

King Fahd University of Petroleum & Minerals
Department of Mathematical Sciences

MATH 321(131)

Course Syllabus

Course Instructor: Shehadeh, Yaqoub

Recommended Text: “Numerical Analysis” by Richard L. Burden, J. Douglas Faires
9th Ed, Brooks/Cole (2011)

Main Topics to be Covered: Error analysis , Solutions of Nonlinear Equations, Solution of Linear Systems, Interpolation and polynomial approximation, Curve fitting, Numerical differentiation and integration, Introduction to solution of initial and boundary value problems for ordinary differential equations.

Course Objectives: This course is designed to provide an introduction to numerical methods for solving a variety of problems, linear and nonlinear and numerical approximation. In this course we focus on both: the theoretical and computational aspects.

Students Learning Outcome: After completion of the course, the students should be able to

- Gain familiarity with a variety of methods used to solve/approximate problems.
- Be able to write computer programs to implement some numerical methods.
- Be aware of the theoretical basis upon which these numerical methods are built.
- Apply his knowledge to solve practical problems.

Computer Usage: Computer software is essential for this course. Mainly we will be using Matlab as the computational platform. Other packages such as Maple may occasionally be used.

General Information

- The Final Exam is comprehensive
- Grading Policy: Homework and, Assignments 20%, Majors I and II 40%, Final40%
- Office Hours: S-M-W, 08:00-09:50 Office: 302 Building 5,
- Email: shehadeh@kfupm.edu.sa
- **Note:** KFUPM attendance policy will be enforced. DN grade for 9 and more unexcused absences. Any student who comes after 5 minutes from the beginning of the class without excuse will be marked “L” and each two “L” will be counted as one absence.

Weekly Coverage of Course Material

Week	Date	Section	Topic
1	Sep1-Sep5	1.2	Round-off Errors and Computer Arithmetic
2	Sep 8-12		MATLAB
3	Sep 15-19	2.1 2.2	The Bisection Method Fixed- Point Iteration
4	Sep 22-26	2.3	Newton's and Secant Methods
5	Sep 29-Oct3		Taylor Series and Big"O' Truncation Error
6	Oct 6-9	3.1 3.3	Interpolation and the Lagrange Polynomial Divided Differences
Id Al -Adha Vacation Oct 10-20			
7	Oct 21-24	3.3 3.5	Divided Differences , Cubic Spline Interpolation
First Major Exam			
8	Oct 27-31	4.1	Numerical Differentiation
9	Nov 3-7	4.3 4.4	Element of Numerical Integration Composite Numerical Integration
10	Nov 10-14	5.1 5.2	The Elementary Theory of I.V.P. Euler' Methods
11	Nov 17-21	5.2 5.3	Euler' Methods Runge-Kutta Methods
12	Nov 24-28	6.1 6.2	Linear systems of Equation Pivoting Strategies
Second Major Exam			
13	Dec1-Dec4	6.5	Matrix Factorization
14	Des 8-12	7.3	The Jacobi and Gauss-Siedel Iterative Techniques
15	Des 15-19	8.1	Discrete Least Squares Approximation
16	Des 22-24		Review