T-104
2022

Course Specification

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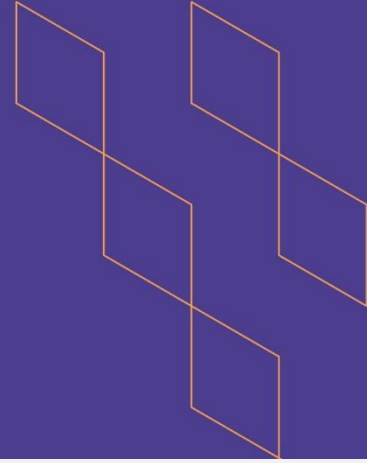
Course Title:	**Numerical Analysis (2)**
Course Code:	**475Math-3**
Program:	**B.Sc. of Mathematics**
Department:	**Mathematics**
College:	**Art and Science**
Institution:	**Najran University**
Version:	1
Last Revision Date:	**07-05-2023**

Table of Contents:

A. General information about the course:

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:		**8/4**		
4. Course general Description				

This course will cover the foundations of numerical analysis. The main focus of this course is find numerical solution of (ordinary differential equations, system of nonlinear equation, system of ordinary differential equations and Partial differential equations)

5. Pre-requirements for this course (if any): Numerical Analysis-1 (474Math-3)				
6. Co- requirements for this course (if any): None				
7. Course Main Objective(s)				

The main objective of the course is to familiarize the students with the essential concepts to Numerical analysis and how to get the numerical solution of the different Mathematical problems

1. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	30	
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distancelearning		
5.	**Other(Lab)**	30	

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (Lab)	30
	Total	60

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe the methods of approximating the solutions of differential equation	K1	Lectures discussions	Theatrical exam Assignments
2.0	Skills			
2.1	Use the numerical methods for solving ordinary differential equations and Partial differential equations	S1	Lectures discussions	Practical exam Theatrical exam Assignments
2.2	Evaluate the error for the different methods			
2.3	Use the numerical method for solving system of nonlinear equations and system of ordinary differential equations			
2.4	Use Mathematical Software to solve ordinary differential equations, system of nonlinear equation, system of ordinary differential equations and Partial differential equations	S5		
3.0	Values, autonomy, and responsibility			
3.1	Work within group and independently	V1	Assignments	Observation card Oral test

C. Course Content

No	List of Topics	Contact Hours
1.	Numerical Solution of system of nonlinear equations: Fixed Point method; Newton's Method; Quasi-Newton Method.	12
2.	Numerical solution of Initial-Value Problems for Ordinary Differential Equations: Euler's Method; Euler's Predictor corrector Method; Taylor Method; Runge-Kutta Method.	15
3.	Numerical Solution of system of ordinary differential equations	15

	Euler's Method; Taylor's Method; Runge-Kutta Method. Numerical solution of Second Order Differential Equations.	
4.	Numerical solution of Boundary-Value Problems of One Variable: Shooting method; Finite difference method.	8
5.	Numerical solution of partial differential equations: Finite difference method	10
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	6	30
2.	Assignments & Quizzes	During classes	10
3.	Final Exam(Practical)	16	10
4.	Final Exam	16 - 18	50

*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	R. Burden, and J. D. Faires, Numerical Analysis, PWS-Kent Publishers, (1993).
Supportive References	V. A. Patel, Numerical Analysis, Harcourt Brace, College Publishers, (1994). [2]- W. Cheney and D. Kincaid, Numerical Mathematics and Computing, Brooks/Cole Publishing Company, (2003). [3]- John H. Mathews & Kurtis D. Fink, Numerical Methods Using Matlab, Fourth Edition (& Higher). UpperSaddleRiver: Pearson Prentice Hall, 2004.
Electronic Materials	• http://www.uaemath.com/ar/aforum. • http://www.mathramz.com/xyz/index.php • http://www.yzeeed.com.
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lab include 20 computers.
Technology equipment (projector, smart board, software)	Data show - Smart Board Maple software - Matlab software Mathematica software Printer Wi-Fi
Other equipment (depending on the nature of the specialty)	None

. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Student Questionnaire (Indirect)
Effectiveness of students assessment	Peer Reviewer	Rubrics (Indirect)
Quality of learning resources		
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods(Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Council of Mathematics Department
REFERENCE NO.	14441017-0208-00014
DATE	17-10-1444H