DIFFERENTIAL GEOMETRY I

1	Course Title:	DIFFERENTIAL GEOMETRY I	
2	Course Code:	MAT3015	
3	Type of Course:	Compulsory	
4	Level of Course:	First Cycle	
5	Year of Study:	3	
6	Semester:	5	
7	ECTS Credits Allocated:	6.00	
8	Theoretical (hour/week):	2.00	
9	Practice (hour/week):	2.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	MAT 2013 Analytic Geometry I, MAT 2013 Analytic Geometry II	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Prof. Dr. Kadri Arslan	
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	arslan@uludag.edu.tr (0 224) 294 17 75 Uludağ Üniversitesi, Fen-Edebiyat Fakültesi, Matematik Bölümü	
17	Website:		
18	Objective of the Course:	The purpose of this course to teach the basic concepts of differential geometry undergraduate level students. Especially some concepts of Euclidean space was introduced. Such as tangent vectors, tangent space, vector space, space of vector fields, directional derivative, cotangent space, 1-form are introduced. However, the course aims are to examine and curves, velocity vector of the curve, and the Serret-Frenet curvatures and Serret-Frenet formulas of the curves in Euclidean spaces.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	He/She defines the basic concepts of differential geometry.
		2	He/She relates mathematics and fundamental sciences to discipline of differential geometry,
		3	He/She compares the structure of affine space with structure of Euclidean space,
		4	He/She decides to the Euclidean space is a topologic space,
		5	He/She adapts concepts of directional derivative and differentiation from analysis courses to directional derivative along a vector and differentiation on manifolds,
		6	He/She adapts functions of gradient divergence and rotational from analysis courses to functions on manifolds,
		7	He/She defines the concept of the curve,
		8	He/She constructs the Frenet frame of the curve,
		9	He/She formulates the curvatures of the curve,
		10	He/She defines and characterizes the types of the curves,
21	Course Content:		

	Course Content:	
Week	Theoretical	Practice
1	The concepts of differentiable functions, Euclidean space, Euclidean coordinates, the Euclidean frame are handled.	Some examples of a differentiable functionsare given
2	Tangent vectors, tangent space, vector fields are considered.	Some examples of a tangent vectors and vector fields are given
3	The directional derivative of a function is given.	Some examples of a directional derivative are given
4	Curves, the parameters, arc length of the curve are discussed.	Some examles of arc length of the curve are given
5	Serret-Frenet formulas, and curvatures are analyzed.	Some examles of Serret-Frenet curvatures are given
6	Osculator planes of the curve, the circle of curvature, curvature of the sphere, osculator sphere are discussed.	Some examles of osculator planes of the curve are given
7	Spherical curves and lines of curvatures are characterized.	Some examles of lines of curvatures are given
8	Repeating courses and midterm exam	The classification of curves are given.
9	Integral curves of a curve are discussed.	Some examles of integral curves are given
10	Evolute and involute, Bertrand curve, indicatrix of a curve are analyzed.	Some examles of evolute and involutes are given
11	Helices, and some special curves are discussed.	Some examles of some special curves are given
12	Transformations and isometries of Euclidean	Some examles of isometry and orientation are given
13	Lie bracket operator, 1-forms, gradient, divergence and rotational functions are	Some examles of gradient, divergence and rotational of the functions are given
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Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	14	2.00	28.00
Self study and preperation	10	4.00	40.00
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	2.00	2.00
Others	2	40.00	80.00
Final Exams	1	2.00	2.00
Total Work Load			180.00
Total work load/ 30 hr			6.00
ECTS Credit of the Course			6.00

22	Textbooks, References and/or Other	O'Neill, B., Elementary Differential Geometry, Academic Gray, A. "Modern Differential Geometry of Curves and Surfaces", CRC Press, Boca Raton Ann Abor London Andrew Pressley, Elemantary Differential Geometry, Springer-Verlag London Limited, Great Britain, 2001
23	Assessment	
	Midterm Exam	1 40.00
	Quiz	
	Home work-project	0 0.00
	Final Exam	1 60.00
	Total	2 100.00
	Contribution of Term (Year) Learning Activities to Success Grade	40.00
	Contribution of Final Exam to Success Grade	60.00
	Total	100.00
	Measurement and Evaluation Techniques Used in the Course	
24	**ECTS / WORK LOAD TABLE**	

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	1 very low			2 low			3 Medium			4 High			5 Very High			