



Course Specification

— (Bachelor)

Course Title: Engineering Numerical Methods

Course Code: MTH3003

Program: Bachelor of Construction Engineering

Department: Civil and Environmental Engineering Department

College: College of Engineering and Computing in Al-Qunfudhah

Institution: Umm Al-Qura University

Version: 5

Last Revision Date: March 2025



Table of Contents

A. General information about the course:	3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods	4
C. Course Content	5
D. Students Assessment Activities	5
E. Learning Resources and Facilities	6
F. Assessment of Course Quality	6
G. Specification Approval	7



A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A. University College Department Track Others
B. Required Elective

3. Level/year at which this course is offered: (5/3)

4. Course General Description:

This course offers an introduction to numerical methods. Topics include curve fitting, roots of equations, integration, and solution of ordinary differential equations. Numerical techniques are presented in the context of engineering applications, and example problems are solved using a variety of computer-based tools (structure programming, and computational processing software).

5. Pre-requirements for this course (if any):

Calculus (2) for Engineering (MTH1182)

6. Co-requisites for this course (if any):

7. Course Main Objective(s):

The main purpose of this course is to enable the students to acquire the knowledge of a range of numerical methods and their application in solving engineering problems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100 %
2	E-learning	None	None
3	Hybrid	None	None





No	Mode of Instruction	Contact Hours	Percentage
	<ul style="list-style-type: none"> Traditional classroom E-learning 		
4	Distance learning	None None	

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	45
3.	Field	None
4.	Tutorial	None
5.	Others (specify)	None
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recognize the fundamental algorithms in numerical mathematics.	K2	Lecture	Assignment, Quiz, Lab, Midterm exam OR final exam
2.0	Skills			
2.1	Evaluate and Analyze the error associated with the use of numerical solutions	S1	Lecture	Assignment, Quiz, Lab, Midterm exam OR final exam
2.2	Apply the appropriate numerical method for a wide range	S3	Lecture	Assignment, Quiz, Lab, Midterm exam OR final exam





Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	of engineering problems and interpret numerical results			
2.2	Solve basic engineering problems by using numerical methods and implementing numerical algorithms efficiently in a suitable software.	S4	Lecture	Assignment, Quiz, Lab, Midterm exam OR final exam
3.0	Values, autonomy, and responsibility			
3.1				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to numerical methods, accuracy, errors.	5
2.	Numerical Differentiation	10
3.	Interpolation and extrapolation	15
4.	Regression	5
5.	Numerical integration	10
6.	Numerical solution of non-linear equations	15
7.	Numerical solution of initial value problems	10
8.	Quizzes and Midterm Exam	5
Total		75

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	2, 5, 8, 11, 14	10%
2.	Quizzes	5, 10	10%
3.	Lab exam	15	20%
4.	Midterm exam	7 or 8	20%
5.	Final exam	16 or 17	40%





*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Title: Applied Numerical Methods with MATLAB for Engineers and Scientists Author: Steven C. Chapra Publication date and edition: 2021, 4th Edition (Hoboken, NJ : Wiley) ISBN number: 978-0-07-339796-2
Supportive References	Title: An introduction to numerical methods and analysis Author: James F Epperson Publication date and edition: 2016, 3rd Edition (CUP - Cambridge University Press) ISBN number: 978-1119604693
Electronic Materials	<ul style="list-style-type: none"> • Electronic materials of the required textbook and its PowerPoints slides • Umm Al-Qura LMS related contents
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Equipped Classroom
Technology equipment (projector, smart board, software)	Blackboard, Data show, Smart Board
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
	Instructor	Direct
Effectiveness of Students assessment	Student	Indirect
	Instructor	Direct



Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Student Instructor	Indirect
The extent to which CLOs have been achieved	Instructor	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Civil and Environmental Engineering Department Council in Al-Qunfudah
REFERENCE NO.	The fifteenth session of the academic year 1446
DATE	01/05/2025

