| | | | | | | |
|---|---|---|---|---|---|---|
| **INSTITUTION** | NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS | | | | | |
| **SCHOOL** | SCHOOL OF SCIENCE | | | | | |
| **DEPARTMENT** | INFORMATICS AND TELECOMMUNICATIONS | | | | | |
| **COURSE LEVEL** | UNDERGRADUATE | | | | | |
| **COURSE TITLE** | **Computer Graphics I** | | | | | |
| **COURSE CODE** | **ΘΠ02** | | **Semester** | 5 | **ECTS** | 6 |
| **TEACHING HOURS per week** | **THEORY** | 3 | **SEMINAR.** | | **LABORATORY** | 1 |
| **COURSE TYPE** | **Select one of the following and delete the rest**<br>Electives (ΠΜ)<br><br>**K**: A B; **E1**: B; **E2**: ; **E3**: ; **E4**: E; **E5**: ; **E6**: B<br>*Fill the table as in the curriculum:* Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E) | | | | | |
| **URL** | https://eclass.uoa.gr/courses/D35/ | | | | | |
| **EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:** | Prerequisites: K08 Data Structures | | | | | |
| **TEACHING AND EXAMINATIONS LANGUAGE:** | GREEK | | | | | |
| **THE COURSE IS OFFERED TO ERASMUS STUDENTS** | NO | | | | | |

| **COURSE CONTENT** |
|---|
| Introduction: history, technology, applications of Computer Graphics. Mathematical curves and finite differences, rasterization algorithms for line segments, general polygons and triangles. Antialiasing with pre- and post-filtering. Affine transformations, 2D and 3D transformations, homogeneous coordinates, composite transformations. Examples of transformations. Viewing transformation. Scene graphs. 2D and 3D line and polygon clipping algorithms. Projections. Back face culling. Hidden surface elimination and the z-buffer algorithm. Basic illumination principles and algorithms. Colour representation models. OpenGL programming laboratories. A selection from the following: parametric curves and surfaces, texture mapping principles, animation principles. |

| STUDENT LEARNING OBJECTIVES |
|---|
| Expected Learning Outcomes<br>Upon successful completion of the course the student will be able to:<br>• Explain the main stages of the Graphics pipeline<br>• Mention and describe the main algorithms used in Computer Graphics<br>• Program graphics applications using OpenGL |

| TEACHING AND LEARNING METHODS - ASSESSMENT | |
|---|---|
| **TEACHING METHOD** | In Class (Face to Face) |
| **USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES** | Learning process supported by the e-class platform. Specifically: Course Description, Course Material Delivery (transparencies, OpenGL labs, in-class exercises etc), Announcements, Course Calendar, Exercise Announcement and Delivery, Discussion groups for labs and exercises, External Links.<br>Email communication<br>Live transmission of lectures<br>Ability to track recorded lectures<br>OpenGL laboratory sessions |
| **TEACHING ORGANIZATION**<br>*Describe in detail the way and methods of teaching:*<br>*Enhanced Lectures,*<br>*Online Lectures,*<br>*Seminars,*<br>*Tutorial,*<br>*Laboratory,*<br>*Laboratory Exercise,*<br>*Study & analysis of literature,*<br>*Practice (Positioning),*<br>*Interactive teaching,*<br>*Developing a project,*<br>*Individual / group work*<br>*Telework (reference to tools) etc.*<br><br>*Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS* | The theory part is presented using transparencies, the blackboard for involved issues and in-class exercises. The OpenGL programming platform is learned via a series of laboratory sessions. An OpenGL exercises is given to groups of 1 to 2 students. The exercise and labs are supported via eclass discussion groups. |

| **Activity** | ***Student Workload*** *(hours)* |
|---|---|
| Lectures | 39 |
| Regular Self-Study for theory part | 31 |
| OpenGL Laboratory Sessions (physical presence) | 10 |
| OpenGL Self-Study | 20 |
| OpenGL Exercise (groups of 1-2) | 30 |
| Self-Study for Final exam | 20 |
| ***Total Course*** | ***150*** |

| | |
|---|---|
| **ASSESSMENT OF STUDENTS**<br>*Description of the assessment process*<br><br>*Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other*<br><br>*Fully defined evaluation criteria are mentioned and if and where they are accessible to students.* | The students are assessed based on a written examination and the OpenGL exercise. The written examination covers the theory part while the exercise covers the programming part. The exercise is assessed based on a set of criteria that are announced at the outset. There exists a complaints and remarking process. |

| **Assessment methods** | ***Number*** | ***Percentage*** |
|---|---|---|
| Written examination | 1 | 66.66% |
| Final exercise | 1 | 33.33% |

**LITERATURE AND STUDY MATERIALS / READING LIST**

Basic textbook: Theoharis T., Papaioannou G., Platis N. Patriakalakis N.M., "Graphics & Visualization: principles and algorithms", English edition by CRC Press (2008). Greek edition by Symmetria (2010). Book website: http://graphics.cs.aueb.gr/cgvizbook/

Auxiliary textbook: Theoharis T., Boehm A., "Graphics: principles and algorithms", (in Greek), Symmetria 1999.

Notes and transparencies for OpenGL are distributed via the eclass platform.