National University

Of Computer & Emerging Sciences
Karachi

Course Outlines of BSCS Degree Program

Course Instructor	Mr.Mohammad Jamil / Dr.Khusro Mian / Mr.Nadeem khan	**Semester**	Spring
Batch/Section(s)	Batch 2019 / Sections A,B,C,D,E,F,G,H,I	**Year**	2019
Course Title	CS 325 NUMERICAL COMPUTING	**Credit Hours**	3
Prerequisite(s)		**Course TA**	

Text Book(s)

Title of book	Numerical Analysis , 9th Edition
Author(s)	Burden and Faires

Reference Book(s)

1) Numerical Methods using MATLAB , 3rd Edition

John H.Mathews

2) Applied Numerical Methods with Matlab for Engineers and Scientist, 3rd Edition

Steven C,Chapra

Course Objective:

- To introduce the students to the mostly used computing methods in the different fields of engineering and sciences.
- The emphasis will be on understanding the algorithem of the various methods for computing and on applying these to obtain the approximate solutions for various mathematical problems.
- MATLAB & Maple will be used as tool for implementation and application of these computing methods.

Course Description:

The Numerical computing includes: Error concept and analysis , Roots of nonlinear algebraic equations of one variable ,Direct and iterative method for system of linear equations, Linear interpolation with 2nd and 3rd dimensional , Interpolating polynomials , Differences , Operators and their relation , Numerical differentiation and integration , Numerical solution of differential equation .Iteration for non linear system of equation

Tentative Weekly Lectures Schedule: Numerical Analysis , Burden and Faires , 9th Ed

Week	Contents / Topics	Exercise	Questions	Exam
1	**Error analysis:** Introduction of Numerical Computing Methods: Chopping.Roundoff and truncation error Absulute ,relative and percentage error Significant figures in approximation, loss of significance	1.2	1,4,5-8	A1
2	**Solution(Root) of equations in one variable:** The Bisection or Binary-search method. Fixed Point iteration. (x=g(x))	2.1 2.2	1-6,12,13 1-6,9-11,14	
3	Newton's Raphson and Secant Method.	2.3	1-10	Q1
4	Method of False position (Regula falsi).			
5	**Interpolation and Polynomial approximation:** Lagrange interpolation polynomial of degree one,two and three	3.1	1,2,5,6	
6	**Mid 1 Exam**			
7	Divided difference table and interpolating polynomial. Newton Forward and Backward difference formula	3.3	1-6,9	A2
8	Newton centered difference (stirling) formula.			
9	**Numerical differentiation :** Differentiation using Forward and Backward differences 3-point Endpoint and Midpoint formula 5-point Endpoint and Midpoint formula	4.1	1,2,5,6,18, 25,26	
10	**Numerical Integration:** Trapezoidal and Simpson's rule Closed and open Newton-Cotes formulas. Composite Numerical Integration: Trapezoidal , Simpson's and Midpoint formula	4.3 4.4	1,2,5-10,22 1-4,7,8,11	Q2
11	**Mid 2 Exam**			
12	**Differential Equations:** Euler's method , 2-RK method , Mid Point formula Modify Euler and Huen's method , 4-RK method	5.2 5.4	1,2,5 1-4 5-8 , 9-12 13-16	A3
13	**Direct Method for solving linear system:** LU decomposition (Dolittle and Crout) Symmetric ,Singular ,Diagonally dominant and positive definite matrices LDL^t Factorization , cholesky method	6.5 6.6	1,2,3-6 1-3,5,11,12	Q3
14	**Iterative Techniques:** Iterative methods for solving linear system Gauss-Siedel and Jacobi's methods.	7.3	1,2,3,4	
15	**Difference Operator analysis:** $\Delta, \nabla, \delta, \mu$,D and E operators and their relations.	Handout will be provided		
16	Revision / Matlab Prog. / Presentation (optional)			

Course coordinator : Jamilusmani

Grading Criteria:

Marks Distribution:

Particulars	**% Marks**
1. Class participation/Attendance	00
2. Quizzes/ Assignments	10
3. Project /Programme	10
4. First Mid Exam	15
5. Second Mid Exam	15
6. Final Exam	50
Total:-	**100**

Important Instructions to be followed for this Course

- Be in classroom on time. Any student who arrives more than 5 minutes late in the class would be marked LATE. Anybody coming to classmore than 15 minutes late will be marked ABSENT.
- Turn off your cell phones or any other electronic devices before entering the class.
- Maintain the decorum of the class room all the time.
- Avoid a conversation with your classmates while lecture is in progress.
- Submit your assignments on time, no assignment will be accepted after the deadline.

Instructions / Suggestions for satisfactory progress in this course:

- On average, most students find at least three hours outside of class for each class hour necessary for satisfactory learning.
- Chapters should be read and homework should be attempted before class.
- Do not get behind. You are encouraged to work with other students. Plus, I am always available during office hours to help you.
- The homework assigned is a minimum. You may always work extra hours on your own.
- Use the few minutes you usually have before the start of each class to review the prior meetings' notes and homework. This will save us valuable in-class time to work on new material.
- Develop a learning habit rather than memorizing.work in groups, whenever appropriate.
- Apply the learned principles and gained knowledge.
- Be creative in thinking, but stick to the topic assigned for discussions, assignments and presentations.
- Always bring your **Work Book** and **Calculator** with you in the class.

Note: Students are welcome all the time in office to get help from the Teacher.

Jamilusmani 04-02-2021

Signature:_____ Date:_____