



Department of Mathematics

College of Science

Salahaddin University-Erbil

Subject: Computational Mathematics II

Course Book: Second year

Lecturer's name: Saman Ahmed Bapir

Academic Year: 2023-2024 (Semester II)

**Depending To the University Time Table the Course
Start from 14/1/2024 To 2/5/2024**

N.	Week's start date	Note	N.	Week's start date	Note
1	14/1/2024			17/3/2024	18-23/3 (Holy.)
2	21/1/2024		10	24/3/2024	
3	28/1/2024		11	31/3/2024	1/4 (Holy.)
4	4/2/2024			7/4/2024	9,10,11,12/4 (Holy.)
5	11/2/2024		12	14/4/2024	17/4 (Holy.)
6	18/2/2024		13	21/4/2024	
7	25/2/2024	Exam	14	28/4/2024	1/5 (Holy.)
8	3/3/2024	5/3 (Holy.)	4/5/2024-18/5/2024 , 28/5/2024-4/6/2024 Final Exam (1 st and 2 nd trial)		
9	10/3/2024	11,14/3 (Holy.)			

Course Book

1. Course name	Computational Mathematics II
2. Lecturer in charge	Saman Ahmed Bapir
3. Department/ College	Mathematics / Science
4. Contact	e-mail: saman.bapir@su.edu.krd Tel: +9647504847441
5. Time (in hours) per week	Theory: 2 Practical: 2
6. Office hours	
7. Course code	
8. Teacher's academic profile	4/10/2016 Awarded M.Sc. in Mathematics, Department of Mathematics, College of Science, Salahaddin University-Erbil. 7/7/2011 Awarded B.Sc. in Mathematics, Department of Mathematics, College of Science, Salahaddin University-Erbil. 2006-2007 Awarded Baccalaureate, Hawler Secondary School, Erbil.
9. Keywords	Matlab, Matrix, Sum, For, If, While, Break, Script, Function.
10. Course overview:	<p>The computer program MATLAB is a powerful tool which can help you solve a wide range of mathematical problems: it can differentiate, integrate, and otherwise manipulate mathematical formulas, perform arithmetic calculations, plot curves and surfaces in two and three dimensions, solve differential equations, and carry out a variety of other useful mathematical operations, At Rutgers, MATLAB is available on the student computer Eden. MATLAB is also available on the Windows PCs and Macintoshes in the public labs. Although the commands you use to do mathematics with MATLAB will be the same on all these machines, there are differences among computers, such as in the way that, les are opened, saved and printed.</p> <p>With MATLAB, you can create powerful interactive documents. The MATLAB environment lets you start solving problems right away by entering expressions in 2-D Math and solving these expressions using point-and-click inter- faces. You can combine text and math in the same line, add tables to organize the content of your work, or insert images, sketch regions, and spreadsheets. You can visualize and animate problems in two and three dimensions, format text for academic papers or books, and insert hyperlinks to other MATLAB files, Web sites, or email addresses. You can embed and program graphical user interface components, as well as devise custom solutions using the MATLAB programming language.</p>
11. Course objective:	<p>Matlab (Matrix laboratory) is an interactive software system for numerical computations and graphics. As the name suggests, Matlab is especially designed for matrix computations: solving systems of linear and non-linear equations, computing eigenvalues and eigenvectors, factoring matrices and so forth. In addition it, has a variety of graphical capabilities, and can be extended through programs written in its own programming language. Many such programs come with the system; a</p>

number of these extend Matlab's capabilities to nonlinear problems, such as the solution of initial value problems for ordinary differential equations.

Matlab is designed to solve problems numerically, that is, in finite-precision arithmetic. Therefore it produces approximate rather than exact solutions, and should not be confused with a symbolic computation system SCS such as Mathematica or Maple. It should be understood that this does not make Matlab better or worse than an SCS; it is a tool designed for different tasks and is therefore not directly comparable.

12. Student's obligation

- a. Students must come on time and remain in the classroom for the duration of scheduled classes and Labs.
- b. Students own an obligation to write tests and final examinations at the times scheduled by the teacher or the College.
- c. Nothingness speaks students with each other during lecture.
- d. All devices must be turned off.
- e. When teacher ask question, Students will be to raise your hand before answer question.

13. Forms of teaching

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. **Each week at the end of the lecture give a homework and assignment sheet for the next week.** During this proses I am use presentation and whiteboard.

14. Assessment scheme

1. **Practical:** 35% divided as follows:
 - i. Weekly Exam 25%.
 - ii. Homework, Assignment, report 10%.
2. **Theoretical:**(15%). Exam 10% + Quiz's & Homework 5%.
3. **Final Exam: Practical** 0% & Theoretical 50%.

15. Student learning outcome:

Student learning in every facet of computational mathematics. Following are some commonly used mathematical calculations where it is used most commonly:

- a. 2-D and 3-D Plotting and graphics
- b. Linear Algebra
- c. Algebraic Equations
- d. Non-linear Functions
- e. Statistics
- f. Data Analysis
- g. Calculus and Differential Equations
- h. Numerical Calculations
- i. Integration
- j. Transforms
- k. Curve Fitting
- l. Various other special functions

16. Course Reading List and References:

- A Guide to MATLAB for Beginners and Experienced Users Second Edition, Brian R.Hunt, Cambridge, 2006.
- An Introduction to MATLAB, Winfried Auzinger, Vienna, 2002.
- Applied Numerical Methods Using Matlab, Won Young Yang, New Jersey, 2005.
- Learning MATLAB 7, The MathWorks, 2005.

<p>□ Numerical Analysis Using MATLAB and Spreadsheets, Second Edition, Steven T. Karris, Orchard Publications, 2004.</p>	
17. The Topics:	Lecturer's name
<p>1. Graphics</p> <ul style="list-style-type: none"> • 2D Plotting, • Polar Plots, • 3D Plotting, • Mesh and surface plots. <p>2. Polynomial applications</p> <ul style="list-style-type: none"> • Input output polynomial • Algebraic of polynomial, • Calculus of polynomial, <p>3. The Symbolic Math Toolbox</p> <ul style="list-style-type: none"> • Symbolic variables, • Symbolic substitution, • Symbolic matrix operations. • Useful symbol functions, • Algebraic by symbol. <p>4. Calculus application</p> <ul style="list-style-type: none"> • Limits, Differentiation, Integration, • Symbolic Summation, • Taylor Series. <p>5. Linear Algebra</p> <ul style="list-style-type: none"> • Eigenvalues, • Solving Algebraic Equations, • Solving linear system of equation. <p>6. Differential Equations</p> <ul style="list-style-type: none"> • Differential Equation, • Solving differential equations, • Solving system of differential equations <p>7. Introduction numerical analysis</p> <ul style="list-style-type: none"> • Errors definition • Locating root of polynomial, • Bisection method, • false-position method • Newton-Raphson method 	
18:	
<p>19. Examinations:</p> <p>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.</p>	
20. Extra notes:	
21. Peer review	