GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00030017		
Field of study	Mathematics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
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	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Bartosz Reichel	
	Teachers	dr inż. Bartosz Reichel	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	45.0	0.0	0.0	60

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=5092

Moodle ID: 5092 Programowanie gier komputerowych 2026
https://enauczanie.pg.edu.pl/2025/course/view.php?id=5092

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	5.0	35.0	100

Subject objectives

Understanding the basics of of graphics creation pipline on computers,

Learning basic operations and transformation (projection, rotation, filling, tessellation)

Knowledge of basic libraries 3D (OpenGL, DirectX)

Getting to know the Unity platform, to create a simple game.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U10] understands the mathematical foundations of the analysis of algorithms and computational processes, constructs algorithms with good numerical properties, used to solve typical and unusual mathematical problems	The student implements basic algorithms. It checks their operation and borderline cases.	[SU1] Assessment of task fulfilment
[K7_K03] works as a team; understands the necessity of systematic work on all projects that are long-term in nature, understands and appreciates the importance of intellectual honesty in one's own activities and the activities of other people; behaves ethically	The student performs specific tasks group design task, which ends with him explanation and visualization. This is how he learns how to work teamwork, systematicity and responsibility for the entrusted component task	[SK2] Assessment of progress of work [SK1] Assessment of group work skills
[K7_W07] describes well symbolic computation software package and statistical data processing package.	Knows packages such as OpenGL, Vulkan and high-level PyGame and Unity. He can use them in a basic way.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
- Display Process: how it works on simple graphics card

- The process of creating 2D graphics

- Bitmaps operations (Terenary raster Operations)

- Collision in 2D systems

- The process of creating 3D graphics

- The importance of basic concepts in 3D graphics (eg camera) and elements associated with them

- Shaders (basic)

- Collisions in 3D

- Physics engine libraries for games

- Sound (playback, create / filtering)

- Input-output devices (HID devices)

- Use of platforms: OpenGL / DirectX, GDI +, Vulcan will be mention

- Unity Platform etc..

Course content – laboratory
Completion of at least 10 tasks

1) 2D graphic elements, familiarization with bitmaps, sprites, and simple animation

2) 3D elements, view matrices, models, and projection

3) Shader elements</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Implementation of tasks on the laboratory</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>• Pro C# 5.0 and the .NET 4.5 Framework,6th Edition,Andrew Troelsen, Apress
• Graphics Gems (I-V), Academic Press</td></tr><tr><td>Supplementary literature</td><td>Dave Calabrese, Unity 2D Game Development, March 2014, ISBN 139781849692564

or a similar from scope of Unity</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Implement a simple 2D game (eg. PAC MAN)</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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