

## 。 GDAŃSK UNIVERSITY OF TECHNOLOGY

## 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 2023		Academic year of realisation of subject			2023/2024			
Education level	second-cycle studies		Subject group			Optional 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			5.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Department Of Nonlinear Analysis And Statistics -> Faculty Of Applied Physics And Mathematics -> Wydziały Politechniki Gdańskiej								
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	Projec	t	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 classes includ plan	n didactic ed in study	Participation in consultation hours		Self-study SUM		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_W04] Has enhanced knowledge of a selected branch of mathematics, theoretical or applied.		Student knows the basic methods and algorithms of computer graphics and computational geometry.			[SW1] Assessment of factual knowledge			
	[K7_U11] Can construct mathematical models used in specific advanced applications of mathematics, can use stochastic processes as a tool for modeling phenomena and analyzing their evolution.		Student can create and analyze basic algorithms.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment			
	[K7_K02] Can precisely formulate 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.		The student is able to formulate a precise model based on a verbal description and explain its operation to colleagues.			[SK3] Assessment of ability to organize work [SK1] Assessment of group work skills			
	[K7_U07] Can use algebraic methods (especially on linear algebra) when solving problems in various fields of mathematics and practical tasks.		Student is able to apply the methods of linear algebra and geometry in computer graphics.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment			

Subject contents	<ol> <li>Geometric transormations in 2D and 3D. Homogenoeus coordinates.</li> <li>Projections in 2D and 3D.</li> <li>Representation of curves and surfaces: Bezier, B-splain and NURBS.</li> <li>Selected topics of rendering: colors, reflections, shading, ray tracing, cliping</li> <li>Data structures in computer graphics.</li> <li>Introduction to computational geometry.</li> <li>Convex hull. Intersections of lines and poygons. Triangulation.</li> <li>Voronoi diagrams. Delunay triangulation.</li> <li>Determning position. Range searching. Motion planning.</li> </ol>					
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> <li>D. Marsh, Applied geometry for Springer Science &amp; Business M</li> <li>M. de Berg, O. Cheong, M. van Computational Geometry. Algo and Applications. Third Ed., Sp 2008</li> </ol>	Died geometry for computer graphics and CAD, nce & Business Media, 2006 ). Cheong, M. van Kreveld, M. Overmars, al Geometry. Algorithms ons. Third Ed., Springer Science & Business Media			
	Supplementary literature	brak				
	eResources addresses	Adresy na platformie eNauczanie:				
		Wstęp do grafiki komputerowej i geometrii obliczeniowej [2023/24] - Moodle ID: 28410 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28410				
Example issues/ example questions/ tasks being completed	Create an algorithm drawing a given shape using the given primitives. Describe 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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