University of Bahrain
Quality Assurance and Accreditation Center

Course Syllabus Form

Course code: EENG 205 Course title: Numerical Methods

College:	Engineering
Department:	Electrical & Electronics Engineering
Program:	Electrical - Electronics
Course credits:	3-1-3
Course NQF Level:	6
NQF Credits:	3
Prerequisite:	
Lectures Timing & Location:	MW, 9:30-10:45, Room: 14-141
Course web page:	Blackboard and my website https://www.dr-e-mattar-uob.com/
Course Instructor:	Prof. Ebrahim Abdulla Mattar
Office Hours and Location:	MTW: 11-1 pm (14-143)
Course coordinator:	Prof. Ebrahim A. Mattar
Academic year:	2023/2024

Semester:		First		Second		Summer

Textbook(s):

Textbook(s):
J.H. Mathews and K. D. Fink, Numerical Methods using Matlab
R. L. Burden and J. D. Faires, Numerical Analysis

References:

S. C. Chapra and R. P. Canale, Numerical methods for Engineers.
T. J. Akai, Applied Numerical methods for Engineers.

Other learning resources used (e.g. e-Learning, periodicals, software, etc.): e-Learning

Course description (as per the published):

Roots of nonlinear equations. Roots of simultaneous equations: Matrix Inversion, Gauss, Gauss-Jordan, Gauss-Seidel, Cholesky methods, Solution of nonlinear simultaneous equations. Numerical solution of ordinary differential equations, Numerical differentiation and integration. Interpolation and curve fitting methods. Introduction to Finite Difference and Finite Element methods.

Course Intended Learning Outcomes (CILOs)

	Mapping to PILOs						
CILOs	1	2	3	4	5	6	7
Solve non-linear equations and system of non-linear equations numerically.		✓					
Solve system of linear equations numerically.			✓				
Use interpolation and curve fitting methods to construct a function.	✓						
Apply numerical techniques to approximate derivative and definite integral.		✓					
Solve ordinary differential equations numerically.							
Apply finite difference and finite element methods.					✓	✓	
Explain Genetic algorithm					✓	✓	

Course assessment:

Assessment Type	Details/ Explanation of Assessment in relation to CILOs	Number	Weight	Date(s)
Assignments	1,2,3,4	1-3	10 %	Randomly Given
Midterm Examination	3,4	1	30 %	Refer to course weekly breakdown below
Laboratory/Practical	1,2,6	5-6 Labs	10 %	Refer to course weekly breakdown below
Projects/Case Studies		1	10%	
Final Examination	1,2,3,4,5,6	1	40%	
Total			100%	

Description of Topics Covered

Topic Title (e.g. chapter/experiment title)	Description
Roots of nonlinear equation	Roots of nonlinear equations, maths and use of coding to find roots
Roots of nonlinear equation	Secant .. to find Roots of nonlinear equations, maths and use of coding to find roots.
Roots of Simultaneous Equations (Direct and Iterative Methods)	GJ, GS Methods, and algorithms The use of Newton Raphson for Multi-equations
Interpolation and curve Fitting	Interpolation and curve Fitting, and the use of Lagrange, and Newtons Method
Numerical Differential and Integration	Different approaches for solving DE, linear and Nonlinear.
Finite Element	Use of Finite Element approach to solve DE.

Weekly Schedule

Week	Date 1st Semester weeks	Topics covered	CILOs	Teaching Method	Assessment
1		Review		Lectures	
2		Roots of nonlinear equation	1	Lectures	Self-assessment
3		Roots of nonlinear equation	1,3	Lectures	Self-assessment
4		Roots of nonlinear equation	1,3	Practical work	Self-assessment
5		Roots of Simultaneous Equations (Direct and Iterative Methods)	1,3	Lectures	Quiz 1
6		Roots of Simultaneous Equations (Direct and Iterative Methods)	1,3	Practical work	Self-assessment
7		Optimal Relaxation Factor, Roots of Simultaneous Equations (Direct and Iterative Methods)	1,2	Lectures	Mid-Term
8		Mid-semester break			

9		Interpolation and curve Fitting	1,2	Lectures	Self-assessment
10		Lagrange, Interpolation and curve Fitting	1,3,5,6	Practical work	Self-assessment
11		Lagrange, Interpolation and curve Fitting	1,3,5,6	Lectures	Quiz 2
12		Newton's, Interpolation and curve Fitting	1,3,5,6	Lectures	Self-assessment
13		Numerical Differential and Integration	1,3,5,6	Lectures	Mid-Term
14		Numerical Differential and Integration	1,3,5,6	Practical work	Self-assessment
15		Complex, Numerical Differential and Integration	1,3,5,6	Lectures	Self-assessment
16		Review	2,6	Practical work	Self-assessment

Academic Integrity Statement
Honesty and integrity are integral components of the academic process. Students are expected to be honest and ethical at all time in their pursuit of academic goals in accordance with Regulations of Professional Conduct Violations for University of Bahrain Students, UOB Plagiarism Policy and UoB Guide to Students Rights and Duties. Any breach of academic integrity will be dealt according to the Regulations for Professional Conduct Violations

Prepared by:	Prof. Ebrahim A. Mattar
Date:	Sunday, February 11, 2024