Subject code	Credits
INF3020	3

Title

KOMPIUTERINĖ GRAFIKA

Title in English

COMPUTER GRAPHICS

Subject goal and annotation

This course introduces students to computer applications for the visualization of information. Algorithms, data structures, graphics primitives, two- and three-dimensional computer graphics techniques, visual realism algorithms, curves and surfaces are discussed. The student will learn fundamental algorithms and techniques and gain the knowledge necessary to understand and augment the latest innovations in computer graphics. OpenGL graphics library is used through laboratory exercises to provide the students opportunity to gain practical experience programming graphical applications.

Prerequisites

Undergraduate courses:Programming Fundamentals, basics of C# programming language.

Relationship between the learning outcomes of the Programme and learning outcomes of the subject

Learning outcomes of the Programme	Learning outcomes of the subject	Criteria for measuring the achievement of learning outcomes
4. Knowledge of basic and advanced multimedia theories and applications, ability to apply it. 9. Perform interdisciplinary research and development/creation in multimedia area, apply results in practical applications. 11. Analysis, design and development of advanced Multimedia systems. 13. Ability to analyse the newest trends in Internet and multimedia systems (and general computer science and digital arts) and apply them in development of novel systems. 17. Personal development skills - planning of studies based on the personal needs and tendencies in industry.	Understand computer graphics hardware, algorithms, and applications.	Student demonstrates the ability to understand 2D and 3D transformations, graphical data structures, data representation.
	Choose and apply programme tool and interpret results.	Student demonstrates skills to understand and be capable to apply shading and lighting algorithms.
	Ability to use programming languages to solve practical problems.	Be able to program 2D and 3D graphics using OpenGL graphical library.
	Working in team. Presenting results.	Students create graphic objects and present them to their colleagues and lecturer.
	Ability to select a formal computer graphics technique and tools.	Oral student presentation including critical examination and assessment of technical and business limitations of either fictional or real systems

Subject content

	Lecture topics and contents	Hours
1.	**Hardware and software in computer graphics**.	3
2.	Topics include computer graphics hardware components, graphical data input and output devices, display technologies, software for programming graphical applications, programming OpenGL.	6
3.	**2D graphics**. Topics include 2D primitives, transformations, 2D viewing operations, programming 2D graphics using OpenGL	6
4.	**3D graphics**. Topics include 3D primitives, transformations, programming 3D graphics using OpenGL. **Projections**. Topics include orthographic and perspective projections, their implementation in	3

	OpenGL programs.	
5.	**Viewing operations in 3D**. Topics include viewing transformations, object clipping, viewing volumes, and programming viewing operations in OpenGL. **Composite transformations**. 2D, 3D composite transformations and their implementation in OpenGL. **Shading and Lighting**. Topics include Gouraud and Phong shading algorithms, lighting models and their implementation in graphical applications using OpenGL library.	9
6.	**Curves and Surfaces**. These topics are about various types of curves and surfaces including Bezier and B-Spline, their mathematical description and construction using OpenGL library. **Colors**. Topics include color models, gamma correction problems.	3
7.	**Formal methods development tendencies.**	
	Total	**30**

Practical work contents

Three groups of practical problems. All problems should be presented and described.
1. Algorithms and models implementation in graphical applications using OpenGL library.
2. Mathematical description and construction using OpenGL library..

Evaluation of study results

Final written exam (50%), mid-term written exam (17%), and assessments of laboratory (practical) work (33%).

Distribution of subject study hours

Lectures	30
Laboratory work	15
Individual studies (including studies in groups, preparation for the mid-term and final exams)	45
Total	**90**

Recommended literature

No	Authors of publication and title	Number of copies available		
		in the Library of VMU	*in specialized publication collections at VMU*	*in other libraries*
Basic materials				
1.	1. Computer graphics and geometric modelling for engineers. John Wiley and Sons, 1993.		1	1
2.	2. Computer Graphics, a programming approach. McGraw-Hill, 1987 Windows graphics programming with Borland C++, John Wiley and Sons, 1992, p.652.		1	
3.	3. Computer Graphics, Hearn D., Baker P.M., Prentice Hall, 1997.		1	1
	4. Computer Geometry and Computer Graphics in C++, Laszlo M.J, Prentice Hall, 1996, p.266			
Supplementary materials				
1.	1 Liutkeviļius R. Kompiuterinã grafika. VDU, 2003, 201p. (digital version on the course web page)	10		

Subject prepared and coordinated by

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