



The Islamia University Of Bahawalpur,
Department of Computer Science & IT
Bahawalnagar Campus

Course Name: Numerical Analysis	
Prerequisites: Differential Equations, Matrix Algebra and Linear Algebra	
Course Code : CSIT-01504	Credit Hours: 3-0
Class : BSCS-V (Spring 2020)	Session : (Spring 2018-22)
Objectives: This course covers the basics of mathematical process emphasis on approximation of the functions in terms of Polynomials, Major topics covered in the course are Fundamentals & Preliminaries of Mathematical Process; solving the ordinary differential equations; IVC & BVCs on O.D.E; Polynomial Approximation methods; Direct Methods for solving linear systems; Iterative techniques in Matrix Algebra; Solutions of non linear equations ;Approximation theory; Eigenvalues & Eigenvectors computation.	

Week	Lect. No.	Topics
1	1	Mathematical Preliminaries.
	2	Mathematical Preliminaries with examples/Questions.
2	3	Solution of one variable equation with example/Questions.
	4	Solution of one variable equation with example/Questions.
3	5	Differential Equations (ODE) with example/Questions.
	6	Initial value problems for O.D.E
4	7	Practice questions(Initial value problems for O.D.E)
	8	Boundary value problems for O.D.E
5	9	Practice questions (Boundary value problems for O.D.E)
	10	Introduction to polynomial approximations and interpolation
6	11	Taylor series method for polynomial approximation
	12	Exact data method for polynomial approximation
7	13	Practice questions and examples(Exact data method)
	14	Lagrange Interpolation method for polynomial approximation
8	15	Experimental data method for polynomial approximation + questions
	16	Cubic splines method for polynomial approximation + examples
Mid Term		
9	17	Introduction to linear systems, Direct methods for solving these systems
	18	Gaussian elimination method, Examples
10	19	Gauss Jordon method, Examples
	20	Crout's reduction method, example and practice questions
11	21	Jacob's method , questions
	22	Iterative techniques in matrix algebra
12	23	Gauss Seidal method(Iterative method), questions
	24	Introduction to numerical differentiation methods, examples
13	25	Simple method of differentiation, basic idea, procedure, error truncation
	26	Differentiation using interpolations
14	27	Examples, Practice Questions
	28	Introduction to numerical Integration
15	29	Trapezoidal rule, examples and practice questions
	30	Simpson's rule(Numerical Integration)
16	31	Divided difference method for numerical Integration, Approximation theory
	32	Eigenvalues and Eigenvectors computations, Examples
Final Term		

Teaching Methodology

- 1- The class will be conducted in a lecture & discussion environment where the class instructor will lead discussion, and students will be encouraged to participate and ask question at the end of each class session.
- 2- Students will be required to submit assignments on time.
- 3- Class quizzes will be held periodically to evaluate student performance.

Recommended Books

1. Introduction to Numerical Analysis Doron Levy Department of Mathematics University of Maryland
2. Numerical Methods for Scientists and Engineers 3rd Edition by K. Sankara Rao.
3. Mathematical Methods by S.M. Yousaf.
4. Numerical Analysis by S.M. Yousaf.

Testing and Grading:

1. Learning will be accomplished through lectures, class exercises and student participation in class room discussion and presentations.
2. Grading will tend to focus on overall performance rather than one or two aspects. A midterm examination and a comprehensive final examination will be given.
3. The Mid Term examination will be graded for 30 points and final examination will have a value of 50 points. The final term exam should be based on the entire syllabi of the semester.
4. Test questions may be taken from text book, reading, hyper text material, additional material discussed in class and/ or other assigned readings.

Marks Distribution

Mid Term	30
Final Term	50
Sessional	20
Total	100

Sessional Marks Distribution

Attendance / Class Behavior	05
Quiz / Surprise Test	05
Assignments	05
Presentation / Viva	05
Total	20



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Assignments:

Sr No.	Description	Date of Announcement	Due Date
1	What are the Initial value problems? And five Questions related to I.V.P.		
2	What are the Boundary value problems? And five Questions related to B.V.P.		
3	Define mathematical preliminaries and Explain Classification of Numbers		
4	Discusses the one variable Equations and their Solutions and find Solution of any three types of one variable Equation.		

Guide lines for the students

- Please follow the instructions of department and university
- Follow the Course outlines, materials, Books and lectures provided on WhatsApp groups and IUB Website.
- Prepare your lectures daily bases as you do in normal classes.
- Please ensure to complete your Assignments work specially.
- In case of any difficulty contact your course teacher.