Department of Mathematics College of Science

University of Salahaddin

Subject: Numerical Analysis Lab

Course Book –(Year -3)

Lecturer's name: Dr. Jabar Salih Hassan

Academic Year: 2023/2024

Course Book

1. Course name	Numerical analysis Lab
2. Lecturer in charge	Dr. Jabar S. Hassan
3. Department/ College	**Mathematics/ Science**
4. Contact	**e-mail : jabar.hassan@su.edu.krd** **Tel: ()**
5. Time (in hours) per week	**For Theory: 2 +2 Lab**
6. Office hours	**1 hours**
7. Course code	
8. Teacher's academic profile	**Name:** Dr. Jabar Salih Hassan Work Address: Mathematics Department, College of Science, Salahaddin University-Erbil. Employment: October 2002– up to now: Mathematics Department, College of Science, Salahaddin University-Erbil Qualifications & background 1) B. Sc., Salahaddin University-Erbil, College of Science, Mathematics Department, Iraq. 2) M. Sc., Al-Mustansiriya University-Baghdad, College of Science, Mathematics Department, Iraq. 3) PhD, Missouri University of Science and Technology, Faculty of Science Mathematics and Statistics department , Rolla MO, USA. General specialization: Mathematics. Specific specialization: Differential Equations and Functional Analysis Assignments 2006-2019: Assistant Lecturer**,** Department of Mathematics, Faculty of Science, Salahaddin University -Erbil, Iraq.

	2020- up to now Lecturer: Department of mathematics, college of science, Salahaddin university.
9. Keywords	Interpolations, Newton's Method, Lagrange method, Euler's Method, Spline Method, Least squre method

10.Course overview:

This course covers the fundamental concepts of this course such as how to use numrical methods and how to apply to differntial equations descritly and continousely.

11. Course objective:

The aim of this course is to learn the students Where is the numerical methods come from? the fundamental concepts in numerical approximation. Learn essential idea of methds and their properties. relation between the methods. Furthermore, this course demonstrates major tools to understand how implement the codes in Lab.

12. Student's obligation :

You are expected to attend every class for the full class period. If you know in advance that you will not be able to attend, contact me ahead of time. Your enrollment in this course may be terminated due to excessive absences (%10 per semester).

13. Forms of teaching

Slides, Magic board, discussion and explain the methods in board and allow students to write the items on the board.

14. Assessment scheme

The students are required to do 2 or 3 closed book exams per semester. The exam has 20 marks, the attendance, and classroom activities and quizzes 10 marks. There will be a final exam on 60 marks.

15. Student learning outcome:

The students will learn major mathematical and physical concepts. These concepts will help student to better understand how to implemnt the codes.

16. Course Reading List and References:

1) Numerical Methods 1st Edition by Wolfgang Boehm (Author), Hartmut Prautzsch (Author

2) Numerical Analysis 9th Edition by Richard L. Burden (Author), J. Douglas Faires (Author)

17.The Topics: -	Lecturer name
1 Chapter one 1- Introductin 2- Finite differences 3-Forward Difference Operator 4-Backward Difference Operator 5-Divided Difference Operator	
2 Chapter two Interpolation 1- Lagrange Interpolation Polynomial 2- Divided Difference Interpolation Formula 3- Newton Forward Difference Interpolation Formula 4- Newton Backward Difference Interpolation Formula	
3. Chapter Three **1**- Least Square and Curve Fitting 2- Polynomial Models 3- Transforming the data to use linear least square formulas 4- Exponential Curve	
4. Chapter Four **1-** Inverse Interpolation 2- Numerical Differentiation of Discrete Functions	

5 Chapter Five

1- Logarithmic Functions

2- Power Functions

3- Growth Model

6 Chapter Six

6.1 Difference Scheme

6.2 Finite Difference for ODEs

6.3 Finite Difference for PDEs

6.4 Finite Element Method for PDEs

19. Examinations

Apart of exam questions from lecture notes, exercises and home works. In addition, some questions about the subject but not included in the lecture notes for high-level students in the class.