

M114	Elective 2 nd Year	Introduction to Differential Geometry	L	P	S	ECTS 6
			2	2	0	

Course objectives: Students will gain basic knowledge in differential geometry of curves and surfaces in R^3 .

Prerequisites. Undergraduate mathematics or computer science study programme.

Course content.

1. The local theory of curves: Regular curve. Arc length. Curvature and torsion. The Frenet frame. Fundamental theorem of curves.
2. The local theory of surfaces: Regular surface. Tangential plane of a surface. First fundamental form. Shape operator. Gaussian and mean curvature. Second fundamental form. Normal curvature. Special curves on surface: principal curves, asymptotic curves, geodesic curves. Locally isometric surfaces. Gauss's Theorema Egregium. Fundamental theorem of surfaces in R^3 .

LEARNING OUTCOMES

No.	LEARNING OUTCOMES
1.	Analyze curve using curvature and torsion.
2.	Apply first and second fundamental form of a surface.
3.	Analyze surface using mean, Gaussian and normal curvature.
4.	Interpret and use definitions, theorems and equations of differential geometry in solving problems.
5.	Conduct mathematical proofs of adequacy of the procedures and formulas encountered in this course.

RELATING THE LEARNING OUTCOMES, ORGANIZATION OF THE EDUCATIONAL PROCESS AND ASSESSMENT OF THE LEARNING OUTCOMES

TEACHING ACTIVITY	ECTS	LEARNING OUTCOME **	STUDENT ACTIVITY*	EVALUATION METHOD	POINTS	
					min	max
Attending lectures	1	1-5	The presence at lectures, discussions, teamwork and independent work on assignments and brief examinations	Attendance lists, tracking activities	0	4
Written exam (Mid-terms)	2	1-4	Preparing for written exams	Verification of correct answers (evaluation)	25	48
Final exam	3	1, 2,3,5	Revising	Oral exam	25	48
TOTAL	6				50	100

Teaching methods and knowledge assessment. Attendance at lectures and exercises is mandatory. The exam consists of written and oral part, taken after the lectures. During semester students can write mid-terms which can replace a part of the written exam or the whole written exam. Satisfactorily done mid-terms substitute the written part of exam.

Can the course be taught in English: Yes

Basic literature:

1. W. Kuehnel, Differential geometry: Curve, Surfaces, Manifolds, AMS, 2002.
2. Gray, Modern differential geometry of curves and surfaces with Mathematica, CRC PRES, 2006.

Recommended literature:

1. E. Kreyszig, Differential geometry, Courier Corporation, 2013.
2. B. O'Neill, Differential geometry, Acad. Press, New York, 1966.