

College of Science
Department of Mathematics
Course syllabus: Numerical Analysis (1)
Second semester 2019/2020

1. Instructor Information:

Instructor Name	Safwan Al-Shara'		
Office Hours	Monday, Wednesday	9:30 – 11:00	
	Thursday	1:00 – 2:00	
Office Number and Telephone Extension	2201		
Email	safwan_alshara973@yahoo.com		

2. Course Description:

Round off Errors and Computer Arithmetic, error analysis, numerical solution of equations in one variable, interpolation and polynomial approximation, Iterative Techniques in Matrix algebra, orthogonal polynomials and least squares approximation.

3. Course Information

Course Code: 401321	Course Title: Numerical Analysis (1)	Level: Third year
Delivery Mode: Lecture	Pre-requisite: 401241	Day(s) and Time: Monday, Wednesday: 11:00-12:30
Academic year: 2019-2020	Semester: Second semester	Credit Hours: 3

4. Course Objectives:

1. Write a machine number in the normalized form.
2. Round off Errors of the floating point.
3. Finding the numerical Solutions of Equations in One Variable.
4. Approximate the functions using Lagrange polynomial method, Divided differences method and Hermite Interpolation method.
5. Finding the norms of vectors and matrices, eigenvalues and corresponding eigenvectors.
6. Using some Iterative techniques to find the numerical solution of the linear system.
7. Understanding the orthogonal polynomials and least square approximation.

5. Intended Student Learning Outcomes

1. Transform a machine number in the normalized form
2. Finding the errors of the floating point
3. Demonstrate knowledge and understanding of numerical solutions of equations in one variable
4. Demonstrate knowledge and understanding of Lagrange polynomial method, Divided differences method and Hermite Interpolation method.
5. Finding the norms of vectors and matrices, eigenvalues and corresponding eigenvectors.
6. Using some Iterative techniques to find the numerical solution of the linear system.
7. Demonstrate knowledge and understanding the orthogonal polynomials and least square approximation.

6. Course Content:

Week	Chapter	Subject	Pages
1 – 2	Chapter 1 : Mathematical preliminaries	1.1 Review of Calculus 1.2 Roundoff Errors and Computer Arithmetic 1.3 Algorithms and Convergence	2 – 39
3 – 6	Chapter 2 : Solutions of Equations in One Variable	2.1 The Bisection method 2.2 Fixed-point iteration 2.3 Newton's method 2.4 Error Analysis for iterative methods 2.6 Zeros of polynomials and Muller's method	48 – 100
7 – 11	Chapter 3 : Interpolation and polynomial approximation	3.1 Interpolation and the Lagrange polynomial 3.2 Divided differences 3.3 Hermite Interpolation	107 – 141
11	Chapter 6 : Direct Methods for Solving Linear Systems	6.6 Special Types of Matrices	398 – 141
12 – 13	Chapter 7 : Iterative Techniques in Matrix algebra	7.1 Norms of vectors and matrices 7.2 Eigenvalues and Eigenvectors 7.3 Iterative techniques for solving linear system	418 – 454
14	Chapter 8 : Approximation Theory	8.1 Discrete Least Square Approximation 8.2 Orthogonal Polynomials and Least Square Approximation	484 – 507

7. Assessment:

Assessment	Grade Proportion	Week/Dates
First exam	22 %	الاثنين 2020/3/9
Second exam	22 %	الاثنين 2020/4/20
Class Work (Quizzes, Homework and Attendance of the lecture)	6 %	-
Final exam	50 %	End of Semester
Total	100 %	

8. Text Book:

The main reference	Numerical Analysis
Author(s)	Richard L. Burden & J. Douglas Faires
Publisher	Gary Ostedt
Year	2001
The edition	7th-edition
The reference website	https://epdf.pub/queue/numerical-analysis-seventh-edition.html

9. References and additional resources:

1)	Laurene V. Fausell , Applied Numerical Analysis using Mat Lab.
2)	David Kincaid & Ward Cheney, Numerical Analysis.
3)	Cuntis F. Gerald & Patrick O. Wheatley, Applied Numerical Analysis, 7th edition