COURSE DESCRIPTION

1. Information about the Study Program

1.1 Higher Learning Institution	**“Alexandru Ioan Cuza” University of Iaşi**
1.2 Faculty	**Faculty of Computer Science**
1.3 Department	**Computer Science**
1.4 Field of Study	**Computer Science**
1.5 Type of Degree	**Bachelor**
1.6 Study Program / Qualification	**Computer Science / Computer Scientist**

2. Course Information

2.1 Course Name			**COMPUTER GRAPHICS**				
2.2 Course Coordinator			**LECTURER CONSTANTIN-LUCIAN GHIRVU, PHD**				
2.3 Seminary Teacher			**LECTURER CONSTANTIN-LUCIAN GHIRVU, PHD** **ASSISTANT LECTURER NICOLAE-EUGEN CROITORU, PHD**				
2.4 Study Year	**3**	**2.5** Semester	**2**	**2.6** Evaluation	**EVP**	**2.7** Course Status*	**OB**

** OB – Compulsory / OP – Optional*

3. Total estimated hours (hours per semester and didactic activities)

3.1 Hours per week	**4**	in which: **3.2** course	**2**	**3.3** seminary/laboratory	**2**
3.4 Hours in curriculum	56	in which: **3.5** course	28	**3.6** seminary/laboratory	28

Time Distribution	hours
Manual study, Course support, Bibliography, and others	**8**
Supplementary Documentation in library, in electronic forums, and on the field	**8**
Seminaries/laboratories preparation, homeworks, reports, portfolios and essays	**16**
Tutoring	**-**
Evaluation	**4**
Other activities (consultations per student)	**-**

3.7 Total hours individual study	**32**
3.8 Total hours per semester	**92**
3.9 Credits	**4**

4. Preconditions (if necessary)

4.1 Of Curriculum	**CS1101 Data Structures** **CS1211 Algorithms Design** **CS1207 Object Oriented Programming**
4.2 Of Skills	**Specific skills acquired in 4.1**

5. Conditions (if necessary)

5.1 For Course Operation	**Projector, blackboard, laptop (Microsoft Office PowerPoint, Acrobat Reader).**
5.2 For Seminary/Laboratory Operation	**OpenGL library, Microsoft Visual Studio 2010 or Bloodshed Dev-C++.**

6. Specific Skills Acquired

Professional Skills	**C1. The description of concepts, theories, and models used in computer graphics.** **C2. The explanation of computer graphics applications programmed using OpenGL library.** **C3. The IDE's use in programming a computer graphics application.** **C4. The use of mathematical and computer science models and tools for solving some specific computer graphics problems.** **C5. The analysis of models used in computer graphics.**
Transversal Skills	**CT1. The efficient conduct of activities organized in an inter-disciplinary group.** **CT2. The development of empathic capacities of inter-personal communication.** **CT3. The development of relationship and collaboration with diverse groups.**

7. Course Objectives (from the grid of specific skills acquired)

7.1 General Objectives	1. Introduction to computer graphics. 2. Acquiring the ability of designing simple models (i.e., a collection of statically or dynamically objects having simple geometric shapes). 3. Acquiring the techniques of rendering models (by using raster graphics). 4. Acquiring the ability of designing graphics software using a standard graphics API.
7.2 Specific Objectives	On successful completion of this course, students will be able to: ▪ Describe the concepts of vector/raster display, the general structure of a computer graphics application, algorithms for drawing 2D primitives on raster displays ▪ Use color models, geometric transformations, and planar geometric projections ▪ Explain how the 3D visualization is achieved, various techniques for representing curves and surfaces, solid modeling techniques ▪ Analyze the structure of a computer graphics applications (in order to change it)

8. General Description

8.1	**Course**	**Teaching Methods**	**Observations** (hours and bibliographic references)
1.	Course Organisation Introduction to Computer Graphics	Exposition (lectures with examples and applications, explanation). Lectures are given using MS Office Powerpoint and blackboard presentations.	Ghirvu.
2.	Raster Graphics, Clipping, Anti-aliasing		Ghirvu. Foley. Hearn. Moldoveanu.
3.			
4.	2D/3D Geometric Transformations and their Representation by Matrices		Ghirvu. Foley. Hearn. Moldoveanu.
5.			

6. 7.	3D Viewing Transformations		Slides. Foley (chap 6). Hearn (chap 12). Moldoveanu (chap 3).
8.	Students evaluation.		
9. 10.	Parametric Polynomial Curves and Surfaces	Exposition (lectures with examples and applications, explanation). Lectures are given using MS Office Powerpoint and blackboard presentations.	Slides. Foley. Hearn. Moldoveanu.
11. 12.	Solid Modelling: Spatial Subdivision Techniques		Slides. Foley. Hearn. Moldoveanu.
13.	Use of Color in Computer Graphics		Ghirvu. Foley. Hearn. Ionescu.
14.	Optional Topics (these topics will be addressed if the remaining time will allow it; please note that although the above topics will be surely addressed, the above timetable is indicative): Hidden Surface Removal, Reflection and Shading Models.		Slides. Foley. Hearn. Ionescu.
15.	An optional written test (during the last course or at a date displayed on the course page).		

Bibliography

Main references:

1. F.Ionescu, Grafica în realitatea virtuală, Ed.Tehnică 2000.
2. C.-D.Neagu, S.Bumbaru, Sisteme multimedia - Grafică pe calculator, Ed. Matrix Rom, 2001.
3. D.Hearn, M.P.Baker, Computer Graphics, C Version (2nd Edition), Prentice Hall 1996.
4. L.Raicu, Grafic şi vizual între clasic şi modern, Ed. Paideia, 2000.
5. F.Moldoveanu, Grafică pe calculator, Ed. Teora, 1996.
6. J.D. Foley, A.v. Dam, S. Feiner, J. Hughes, Computer Graphics: Principles & Practice in C (2nd edition), Addison-Wesley 1995.
7. L.Ghirvu, Grafică pe calculator, note de curs, Editura UAIC 2006. Versiune adăugită şi revizuită.

Supplementary references:

8.2	**Seminary / Laboratory**	**Teaching methods**	**Observations** (hours and bibliographic references)
1.	Homework 1: OpenGL library (and GLUT toolkit). Introduction.	Problematizing, exercise method, use of technical specifications. During the laboratory classes the students will receive a set of solved problems (usually	The same as for course. OpenGL and GLUT specifications (see below).
2.	Homework 1 evaluation.		

3.	Homework 2: Using OpenGL for 2D curves drawing.	programming assignments) and they are asked to solve a set of similar problems or to implement (using OpenGL and the IDEs Microsoft Visual Studio 2010 or Bloodshed Dev-C++) some algorithms schematically presented during the lectures.	The same as for course. OpenGL and GLUT specifications (see below).
4.	Homework 2 evaluation.		
5.	Homework 3: 2D raster graphics part 1.		The same as for course. OpenGL and GLUT specifications (see below).
6.	Homework 3 evaluation.		
7.	Homework 4: 2D raster graphics part 2.		The same as for course. OpenGL and GLUT specifications (see below).
8.	Homework 4 evaluation.		
9.	Homework 5: Fractals.		Vlada. OpenGL and GLUT specifications (see below).
10.	Homework 5 evaluation.		
11.	Homework 6: Geometric transformations in OpenGL.		The same as for course. OpenGL and GLUT specifications (see below).
12.	Homework 6 evaluation.		
13.	Homework 7: 3D viewing transformations in OpenGL.		The same as for course. OpenGL and GLUT specifications (see below).
14.	Homework 7 evaluation.		
15.	Homework 8 (optional): basic accelerated rendering in OpenGL.		nehe.gamedev.net, songho.ca, gafferongames.com, stackoverflow.com
16.	Homework 8 evaluation.		

Note: Lab topics are addressed after the relevant theoretical concepts were presented in the course. The homeworks order is the same as above but please note that the timetable is indicative (usually, homework evaluation being realized in parallel with current homework explanations). However, a precise timetable with their deadlines will be posted on the course page and permanently updated during the semester.

Bibliography

1. M.Vlada, I.Nistor, A.Posea, C.Constantinescu, Grafică pe calculator în limbajele Pascal şi C, Ed. Tehnica 1991.
2. OpenGL Library v.1.5 (http://www.opengl.org).
3. The GLUT Toolkit v.3 (http://www.opengl.org/documentation/specs/glut/spec3/spec3.html).

9. Course content synchronization with the expectations of the community representatives, professional associations and employers from the program domain

The content of this Computer Graphics course generally corresponds to the content of several courses ("Introduction to Computer Graphics") taught at (important) universities from the U.S. (Stanford http://graphics.stanford.edu, Duke http://www.cs.duke.edu/courses/cps124/spring08, Ohio State University http://www.cse.ohio-state.edu/~hwshen/681/Site/Main.html). This fact give students, on the one hand, the opportunity to take courses at other universities (U.S. or E.U.) which have as prerequisites completion of a course such as "Introduction to Computer Graphics" and, on the other hand, a necessary background for integration into a globalized labor market.

10. Evaluation

Activity Type	**10.1 Evaluation criteria**	**10.2 Evaluation methods**	**10.3 The weight of each evaluation form (%)**
10.4 Course	Formative and summative assessment using an optional written test (at the end of the semester – during the last course or at a date displayed on the course page). Each problem from the written test will be graded with a certain score and the written test score will be the arithmetic mean of the problems scores.	Optional Written Test.	The score of the written test will be converted into a coefficient C ($C \in \{0\} \cup [1,2]$). C is zero if the student did not pass the lab. C is one if the student did pass the lab but he/she was absent at the optional written test or the score of the written test is zero.
10.5 Seminary/ Laboratory	Formative and summative assessment (possibly by practical tests) of each solved homework. Each homework is made up of a number of problems. The homework score is the arithmetic mean of the problems scores and the laboratory score P is the arithmetic mean of the homeworks scores.	Homeworks. Laboratory attendance. Bonuses for special problem solutions.	The final score $C \times P$ is computed. Subsequently, the final grade will be granted using a Gauss type classification of the final scores $C \times P$.
10.6 Minimal performance standards			
In order to pass this course the student must pass the lab, that is he/she must obtain at least 40% (or other percentage communicated at the first course meeting and posted on the course page) of the maximum score that can be achieved at the lab homeworks, without taking into account any bonuses.			

Date
17/03/2018

Course Teacher
Lect.dr. Lucian GHIRVU

Seminary/Laboratory Teacher
Lect.dr. Lucian GHIRVU
Asist.dr. Nicolae-Eugen CROITORU

Department Date of Approval

Director of the Department
Prof.univ.dr. Dorel LUCANU