



Subject card

Subject name and code	Introduction to computer graphics and computational geometry, PG_00050169						
Field of study	Mathematics						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group			Specialty subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Analizy Nieliniowej -> Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Jakub Maksymiuk					
	Teachers	dr inż. Jakub Maksymiuk					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	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		0.0		0.0	60
Subject objectives	The aim of the course is to familiarize students with selected topics of computer graphics and computational geometry.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W03] demonstrates knowledge advanced computation techniques, supporting the work of a mathematician and understand their limitations.	The student knows the basic problems, methods and algorithms of computer graphics and computational geometry.	[SW1] Assessment of factual knowledge
	[K7_K02] formulates questions to deepen own understanding of a given topic or find missing elements of reasoning, understands the need to clearly present selected achievements of higher mathematics to laymen.	Based on a verbal description of the problem, the student is able to formulate a precise model, find and complete the missing elements, and describe the solution obtained.	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills
	[K7_U09] constructs mathematical models used in specific advanced applications of mathematics, can use stochastic processes as a tool for modeling phenomena and analyzing their evolution, constructs mathematical models used in specific advanced applications of mathematics, uses stochastic processes as a tool for modeling phenomena and analyzing their evolution, recognizes mathematical structures in physical theories	The student is able to create and analyze basic algorithms used in computational geometry.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[K7_U03] uses differential and integral calculus, elements of complex analysis, algebraic methods, applies them in typical practical	The student is able to apply methods of linear algebra, geometry, and analysis in solving computer graphics problems.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
Subject contents	<ol style="list-style-type: none"> 1. Geometric transformations in 2D and 3D. Homogeneous coordinates. 2. Projections in 2D and 3D. 3. Representation of curves and surfaces: Bezier, B-spline and NURBS. 4. Selected topics of rendering: colors, reflections, shading, ray tracing 5. Data structures in computer graphics. 6. Introduction to computational geometry. 7. Convex hull. Intersections of lines and polygons. Triangulation. 8. Voronoi diagrams. Delunay triangulation. 		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project assignments	50.0%	100.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. D. Marsh, <i>Applied geometry for computer graphics and CAD</i>, Springer Science & Business Media, 2006 2. M. de Berg, O. Cheong, M. van Kreveld, M. Overmars, <i>Computational Geometry. Algorithms and Applications. Third Ed.</i>, Springer Science & Business Media 2008 	
	Supplementary literature	brak	
	eResources addresses	Adresy na platformie eNauczenie: Wstęp do grafiki komputerowej i geometrii obliczeniowej - Moodle ID: 39607 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=39607	
Example issues/ example questions/ tasks being completed	Create an algorithm drawing a given shape using the given primitives. Describe the applications of Bezier curves. Propose and analyze the algorithm finding the points of intersection in the set of intervals.		
Work placement	Not applicable		

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