هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

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Course Specification

Course Title:	**Numerical Analysis (1)**
Course Code:	**474Math-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:	7/4				
4. Course general Description This course will cover the foundations of numerical analysis. The main focus of this course is to find the numerical solution of nonlinear equation, system of linear equation, interpolations and numerical differentiation and integration.					
5. Pre-requirements for this course (if any): **Mathematical Software** (314Math-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 of numerical analysis, and to get the numerical solution of the equations.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom		45
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	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	Define the basic concepts and methods of numerical analysis	K1	Lectures discussions	Theatrical exam Assignments
2.0	Skills			
2.1	Solve some algebraic equations using numerical methods.	S1	Lectures discussions	Practical exam Theatrical exam Assignments
2.2	Approximate the error for the different method			
2.3	Apply computer programs to implement numerical methods.	S5		
3.0	Values, autonomy, and responsibility			
3.1	Work within groups and independently	V1	Assignments	Observation card Oral test

C. Course Content

No	List of Topics	Contact Hours
1.	Numerical errors: absolute error – relative error – truncation error	6
2.	Solution of nonlinear equations: Bisection, Secant, fixed-point and Newton-Raphson methods.	14
3	Numerical Solution of linear system: Jacobi and Gaussian –seidel methods	10
4	Interpolation: Difference operators – Newton divided differences - Lagrange's formula - Newton forward method for evenly spaced data and least square method	20
5	Numerical differentiation and integration: Trapezoidal rule - Simpson's rule and Gaussian quadrature	10
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	6	20
2.	Assignments & Quizzes	During classes	20
3.	Final exam (Practical)	16	10
4	Final Exam (Theatrical)	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	التحليل العددي ريتشارد بيردن ودوغلاس فايرس ترجمة محمد صبحي 1434 - R. Burden, and J. D. Faires, Numerical Analysis, PWS-Kent Publishers, (1993).
Supportive References	- V. A. Patel, Numerical Analysis, Harcourt Brace, College Publishers, (1994). - W. Cheney and D. Kincaid, Numerical Mathematics and Computing, Brooks/Cole Publishing Company, (2003). - John H. Mathews & Kurtis D. Fink, Numerical Methods Using Matlab, Fourth Edition (& Higher). UpperSaddleRiver: Pearson Prentice Hall, 2004.
Electronic Materials	
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

F. 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