

Course Specifications

Course Title:	Differential Geometry
Course Code:	MATH 463
Program:	Bachelor of Science in Mathematics
Department:	Mathematics
College:	Science
Institution:	University of Tabuk







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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 MainObjective

- 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 touse differential and integral calculus to perform calculations on curves and surfaces.

3. Course Learning Outcomes

CLOs

AlignedPLO s

1	Knowledge and Understanding	
1.1	Students will be able to recall concepts of local theories of curves and surfaces.	K1
1.2		
2	Skills :	
2.1	Students will be able to solve complex problems using the concept and techniques of differential geometry.	S3
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.	S5
3	Values:	
3.1	Students will be able to develop enhanced self-learning.	V1
3.2	Students will be able to work independently and in groups.	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	6Hrs	
4	Torsion, Gauss Curvature	3Hrs	
5	Normal section, Principal curvature.	3Hrs	
6	Mid-Exam#1		
6	Theories of Curves	3Hrs	
7	Spaces in R3 surfaces of revolution,	3Hrs	
8,9	Fundamental forms, metric form, intrinsic properties	6Hrs	
10	Second Fundamental form,	3Hrs	
11	Mid-Exam#2		
11	Frenet frame, normal curvature	3Hrs	
12	Gauss Curvature in detail	3Hrs	
13	Principal curvature	3Hrs	
14	Christoffel symbols	3Hrs	
15	Revision & Final Exam	3Hrs	
	Total 45Hrs		

D. Teaching and Assessment

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

Code	Course Learning Outcomes	TeachingStrategies	AssessmentMethods
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 concept and techniques of differential geometry.		
2.2	Students will be able to apply differential geometry concepts to problems from various fields of science.	Lectures Class Discussions	Quizzes I II Midterm Exams Final Exams Homework assignments
2.3	Students will be able to communicate mathematical concepts effectively and clearly.	Homework assignments.	
2.4			
3.0	Values		
3.1	Students will develop enhanced self- learning.	Lectures	Quizzes
3.2	Students will be able to work independently and in groups.	Class Discussions Group discussion	Homework assignments Group work

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Home works and Assignments and Quizzes	Weekly basis	10%
2	Mid Exam-I	6th week	25%
3	Mid Exam-II	11th week	25%
4	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	Andrew Pressley, Elementary Differential Geometry (Springer undergraduate mathematics series), Springer-Verlag London,
Essential References Materials	 M. Berger and B. Gostiaux, Differential Geometry: Manifolds, Curves, and Surfaces, Springer-Verlag New York Inc., 1988. Victor Andreevich Toponogov, Differential Geometry of Curves and Surfaces, (Birkhauser Boston, c/o Springer Science +Business Media Inc., 233 Spring Street, New York, NY 10013, USA).
Electronic Materials	None

Other Learning	None
Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	 Lecture room with maximum capacity of 30 students and equipped with White Board, Overhead projector and internet connection. 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	Program and study plan committee
Reference No.	
Date	25/08/2021