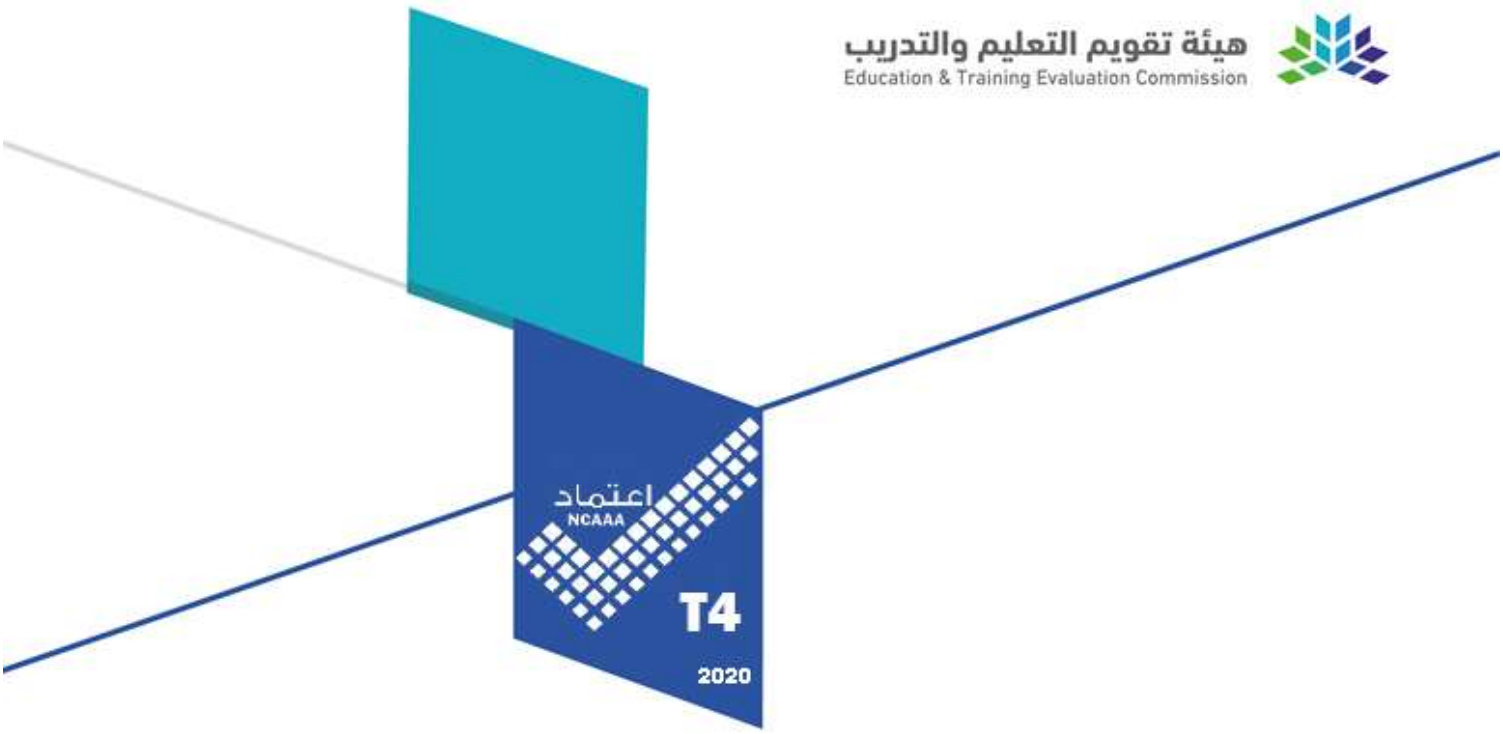
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Introduction to numerical Analysis
Course Code:	MATH 334
Program:	Bachelor of Science in Mathematics
Department:	Mathematics
College:	Science
Institution:	University of Tabuk

Table of Contents

A. Course Identification

1. Credit hours: 03 Hours/Week
2. Course type **a.** University ☐ College ☐ Department √ Others ☐ **b.** Required √ Elective ☐
3. Level/year at which this course is offered: **L6/Y3**
4. Pre-requisites for this course (if any): **Math 2003; Stat 201**
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	45	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	45
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

The main purpose of this course is to study nonlinear equations of one variable, the polynomial interpolation and differentiate and integrate numerically.

2. Course Main Objective

-Students will be able to recognize the importance of using numerical methods to solve problems.
-Students will be able to demonstrate proficiency in applying numerical methods to a variety of mathematical and physical problems.
- Students will be able to interpret results of numerical solutions and draw conclusions.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Students will be able to recall theories and concepts of numerical analysis	K1

CLOs		Aligned PLOs
1.2	Students will be able to demonstrate knowledge of Numerical Methods and procedures for solving nonlinear equations- polynomial interpolation- Numerical Differentiation - Numerical Integration	K2
2	**Skills :**	
2.1	Students will be able to use computational procedures to solve complex problems.	S1
2.2	Students will be able to prove formulas of numerical analysis	S2
2.3	Students will be able to apply the fundamentals of numerical analysis in solving nonlinear equations	S3
2.4	Students will be able to communicate mathematical ideas to others clearly and accurately	S4
2.5	Students will be able to solve mathematical problems using mathematical programming	S5
3	**Values:**	
3.1	Students will be able to work effectively in groups.	V1
3.2	Students will be able to manage duties and time.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction To Numerical Analysis Numerical Solutions of non-linear equations in one variable – The Bisection method	3 Hrs
2	Numerical Solutions of non-linear equations in one variable – The fixed point iteration method	3 Hrs
3	Numerical Solutions of non-linear equations in one variable – Newton's method	3 Hrs
4	Numerical Solutions of non-linear equations in one variable – the secant method	3 Hrs
5	Fundamental theorem of interpolation - Lagrange interpolation	3 Hrs
6	**Mid-Exam 1**	
7,8	Finite differences –forward differences and backward difference – Newton's forward and backward difference interpolating formulae	6 Hrs
9,10	Divide differences- Divide differences interpolating polynomial Hermite interpolation	6 Hrs
11	Numerical Differentiation	3 Hrs
11	**Mid-Exam 2**	
12	Numerical integration- Newton -Cotes formula – The Trapezoidal rule - The Composite Trapezoidal rule- Local truncation Error	3 Hrs
13	Numerical integration- Newton - The Simpson's rule - The Composite Simpson's rule- Local truncation Error	3 Hrs
14	Numerical integration - The Simppson's 3/8 rule - The Composite Simpson's 3/8 rule- Local truncation Error	3 Hrs
15	**Revision & Final Exam**	3 Hrs
Total		**45 Hrs**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Students will be able to recall theories and concepts of numerical analysis	Introducing new ideas through case study Lectures Class Discussions	Quizzes I II Midterm Exams Final Exams Homework assignments
1.2	Students will be able to demonstrate knowledge of Numerical Methods and procedures for solving nonlinear equations- polynomial interpolation- Numerical Differentiation - Numerical Integration		
2.0	**Skills**		
2.1	Students will be able to use computational procedures to solve complex problems.	Lectures Class Discussions	Quizzes I II Midterm Exams Final Exams Homework assignments.
2.2	Students will be able to prove formulas of numerical analysis		
2.3	Students will be able to apply the fundamentals of numerical analysis in solving nonlinear equations		
2.4	Students will be able to communicate mathematical ideas to others clearly and accurately		
2.5	Students will be able to solve mathematical problems using mathematical programming		
3.0	**Values**		
3.1	Students will be able to work effectively in groups.	Lectures Class Discussions Group discussion	Quizzes Homework assignments Group work
3.2	Students will be able to manage duties and time.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Activities	Weekly basis	5%
2	Homework	Weekly basis	5%
3	Quizzes	Weekly basis	10%
4	Mid Exam1	6^{th} week	20%
5	Mid Exam2	11^{th} week	20%
6	Final Exam	At end of the Semester	40%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :
Six office hours per week in the lecturer schedule.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	R. Burden, and J. D. Faires. Numerical Analysis. PWS-Kent Publishers, 1993.
Essential References Materials	V. A. Patel. Numerical Analysis. Harcourt Brace, College Publishers, 1994. W. Cheney and D. Kincaid. Numerical Mathematics and Computing. Brooks/Cole Publishing Company, 2003
Electronic Materials	None
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	1.Lecture room with maximum capacity of 30 students and equipped with White Board, Overhead projector and internet connection. 2.Library
Technology Resources (AV, data show, Smart Board, software, etc.)	Projectors
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Direct and Indirect
Extent of achievement of course learning outcomes	Teachers	Direct
Quality of learning resources	Students	Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	The Curriculum committee
Reference No.	
Date	25/08/2021