Bialystok University of Technology									
Field of study	**Computer Science**							**Degree level and programme type**	**Engineer's degree full-time programme**
Specialization/ diploma path	**---**							**Study profile**	academic
Course name	**Computer Graphics**							**Course code**	**FCS-00010**
								Course type	obligatory
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	**Semester**	3
	30				30			**No. of ECTS credits**	**6**
Entry requirements	Linear Algebra (FCS-00030), Object Oriented Programming (FCS-00012),								
Course objectives	Creating images using a standard API to implement basic operations affine vector objects and raster image, creating and conducting usability of text on an existing application; the use of tools to support the creation of a graphical user interface								
Course content	Lecture: 1. Introduction. A window application that draws primitives. PPM file format. 2. Color models. RGB, CMYK, HSV. RGB cube, HSV cone. 3. Methods of improving the quality of images. Point operations, histogram, filters, thresholding and automatic threshold selection algorithms. 4. Bezier curves. 5. Geometric transformations on the 2D plane. Translation, rotation, scaling. 6. Composition of elementary transformations. 7. Mathematical morphology in image processing. Structuring element, hit-or-miss, dilatation, erosion, opening, closing. 8. Basic raster algorithms. Bresenham line drawing, line clipping, scanline algorithm. 9. Computer animation. 10. JPEG compression standard. 11. JPEG 2000 compression standard. 12. Basic principles of 3D graphics. 13. Lighting modeling and realistic visualization. Specialist workshop: 1. Graphic primitives and the canvas. 2. Graphic file formats. 3. Color spaces. 4. Point transformations. 5. Methods of improving the quality of images. 6. Histogram. 7. Binarization. 8. Bézier curve. 9. 2D transformations. 10. Morphological operators. 11. Analysis and recognition of images.									
Teaching methods	lecture problem, programming,								
Assessment method	Lecture - written exam Laboratory - exercise reports								

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
LO1	is familiar with the basic concepts of computer graphics and computer graphics subsystem building	K_W10 K_W11
LO2	knows the methods of representation and processing of digital images	K_W10 K_W11
LO3	knows the technologies and methods used in the creation of graphical applications	K_W10 K_W11 K_U06 K_U11
LO4	is able to use the known methods, algorithms and graphical libraries to build information systems	K_U10
LO5	is able to present the results of experiments in graphic form	K_U10
LO6	is able to identify the technical and scientific use of computer graphics	K_U10

Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	Written exam	L
LO2	Written exam	L
LO3	Projects	Sw
LO4	Projects	Sw
LO5	Projects	Sw
LO6	Written exam, projects	L, Sw

Student workload (in hours)		**No. of hours**
Calculation		
	1 - Attendance at lectures -	30
	2 - Attendance at laboratories -	30
	3 - Preparation for laboratories -	10
	4 - Homeworks -	30
	5 - Participation in student-teacher sessions -	10
	6 - Preparation of reports -	25
	7 - Preparation for the exam -	15
	TOTAL:	**150**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	70 (5)+(1)+(2)	2.8
Student workload – practical activities	95 (3)+(6)+(2)+(4)	3.8

Basic references	1. P.Shirley ,Fundamentals of Computer Graphics , A.K.Peters, Natick Massachusetts 2002	
Supplementary references	1. A.Glassner, Principles of Digital Imagne Synthesis , Morgan Kaufmann Publ. San Francisco 1995	
Organisational unit conducting the course	Department of Digital Media and Computer Graphics	**Date of issuing the programme**
Author of the programme	dr inż. Marcin Skoczylas	April 5, 2019

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW – field work,S – seminar