MATH 463
DIFFERENTIAL GEOMETRY
COURSE PORTFOLIO

FACULTY OF SCIENCE

MATHEMATICS DEPARTMENT

COURSE NAME:						
COURSE NUMBER:	M	A	T	H	4	6	3
SEMESTER/YEAR:	1st Semester		2019/2020			
DATE:						

Instructors Information

Name of the coordinator: **Khadijah Abdullah Mohammed Sharaf**
Office location: **Room : C-157   Building: 7**
Office hours:

Section	S	M	T	W	Th	Room
			Time			
Math 203		*8:00-9:30*		*8:00-9:30*		
Math 463		*11-12:20*		*11-12:20*		
Office Hour		*9:30-11:00* *2:00-3:00*	*11:00-1:00*	*9:30-11:00*		
		Math 463 Section *1:00-2:00*	*Math 203 Section* *1:00-2:00*			

Contact number(s):   **012-6952000 Ext 63566**
E-mail address(s):   **ksharaf@kau.edu.sa**
Coordinator's profile *(optional)***:**   *(insert your picture here)*

Course Information

Course name: **Differential Geometry**
Course number: **463 DAR**
Course meeting times:

		Time			
Section	**S**	**M**	**T**	**W**	**Th**
		11-12:20 **1:00-2:00**		**11-12:20**	

Place: **Room: 77-C   Building: 7**
Course website address: **www.kaau.edu.sa/faculties/science/math**
Course prerequisites and requirements:

Course name	Course number
Math	**203**

Description of the course:

1- General introduction to the theory of curves in R^n
Parametrized curves, regular curves, tangent vector, arc-length, reparametrization, curvature.

2- Theory of curves in R^2
Unit tangent vector, singular plane curve, cusp singularity, unit normal vector, singed curvature of a plane curve (specific formula), inflexion points , fundamental theorem of plane curve, evolutes and involutes.

3- Theory of curves in R^3
Tangent vector , principal normal vector and binormal vector, curvature , torsion, Serret –Frenet equations, fundamental theorem of space curve, Darboux vector, spherical indicatrices, general helix, slant helix, Bertrand curves, Manheim curves, evolutes and involutes .

4- Theory of surfaces in R^3
Parametrized surface, regular parametrized surface, normal of regular surface, tangent plane, first and second fundamental forms, principal curvatures, Gaussian curvature, mean curvature, umbilical points, normal curvature, geodesic curvature, minimal surface, developable surface, ruled surfaces , tangential ruled surface, normal ruled surface, surface of revolution.

Course Objectives

At the end of the course, students should have a strong working

Knowledge of the following topics:

1- **Basics principles of differential geometry which related to curves and surfaces in space.**

2- **Parametric representations of curves and surfaces.**

3- **Recognize curves on surfaces and various types of curvatures and geodesics.**

Learning Resources

Textbook: **Title: Differential Geometry (Schaum's Outlines)**
Author: Martin Lipschutz
Publisher: McGraw-Hill
Found in: Libraries and book shops

Course Requirements and Grading

Methods of Assessments:

1- Coursework

Assessment Type	Notes	20% Formal Assessment
HOMEWORKS		5%
Total Percentage		5%

2- Exams

First Periodic Exam	Second Periodic Exam	Final Exam	Assesments
Wednesday 16-10-2019	Wednesday 20-11-2019		Homeworks
MCQ & Written	MCQ & Written	MCQ & Written	
30	30	40	5 as curve up bonus

Expectations from Students

- **Students must be responsible of attending exams.**
- **Students should be aware how to use computer programs.**
- **No makeup exams. The mark for the missed exam according to an acceptable excuse will be added to the mark of the final exam.**
- **Any student that exceeds a 25% (6 Lectures) absence with no acceptable excuse will deprived from entering the Final exam.**
- **Cheating in any periodic or quizzes exams will be punished by getting Fail mark.**
- **Cheating in Final exam will held to fail in the exam and expel from university for the next term.**
- **The IC Grade is given only at the following case:**
  - **1-Attending all exams and missing the final.**
  - **2-Not exceeding 25% absent time.**
  - **3-An official illness report.**

Recommended Books:

- **Elementary differential geometry 2nd edition, Andrew Pressley**

- **Differential Geometry, Schaum's outline series by : Lipschutz**
- **Elementary differential geometry by : O'Neill**
- **Curve and surfaces by : Sebastian Montieland Antonio Ros.**
- **A first course in differential geometry by: Chaun-Chih Hsiung**
- **Geometric differentiation for the intelligence of curves and surfaces by: Ian R.Porteous**

Math 364 Schedule 2nd Semester
2018-2019

Week #	Date	Topic	Reading Assignment	What is Due?
1	Sep. 2	Introduction to the course	Chapter 0	Buy Book
	Sep. 2	**3.1.** Regular Representations	Chapter 3	
	Sep. 4	**3.2.** Regular Curves		
2	Sep. 9	**3.3.** Orthogonal Projections	Chapter 3	Section Problems
	Sep. 9	**3.4.** Implicit Representations of Curves		
	Sep. 11	**3.5.** Regular Curves of Class C^m		
3	Sep. 16	**3.6.** Arc Length as a Parameter	Chapter3	Section Problems
	Sep. 16	Discuss Chapter 3 Exercises	Chapter 4	
	Sep. 18	**4.1.** Unit Tangent Vector		
4	Sep. 23	إجازة اليوم الوطني	Chapter 4	Section Problems
	Sep. 23	إجازة اليوم الوطني		
	Sep. 25	**4.2.** Tangent Line and Normal Plane		
5	Sep. 30	**4.3.** Curvature	Chapter 4	Section Problems
	Sep. 30	**4.3.** Curvature		
	Oct.2	**4.4.** Principal Normal Unit Vector	Chapter 4	
6	Oct.7	**4.5.** Principal Normal Line and Osculating Plane	Chapter 4	Section Problems
	Oct.7	**4.6.** Binormal and Moving Trihedron		
	Oct.9	**4.7.** Torsion, General Helix		
7	Oct.14	**4.8.** Spherical Indicatrix	Chapter 4	Section Problems getting ready for 1st Exam
	Oct.14	Discuss Chapter 4 Exercises		
	Oct.16	**First Periodic Exam**		

Week #	Date	Topic	Reading Assignment	What is Due?
8	Oct.21	**Revision for Chapters 3&4**	Chapter 4	Section Problems
	Oct.21	Discuuss Exam problems		
	Oct.23	**5.1.** Frenet Equations		
9	Oct.28	**5.2.** Intrinisic Equations	Chapter 5	Section Problems
	Oct.28	**5.3.** Special Curves (Involutes)		
	Oct.30	**5.3.** Special Curves (Evolutes)		
10	Nov.4	**5.3.** Special Curves (Bertrand)	Chapter 5	Section Problems
	Nov.4	Discuss Chapter 5 Exercises		
	Nov.6	**8.1.** Regular parametric Representation, coordinate patch	Chapter 8	
11	Nov.11	**8.1.** Coordinate patch	Chapter 8	Section Problems
	Nov.11	**8.2.** Tangent plane		
	Nov.13	**8.2.** Normal Line		
12	Nov.18	Discuss Chapter 8 Exercises	Chapter 8	Section Problems and getting ready for 2nd Exam
	Nov.18	Discuss Chapter 8Exercises		
	Nov.20	**Second Periodic Exam**		
13	Nov.25	**9.1.** First Fundamental Form	Chapter 9	Section Problems
	Nov.25	**9.2.** Arc Length		
	Nov.27	**9.2.** Area of Surface		
14	Dec.2	**9.3.** Second Fundamental Form	Chapter 9	Section Problems
	Dec.2	**9.4** Gaussian and mean curvature		
	Dec.4	**9.5.** Problems		
15	Dec.9	Discuss Chapter 9 Exercises	All Chapters	Prepare for Final Exam
	Dec.9	REVIEW For Final		
	Dec.11	REVIEW For Final		
		Final Exam		