, data analysis and curve fitting [1, 6]
3. Students will estimate numerical errors in application of numerical methods [1, 6]
4. Students should be able to numerically differentiate and integrate functions using Simpson?s and Trapezoidal methods [1, 6]
5. Students should be able to numerically integrate ODE using Euler, Huen?s and Runge-Kutta methods [1, 6]

Contribution of Course to Meeting the Professional Component

Relationship to Student Outcomes (%)

1	2	3	4	5	6	7
45					55	

Relationship to Chemical Engineering Program Objectives

PEO1	PEO2	PEO3	PEO4	PEO5	PEO6
Y	-	-	-	Y	-

Topics Covered

1. Introduction to Numerical Methods
2. Round-Off and Truncation Errors
3. Roots of Equations
4. Numerical Solution of Simultaneous Linear Systems and Nonlinear System
5. Introduction to Matlab
6. Curve Fitting: Linear Regression, General Linear Least-Squares and Nonlinear Regression, Polynomial Interpolation
7. Integration and Differentiation
8. Ordinary Differential Equations- Initial-Value Problems and Boundary-Value Problem

Evaluation

Assessment Tool

Expected Due Date

Weight

Homework & Quizzes

One week after homework problems are assigned

10%

First Exam

According to the department schedule

25 %

Second Exam

According to the department schedule

25 %

Final Exam

According to the university schedule

40 %

* Number in brackets refer to the Program outcomes