

DESCRIPTION OF THE STUDY SUBJECT

Title

COMPUTER GRAPHICS AND VISUALISATION

Scope of the subject

Semester	Mode of studies	Structure*				Total number of hours	Number of credits	Group and type of subjects
		L	Lw	C	S			
IV	Full-time	12	54	12	88	166	6	Compulsory subjects of the study field
V	Part-time	8	28	42	88	166	6	

*L – lectures, PS – practical activities, seminars, LW – laboratory work, PR – practice, CP – course paper, C – consultations, S – self-study

Aim of the subject

To provide knowledge and abilities to use possibilities provided by computer graphics, to master three-dimensional design, visualization application, animation development principles, to create and edit spatial models, to visualize and animate them.

Necessary background knowledge for studying the subject

Students shall have heard subjects graphic design, multimedia hardware.

Content of the subject

Title of the topic and description of the content	Number of contact hours			S	Total number of hours
	L	Lw	C		
1. Basics of computer graphics. <i>Visual communication. Computer graphics technologies and their possibilities. Computer graphics types and formats. Three-dimensional modelling, its principles, basic concepts. Three-dimensional coordinate systems. Model types.</i>	2	-	-	-	2
2. Designing and printing of 3D objects. <i>General knowledge of the three-dimensional space. Design methods. Design systems and their possibilities. Management of spatial images. Three-dimensional images and layout of their images in the drawings. 3D printers. Printing of three-dimensional objects.</i>	2	-	-	-	2
Laboratory works: <i>Drawing and editing of objects in the three-dimensional coordinate system. Volumetric modelling according to axonometrics and images of projections. Representation of three-dimensional objects. Development of a working drawing and preparation for printing. Modelling of three-dimensional objects and preparation of graphic files for 3D printing.</i>	-	10	2	6	18
Test. <i>Designing of the 3D object and preparation for printing.</i>	-	2	2	2	6
3. Modelling of three-dimensional graphics. <i>The program interface. Image management. Tagging and layout of objects. Measurement units. Auxiliary working devices. Two-dimensional and three-dimensional modelling tools. Object types. Logical operations. Modifiers and their use.</i>	2	-	-	-	2
Laboratory works: <i>Development of geometric objects and forms. Transformations of objects. Alignment, copying, grouping of objects and other editing commands. Logic operations with objects. Creation of objects from curves. Development and modification of three-dimensional objects.</i>	-	22	2	20	44
4. Visualization of models <i>Visualization. Visual design elements. Three-dimensional images and realistic rendering. Imaging techniques. Colouring and texture customisation. Materials and their use. Lighting. Cameras.</i>	2	-	-	-	2
Laboratory works: <i>Texturing of three-dimensional objects. Ascription of materials and editing. Three-dimensional imaging. Creation and editing of light sources. Animation of light sources. Development and management of cameras. Visualization of three-dimensional images.</i>	-	6	2	10	18
5. Basics of computer animation <i>Animation, its concept. Computer animation and its principles.</i>	4	-	-	-	4

Computer animation technologies and possibilities of their use. File formats. Animation types and methods. Computer animation creation process. Animation development tools.					
Laboratory works: Development of ordinary animation and its devices. Animation of 3D models using animation keys. Animation of transformations. Time control and setting the animation playback speed. Animation along curves. Analysis and customization of animation motion graphs. Animation recording and securing. Optimisation of animation.	-	12	2	16	30
Individual work. Creation and visualization of animated three-dimensional objects.			2	22	24
Preparation for the defence of laboratory works and their defence	-	2	-	12	14
Total number of hours	12	54	12	88	166

Assessment of learning outcomes

Ten-point criteria-based assessment system as well as cumulative assessment using individual cumulative index (ICI) are applied. The overall grade is the sum of grades for intermediate accountings and defence of laboratory works (DLw) multiplied by weighted coefficients.

ICI = 0,3 IND + 0,3 T + 0,4 DLw, where IND – individual work, T – tests

Recommended literature

Key literature						
No.	Year of publishing	Author(s) and title of the publication	Publishing house	Number of copies and/or internet link		
				ŠSC library	Other premises	Other libraries *
1.	2013	Pauliukaitis D. Trimatė kompiuterinė vizualizacija. Laboratoriniai darbai.	Technologija	1	-	-
2.	2013	Vaira Ž., Linkuvienė D. Multimedijos technologijos. Mokymosi vadovas.	VšĮ Socialinių mokslų kolegija	http://www.esparama.lt/es_parama_pletra/failai/ESFproduktai/2013_Multimedijos_tehnologijos.pdf.pdf		
3.	2016	123D Design tutorials	http://www.123dapp.com/design			
4.	2016	Inventor 2016: Guided Tutorials	https://knowledge.autodesk.com/support/inventor-products/downloads/caas/downloads/content/inventor-2016-guided-tutorials.html			
5.	2015	Autodesk 3ds Max 2016 For Beginners: A Tutorial Approach	http://www.ebook777.com/autodesk-3ds-max-2016-beginners-tutorial-approach/			
Additional literature						
No.	Year of publishing	Author(s) and title of the publication	Publishing house and/or internet link			
1.	2016	3DS Max Tutorials	http://www.tutorialspoint.com/listtutorials/3ds-max/1			
2.	2016	3DS Max	http://www.autodesk.com/products/3ds-max/features/all			
3.	2013	Randy H. Shih. Learning Autodesk Inventor 2013. Modeling, Assembly and Analysis	http://www.scribd.com/doc/212816612/Autodesk-Inventor-Professional-Tutorial-PDF			
4.	2010	Autodesk 3DS Max	http://download.autodesk.com/us/support/files/3dsmax_2010_modeling.pdf			

* ŠAVB – Šiauliai Region Povilas Višinskis Public Library, ŠU – library of Šiauliai University

Required material resources and their short description

- **Equipment (devices):** computers (16 units), computers connected to the local network and connected to the Internet, multimedia projector, reader, printer, 3D printer.
- **Software:** Windows 10 or later, 3ds Max, V-Ray for 3ds Max, Autodesk Inventor, Autodesk 123D Design

The description prepared by:

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