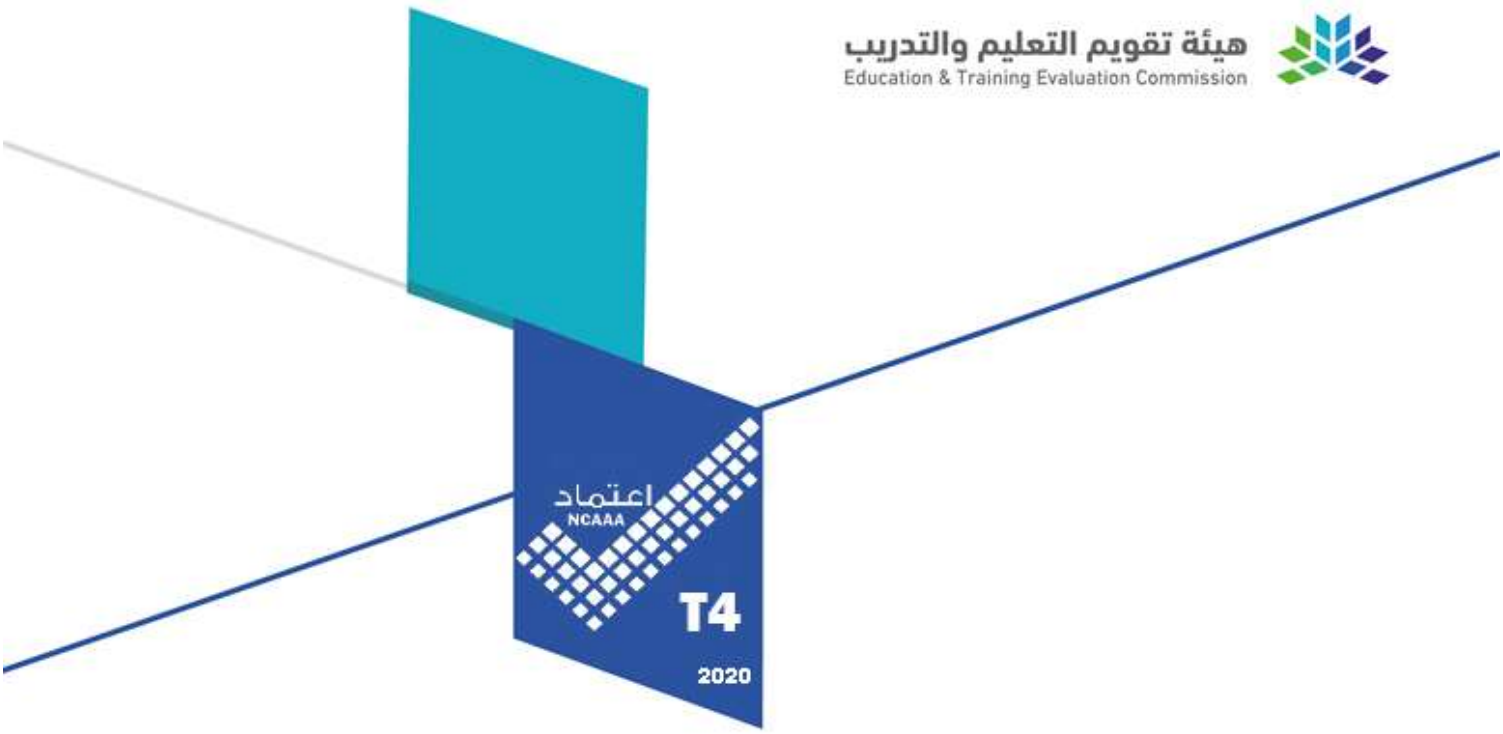
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Differential Geometry
Course Code:	MATH 463
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 305; Math 204**
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

This course provides students with theoretical knowledge and practical skills in the subject of differential geometry, such as the concept of curve and surface to study their curvature and torsion. Students will also learn how to apply these concepts to solve mathematical problems.

2. Course Main Objective

- Students will be able recall basic concepts of regular curves, arc length, torsion, curvature, parametrization, tangent vectors, tangent space and forms.
-Students will be able to use differential and integral calculus to perform calculations on curves and surfaces.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Students will be able to recall concepts of local theories of curves and surfaces.	K1

CLOs		Aligned PLOs
2	**Skills :**	
2.1	Students will be able to solve complex problems using the analytical techniques of differential geometry .	S1
2.2	Students will be able to apply differential geometry concepts to problems from various fields of science.	S3
2.3	Students will be able to communicate mathematical concepts effectively and clearly.	S4
3	**Values:**	
3.1	Students will be able to work in groups while committed to ethics and values.	V1
3.2	Students will be able to manage duties and time.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Curves, Arc length, Tangent vector, Curvature.	3 Hrs
2,3	Curvature , Principal Normal, and Bi-normal, Serret-Frenet Formulae	6 Hrs
4	Torsion, Gauss Curvature	3 Hrs
5	Normal section, Principal curvature.	3 Hrs
6	**Mid-Exam#1**	
6	Theories of Curves	3 Hrs
7	Spaces in R3 surfaces of revolution,	3 Hrs
8,9	Fundamental forms, metric form, intrinsic properties	6 Hrs
10	Second Fundamental form,	3 Hrs
11	**Mid-Exam#2**	
11	Frenet frame, normal curvature	3 Hrs
12	Gauss Curvature in detail	3 Hrs
13	Principal curvature	3 Hrs
14	Basic tensor Analysis, and Christoffel symbols	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 concepts of local theories of curves and surfaces.	Introducing new ideas through case study Lectures Class Discussions	Quizzes I II Midterm Exams Final Exams Homework assignments
2.0	**Skills**		
2.1	Students will be able to solve complex problems using the analytical techniques of differential geometry .	Lectures Class Discussions	Quizzes I II Midterm Exams Final Exams Homework assignments.
2.2	Students will be able to apply differential geometry concepts to problems from various fields of		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	science.		
2.3	Students will be able to communicate mathematical concepts effectively and clearly.		
3.0	**Values**		
3.1	Students will be able to work in groups while committed to ethics and values.	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	6th week	20%
5	Mid Exam2	11th 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	Elementary Differential Geometry curves and surfaces, edition 2008, Author ; Martin Raussen
Essential References Materials	None
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,	Projectors

Item	Resources
etc.)	
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