



Universitat de Lleida

DEGREE CURRICULUM  
**COMPUTER GRAPHICS AND  
MULTIMEDIA**

Academic year 2013-14

## Subject's general information

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|---|---|
| <b>Subject name</b>                             | Computer Graphics and Multimedia                        |
| <b>Code</b>                                     | 103060  |
| <b>Semester</b>                                 | 2n Semester   |
| <b>Typology</b>                                 | Mandatory   |
| <b>ECTS credits</b>                             | 6   |
| <b>Theoretical credits</b>                      | 4.5   |
| <b>Practical credits</b>                        | 1.5   |
| <b>Department</b>                               | Matemàtica  |
| <b>Important information on data processing</b> | Consult <a href="#">this link</a> for more information. |
| <b>Language</b>                                 | Catalan: 70%<br>English: 30%                            |
| <b>Office and hour of attention</b>             | Arrange a meeting via e-mail.                           |

Francesc Sebé Feixas

## Subject's extra information

Activities are carried out employing the OpenGL library in C and C++ languages, so that, it is advisory for the student to be proficient in the use of such languages.

This subject is in the computer technology modulus. The use of graphical and multimedia elements can be found in most contemporary computer applications such as web navigation, scientific data visualization, videogames and virtual reality, among many others. In this subject, we study the technology and algorithms behind applications that make use of graphics in two and three dimensions together with the main formats for multimedia data compression and storage: image, sound and video.

## Learning objectives

See competences

## Competences

### University of Lleida strategic competences

- Master Information and Communication Technologies.

#### Goals

- Implementation of graphical applications in C and C++ languages.

- Master a foreign language.

#### Goals

- Reading and understanding academic material written in English.

### Degree-specific competences

- Capacity to use and develop Graphics computation methodologies, methods, techniques, specific use programs, regulations and standards

#### Goals

- Implementation of graphical applications using the OpenGL standard.

- Capacity to create and exploit virtual environments and to create, manage and distribute multimedia contents

#### Goals

- Addition of multimedia content in web applications.
- Design of virtual environments in two and three dimensions.

- Capacity to comprehend and apply high performance knowledge and numeric or computational methods to engineering problems

#### Goals

- Knowledge on the algorithms employed for 2D and 3D graphics processing.
- Knowledge on the main algorithms for multimedia data compression.

### Degree-transversal competences

- Capacity to plan and organize one's own personal work

#### Goals

- Activities and projects scheduling for being handed in time.

- Capacity to draft, design and implement projects and/or give novel solutions, using engineering-related tools

#### Goals

- Choosing the best technology for the development of computer graphics and multimedia projects.

## Subject contents

### 1. Computer graphics on the plane (2D)

- Coordinate systems
- Straight line, circle and curve drawing
- 2D polygons
- Point, line and polygon clipping
- Geometric transformations on the plane

### 2. Computer graphics in the space (3D)

- Parallel and perspective projection
- 3D Polygons
- Geometric transformations in the space
- Texture mapping
- Lighting and shadowing effects

### 3. Multimedia data storage

- Data compression
- Image storage
- Sound storage
- Video storage

## Methodology

Lectures will take place in a classroom making use of a beamer.

The students will be required to implement graphical applications in C using the OpenGL libraries. These activities will be carried out at home.

## Evaluation

This subject will be evaluated by means of two exams in site (50%):

- First exam (20%)
- Second exam (30%)

And the marks obtained from five programming activities (50%):

- Activity 1: Elemental drawing on the plane (5%)
- Activity 2: Polygons on the plane (10%)

- Activity 3: Polygons in the space (10%)
- Activity 4: Use of textures (10%)
- Activity 5: Use of lighting (15%)

There exists the possibility to take a final exam which replaces the mark obtained from the two exams in site.

## Bibliography

- D.Hearn,M.P.Baker, *Computer graphics with OpenGL*, Pearson Prentice Hall (2004).
- A.Watt, *3D computer graphics (3rd Ed.)*, Pearson Addison Wesley (2000).
- P.Shirley,S.Marschner, *Fundamentals of computer graphics (3rd Ed.)*, A.K.Peters (2009).
- Z.N.Li, M.S.Drew, *Fundamentals of multimedia*, Prentice-Hall (2004).