GAU, Faculty of Engineering

Course Unit Title	Numerical Analysis
Course Unit Code	MT208
Type of Course Unit	Compulsory, All engineering students
Level of Course Unit	Third year of BSc
National Credits	3
Number of ECTS Credits Allocated	5 ECTS
Theoretical (hour/week)	2
Practice (hour/week)	-
Laboratory (hour/week)	1
Year of Study	3
Semester when the course unit is delivered	6
Mode of Delivery	Face to Face, Laboratory Experiments, E-learning activities
Language of Instruction	English
Prerequisities and co-requisities	-
Recommended Optional Programme Components	Basic background of calculus and linear algebra

Objectives of the Course:

The main purpose of the course is to introduce the students into fundamentals of numerical analysis that are mainly used in engineering. The course is focused on techniques of mathematical analysis that can be used in computer algorithms, etc.

Learning Outcomes

When this course has been completed the student should be able to		Assessment.
1	Get familiar and understand conceptually topics of numerical analysis.	1
2	Apply the methods of solving elementary numerical analysis problems that leads to the first insights into the rudiments of related fields in engineering sciences.	1
3	Apply the curve fitting methods of linear and non-linear forms to analyse the data	1, 2, 5
4	Apply the fundamentals of classical iteration methods to find the roots of equations	1, 2, 5
5	Apply the eigen values and eigen vectors and their applications in engineering.	1, 2

Assessment Methods: 1. Written Exam, 2. Assignment 3. Project/Report, 4.Presentation, 5 Lab. Work

Course's Contribution to Program

		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	4
2	Ability to design and conduct experiments as well as to analyze and interpret data	3
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	2
4	Ability to apply systems thinking in problem solving and system design	4
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	4
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	3
7	Ability to express their ideas and findings, in written and oral form	4
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	3
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	4

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate 4: High, 5:Very High)

Course Contents

Week			Exams
1		Introduction	
2		Solution of Nonlinear Equations	
3		Solution of Nonlinear Equations	
4		Solution of Nonlinear Equations	
5		Solution of Nonlinear Equations	
6		Solution of Linear Equations	
7		Solution of Linear Equations	
8			Midterm
9		Interpolation	
10		Interpolation	
11		Curve Fitting	
12		Curve Fitting	
13		Numerical Differentiation	
14		Numerical Integration	Lab. Exam
15			Final

Recommended Sources

Main:

1. Numerical Methods using Matlab, written by; John H. Mathews, published by; Prentice Hall, 4th edition, 2004.

Supplementary:

2. Schaum's Outline of Theory and Problems of Numerical Analysis, 2nd edition, written by; Francis Sheid, published by; McGraw-Hill, 1989.

Assessment

Attendance & E-learning & Quiz	15%	
Laboratory	15%	Lab Grade = (Lab exam grade + Lab Attendance)
Midterm Exam (Written)	30%	
Final Exam (Written)	40%	
Total	100%	

ECTS Allocated Based on the Student Workload

Activities	Number	Duration (hour)	Total Workload (hour)
Course duration in class (including the Exam week)	15	2	30
Labs and Tutorials	13	1	13
Assignments	5	2	10
Project/Presentation/Report Writing	-	-	-
E-learning Activities	-	-	-
Quizzes	1	10	10
Midterm Examination	1	20	20
Final Examination	1	25	25
Self Study	14	3	42
Total Workload			150
Total Workload/30 (h)			5
ECTS Credit of the Course			5