Subject code: G.4(2)	**Subject name:** Computer Graphics		
Study load: 5 ECTS	**Load of contact hours:** 67	**Study semester:** Autumn	**Assessment:** 5-points grade credit
Objectives:	Mastering algorithms and methods for constructing two-dimensional and three-dimensional computer graphics and graphics processing technology. Knowledge of the basic algorithms for processing graphic information.		
Course outline:	Topics covered: 1. Two-dimensional transformations 2. Transformations of three-dimensional graphics 3. Projections 4. Image of three-dimensional objects 5. Algorithms for removing invisible lines and surfaces 6. Filling methods 7. OpenGL library 8. Computer graphics hardware Contact lessons will be divided into two parts: lectures and laboratory with individual and team tasks.		
Learning Outcomes:	By the end of the course students (in the terms of knowledge, skills, and attitudes) should be able to: 1 – critically evaluate the theoretical and technical foundations of computer graphics; 2 – programmatically implement the basic algorithms for raster and vector graphics; 3 – use modern hardware for computer graphics; 4 – implement the basic algorithms for raster and vector graphics; 5 – create and modify graphic objects in the most common formats for specific tasks.		
Assessment Methods:	Assessment is split into two parts: individual tasks, and some questions on the material covered.		
Teacher(s):	Vakhtin Alexsey		
Prerequisite subject(s):	None		
Compulsory Literature:	1. Evgeny Shikin, Alexey Boreskov Computer Graphics: From Pixels to Programmable Graphics Hardware (Chapman & Hall/CRC Computer Graphics, Geometric Modeling, and Animation Series) – 2013. 2. Madsen R., Madsen S. - OpenGL Game Development By Example – 2016. 3. John Clevenger, V. Scott Gordon - Computer Graphics Programming in OpenGL with Java – 2017.		
Replacement Literature:	1. Kessenich J., Sellers G., Shreiner D. - OpenGL Programming Guide. The Official Guide to Learning OpenGL – 2017.		

<table>
<tr><td></td><td>2. Graham Sellers, Richard S. Wright Jr., Nicholas Haemel - OpenGL SuperBible Comprehensive Tutorial and Reference, 7th Edition – 2015.</td></tr>
<tr><td>Participation requirements:</td><td>Lower limit of lectures attendance is 80%, each test and individual tasks must be presented by end of the course.</td></tr>
<tr><td>Independent work:</td><td>1. Creation of a vector logo in a vector editor.
2. Processing raster images in a raster editor.
3. Tasks with fractal graphics.
4. Tasks with raster algorithms.
5. Transformations on the plane and animation.
6. Three-dimensional transformations and obtaining projections.
7. Construction of three-dimensional scenes.
8. Working with the OpenGL library.</td></tr>
<tr><td>Grading criteria scale or the minimal level necessary for passing the subject:</td><td><table><tr><td>Failed</td><td>< 50 points</td></tr><tr><td>Passed, grade 3</td><td>50-69 points</td></tr><tr><td>Passed, grade 4</td><td>70-89 points</td></tr><tr><td>Passed, grade 5</td><td>90-100 points</td></tr></table>
Points distribution:

Ongoing assessment:
Tests: 25 points
Individual Tasks: 10 points
Homework reports: 10 points
Presentations (3 per student): 15 points

Final Group Project
GameCraft Analyses: 10 points
Balancing Report: 5 points
Playtest Report: 10 points
Pitch session: 5 points
Final Presentation: 10 points</td></tr>
<tr><td>Information about the course:</td><td>Room ___, on ___ at ___</td></tr>
<tr><td>1) Date 1</td><td>Lecture 1
Two-dimensional transformations.</td></tr>
<tr><td>2) Date 2</td><td>Laboratory 1
Creation of a vector logo in a vector editor.</td></tr>
<tr><td>3) Date 3</td><td>Laboratory 2
Creation of a vector logo in a vector editor.</td></tr>
<tr><td>4) Date 4</td><td>Lecture 2
Transformations of three-dimensional graphics.</td></tr>
<tr><td>5) Date 5</td><td>Laboratory 3
Processing raster images in a raster editor.</td></tr>
<tr><td>6) Date 6</td><td>Laboratory 4
Processing raster images in a raster editor.</td></tr>
</table>

7) Date 7	**Lecture 3** Projections.
8) Date 8	**Laboratory 5** Tasks with fractal graphics.
9) Date 9	**Laboratory 6** Tasks with fractal graphics.
10) Date 10	**Lecture 4** Image of three-dimensional objects.
11) Date 11	**Laboratory 7** Tasks with raster algorithms.
12) Date 12	**Laboratory 8** Tasks with raster algorithms.
13) Date 13	**Lecture 5** Algorithms for removing invisible lines and surfaces.
14) Date 14	**Laboratory 9** Transformations on the plane and animation.
15) Date 15	**Laboratory 10** Transformations on the plane and animation.
16) Date 16	**Lecture 6** Filling methods.
17) Date 17	**Laboratory 11** Three-dimensional transformations and obtaining projections.
18) Date 18	**Laboratory 12** Three-dimensional transformations and obtaining projections.
19) Date 19	**Lecture 7** OpenGL library.
20) Date 20	**Laboratory 13** Construction of three-dimensional scenes.
21) Date 21	**Laboratory 14** Construction of three-dimensional scenes.
22) Date 22	**Lecture 8** Computer graphics hardware.
23) Date 23	**Laboratory 15** Working with the OpenGL library.
24) Date 24	**Laboratory 16** Working with the OpenGL library.
25) Date 25	**Laboratory 17** Working with the OpenGL library.