



Department of Mathematics

College of Science

Salahaddin University-Erbil

Subject: Numerical Analysis I

Course Book: Third General Stage-First Semester

Lecturer's Name: Dr. Andam Ali Mustafa

Academic Year: 2022-2023

Course Book

1. Course name	Numerical Analysis I
2. Lecturer in charge	Andam Ali Mustafa
3. Department / College	Mathematics / Science
4. Contact	E-mail: andam.mustafa@su.edu.krd Tel: +9647504302367
5. Time (in hours) per week	2 hours
6. Office hours	Sunday 11:30-2:30 Or Monday 10:30-1:00
7. Course code	
8. Teacher's academic profile	<ul style="list-style-type: none"> ❖ 25/8/2022 PhD in University Roma Tre in Rome, Italy. ❖ 3/3/2015 M.Sc. in Department of Mathematics, College of Science, Salahaddin University-Erbil, Iraq. ❖ 31/3/2015 Assistant lecturer in Department of Mathematics, College of Science, Salahaddin University-Erbil, Iraq. ❖ 2/7/2009 B.Sc. in Department of Mathematics, College of Science, Salahaddin University-Erbil, Iraq. ❖ 2004-2005 Awarded a baccalaureate from the Kurdistan High School, Erbil, Iraq.
9. Keywords	Error, Approximation root, Interpolation, Differentiation and Integration Approximate.
<p>10. Course overview:</p> <p>This introductory course in numerical analysis covers a wide range of methods and applications in physics. The field of Numerical analysis Physics has the support of Mathematics and of Theoretical Physics, providing the necessary algorithms for the computing codes used by the Computational Physics. Surely, the results of numerical computations have many applications, both in the field of Theoretical Physics and in different domains of Applied (Technical) Physics. Taking into account that the validity domain of the different Physics theoretical models corresponds to some numerical values of the similitude criteria, one finds that the Numerical analysis Physics is also very important for the classification of these domains and, for the Physics teaching, consequently.</p> <p>On the other hand, this course covers the solution of nonlinear equations in one variable as well as large system of simultaneous linear and nonlinear equations. Also covers the approximating of functions (Interpolation), numerical differentiations and the numerical integrations. Finally, we will study numerical solutions of ordinary differential equations with</p>	

boundary value problems. The methods considered are suitable for implementation on computers and the course includes practical work. The course will use MATLAB to provide a programming environment in which we will implement many of these algorithms.
<p>11. Course objective:</p> <p>The overall goal of the field of numerical analysis is the design and analysis of techniques to give approximate but accurate solutions to hard problems. Also, to introduce students to the topic of Numerical Analysis and some of the major issues involved, including accuracy and convergence, through the study of some simple numerical algorithms. Therefore introduce students to MATLAB programme and the use it with the topic of numerical analysis, because many of times calculation of the problem by hands is difficult. Finally, to learn how to apply numerical methods to a variety of physical problems.</p>
<p>12. Student's obligation</p> <ul style="list-style-type: none"> ❖ Students reign a commitment to come on time and remain in the classroom for the duration of scheduled classes. ❖ Nothingness speaks students with each other during lecture. ❖ All devices must be turned off. ❖ When teacher ask question, Students will be to raise your hand before answer his question. ❖ Students own an obligation to write tests and final examinations at the times scheduled by the teacher or the College.
<p>13. Forms of teaching</p> <p>I give hard copy of My lecture notes to students before coming lecturer time. first, I remember students about previous lecture, and then I start new lecture. At the end of the lecture give a homework for the next lecture. During this proses I use presentation and whiteboard.</p>
<p>14. Assessment scheme</p> <ul style="list-style-type: none"> ❖ Practical: 35% MATLAB assignments and quizzes in Lab. ❖ Theoretical: 15% (Midterm exams and other activities). ❖ Final Exam: 50%. (Only theoretical)
<p>15. Student learning outcome:</p> <ul style="list-style-type: none"> ❖ Explain some of the concepts of number theory, a primary area of mathematics, using examples. ❖ Apply mathematical ideas and concepts within the context of number theory. ❖ Solve a range of problems in number theory.

❖ Recognize the appropriate use of the division algorithm, the divides relation and congruences in problem solving.	
16. Course Reading List and References: [1] Saeed, R. k., Jwamer, K. H., Hamasalh F. K. (2015) "Introduction to Numerical Analysis, First Edition", Sulaimani, Kurdistan Region – Iraq. [2] Burden, R. L. and Faires, J. D. (2011) "Numerical Analysis, Ninth Edition", Prindle, Weber and Schmidt. [3] Kincaid, D. and Cheney, W. (2002) "Numerical Analysis: mathematics of Scientific computing, third edition", Brooks/Cole Publishing Company. [4] Phillips, G. M. and Taylor, P. J. (1973) "Theory and applications of Numerical Analysis", New York: Academic Press. [5] Ralston, A. and Rabinowitz, P. (1978) "A First course in Numerical Analysis", New York: McGraw-Hill.	
17. The Topics:	Lecturer's name
Chapter One: Introduction Numerical Analysis: What is it? Floating-point numbers and round off errors. Errors: Sources of error in numerical computation. Absolute and relative errors. Chapter Two: Solution of Nonlinear equations Review of the following methods Programming, Bisection (Interval Halving), False-position, Newton-Raphson. Chapter Three: Solving systems of linear Equations Introduction. LU and Cholesky factorizations. Norms of matrix and vectors. Solution of equations by iterative methods: (i) Jacobi method (ii) Gauss-Siedel method. Chapter Four: Solving systems of nonlinear Equations Introduction. Fixed point method. Newton method.	Dr. Andam Ali Mustafa
18. Practical Topics (If there is any)	
Chapter One: Introduction to MATLAB. Chapter Two: Some important Commands of MATLAB Chapter Three: Some basic Concepts of MATLAB program. Chapter Four: Coding Topics of methods in Numerical Analysis.	M. Saman Ahmed

19. Examinations:

Questions in the examination will be arranged the matching mode by way of the examples and exercises that I give delivered in the lecture notes. Sometimes will be have extra mark in examination for worthy students. Many of the questions will take from those books that I mentioned in the References part.

20. Extra notes:

Answers of examination will find in the board's declaration physics department after every examination.

21. Peer review: