

Subject card

Subject name and code	Differential geometry, PG_00155435						
Field of study	Mathematics						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
Education level	Master's studies		Subject group		Optional subject group Specialty subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		6.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Andreas Zastrow				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		10.0		80.0	150
Subject objectives	The aim of this subject is to familiarize the students with the terminology, theorems and methods of geometry while making use of differential and integral calculus of functions of several variables. The student should learn the precise definition of curvature, and obtain some mathematical intuition of the two-dimensional space that surrounds him.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MATMU2_U01] can construct mathematical reasoning: prove theorems and refute hypotheses through construction and selection of counterexamples	The student can apply the theorems including their methods of proof, that he/she learnt during the lecture, and can make use of the ideas and techniques that occurred in the proofs of the theorems and the examples that were given during the classes, and can give applications of the these theorems. He/she can in an understandable way, orally and in writing, formulate definitions and theorems, and independently present correct mathematical reasoning, for example investigate properties of a given object, construct an example of some object with prescribed properties, or give a corresponding counter-example (in particular concerning the tangent space, the curvature of curves, the moving n-hedral, the curvature of surfaces, Gauss' Theorema Egregium, and his first and second quadratic forms).	[SU2] presentation/project/paper/report [SU3] text preparation/written work [SU4] test/exam - oral or written
	[MATMU2_W03] knows and understands in-depth a selected field of theoretical or applied mathematics and is able to understand the formulations of issues in this field that are still at the research stage and knows the connections of issues in this field with other areas of mathematics	The student knows and understands the basics of differential geometry, in particular the theorems that are the subject of this lecture, concerning amongst others the theory of curves, curvature of surfaces and the basis of Riemannian geometry, including the corresponding definitions, examples, and most important proofs or proof-sketches. He/she knows and understands the connection between the issues being the subject of the lecture, and the mathematical objects that were thought earlier, e.g. in the framework of the lectures on mathematical analysis and linear algebra.	[SW4] test/exam - oral or written
	[MATMU2_U03] can understand mathematical texts of various types from selected fields of mathematics	The student can apply the theorems including their methods of proof, that he/she learnt during the lecture, and can make use of the ideas and techniques that occurred in the proofs of the theorems and the examples that were given during the classes, and can give applications of the these theorems. He/she can in an understandable way, orally and in writing, formulate definitions and theorems, and independently present correct mathematical reasoning, for example investigate properties of a given object, construct an example of some object with prescribed properties, or give a corresponding counter-example.	[SU8] observation of student's independent or team work

Course outcome	Subject outcome	Method of verification
[MATMU2_W02] knows and understands well the role and importance of the construction of mathematical reasoning	The student knows and understands the basics of differential geometry, in particular the theorems that are the subject of this lecture, concerning amongst others the theory of curves, curvature of surfaces and the basis of Riemannian geometry, including the corresponding definitions, examples, and most important proofs or proof-sketches.	[SW4] test/exam - oral or written
[MATMU2_W01] knows and understands in-depth the theory of selected areas of mathematics	In the area of those parts of Differential Geometry, that can be presented in the course of one semester (in part curvature of surfaces and the basis of Riemannian geometry, including the corresponding definitions, examples, and most important proofs or proof-sketches) the student knows and understands in-depth the relevant theory. Especially in this field he/she can communicate about basic definitions and formulae, knows examples and counterexamples of defined objects, and correctly formulates and proves basic theorems.	[SW4] test/exam - oral or written
[MATMU2_U04] is able, at an advanced level and including modern mathematics, to apply and present, orally and in writing, methods of at least one selected branch of mathematics	In the area of differential geometry a student, can on the basis of the presented material learn to present mathematical arguments orally and in writing at an advanced level.	[SU2] presentation/project/paper/report [SU3] text preparation/written work
[MATMU2_K04] is ready to understand and appreciate the importance of intellectual honesty in one's own and other people's actions; ethical conduct	The student is ready to understand and appreciate the importance of intellectual honesty in his own and other people's actions; ethical conduct	[SK8] observation of student's independent or team work
[MATMU2_U06] is able to apply methods and examples from a selected field of mathematics in related fields	The student is able to solve practical problems in the field of the lecture, (in particular concerning the tangent space, the curvature of curves, the moving n-hedral, the curvature of surfaces, Gauss' Theorema Egregium, and his first and second quadratic forms).	[SU3] text preparation/written work [SU4] test/exam - oral or written
[MATMU2_U07] is able to define his/her interests and develop them; in particular, is able to establish contact with specialists in his/her field, e.g. understand their lectures intended for young mathematicians	The student is able to define his/her interests and develop them; in particular, he is able to establish contact with specialists in the field of differential geometry, e.g. understand their lectures intended for young mathematicians.	[SU1] oral statement/conversation/discussion [SU8] observation of student's independent or team work
[MATMU2_U05] can perform proofs in a selected field and, if necessary, also use tools from other areas of mathematics	The student is able to define his/her interests and develop them; in particular, he is able to establish contact with specialists in the field of manifold analysis, e.g. understand their lectures intended for young mathematicians.	[SU2] presentation/project/paper/report [SU8] observation of student's independent or team work
[MATMU2_K01] is willing to acknowledge the limitations of his or her own knowledge and is willing to pursue further education	The student is ready to acknowledge the limitations of one's own knowledge and pursue further education.	[SK8] observation of student's independent or team work
[MATMU2_K02] is ready to precisely formulate questions to deepen his/her understanding of a given topic or find missing elements of reasoning	In the field of differential geometry, the student is ready to precisely formulate questions to deepen his or her understanding of a given topic or find missing elements of reasoning.	[SK1] oral statement/conversation/discussion

	Course outcome	Subject outcome	Method of verification
	[MATMU2_K06] is ready to formulate opinions on basic mathematical issues	The student is ready to formulate opinions on basic mathematical issues in the field of differential geometry	[SK1] oral statement/conversation/discussion
	[MATMU2_K05] is ready to independently search for information in literature, also in foreign languages	The student is ready to independently search for information in the literature in the field of differential geometry	[SK1] oral statement/conversation/discussion
Subject contents	Making the student acquainted with <		

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