SUBJECT TEACHING GUIDE

G685 - Computer Graphics and Virtual Reality

Degree in Computer Systems Engineering

Academic year 2026 - 2027

1. IDENTIFYING DATA					
Degree	Degree in Computer Systems Engineering			Type and Year	Optional. Year 4
Faculty	Faculty of Sciences				
Discipline	Subject Area: Computing Mention in Computing				
Course unit title and code	G685 - Computer Graphics and Virtual Reality				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web	https://moodle.unican.es/course/view.php?id=12153				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICA APLICADA Y CIENCIAS DE LA COMPUTACION
Name of lecturer	ANDRES IGLESIAS PRIETO
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Other lecturers	

3.1 LEARNING OUTCOMES
Acquisition of knowledge and skills necessary for the student to deepen computer graphics autonomously.
Understanding the basics of the main methods of computer graphics, and possible ways of implementation and their effects on the virtual scenes.
Knowledge about how do the main graphics packages actually work, their advantages and limitations, as well as their possible applications in the professional arena.
Knowledge of what is the purpose of computer graphics and what are the pillars on which this discipline is settled.
Knowledge of different techniques to achieve realism in three-dimensional images.

4. OBJECTIVES
Learning and understanding the basic concepts and techniques in computer graphics.

Knowing the major graphical formats and industry standards of computer graphics, their scope and main advantages and disadvantages.
Understanding the basics of computer graphics, the graphics pipeline and use of the software and hardware applied to this field.
Knowing the history of computer graphics since its inception, as well as the historical evolution of the different methods in this field depending on the software and hardware available at any time.
Understand the use of the Graphical User Interfaces present today in many programs and operating systems from the viewpoint of computer graphics.
Gain enough knowledge to design algorithms for the most common geometric entities in computer graphics and make their implementation in a programming language.

6. COURSE ORGANIZATION

CONTENTS	
1	Part I. INTRODUCTION TO COMPUTER GRAPHICS. Introduction to the subject. Basic bibliography. Applications of computer graphics. Relevant examples and scope. History of Computer Graphics. Information sources: magazines, books, CDs, websites. Hardware and Software for Computer Graphics. Free and commercial software. Structure of the course. Basic Algorithms for Computer Graphics. Computer Lab Module 1: Line Algorithms. (I) Slope Intercept (basic and advanced); (II) DDA; (III) Bresenham's Algorithm.
2	Part II. 2D GRAPHICS. Basic algorithms for 2D graphics. 2D transformations. Transformation matrices. Computer Lab Module 2: 2D Transformations. (IV) 2D basic transformations; (V) application to 2D computer animation. Fractals. IFS. Computer Lab Module 3: Fractals. (VI) recursive fractals; (VII) Julia fractal sets; (VIII) Mandelbrot fractal sets; (IX) IFS; (X) application of the iterated function systems. L-systems. Simulation of natural phenomena. Computer Lab 4: L-systems. (XI) L-systems generation; (XII) applications of L-systems.
3	Part III. 3D GRAPHICS AND VIRTUAL REALITY. 3D transformations. Projections and perspectives. Representation systems. Polygon models: wire-frame, faces and vertices, etc. Virtual and augmented reality.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessment	%
There is no exam in this subject. Assessment is based on computer lab training. DIfferent activities are proposed during the semester. Once finished, they are individually shown to the instructor for assessment. Grades are aggregated for each activity.	Others	No	Yes	100,00
TOTAL				100,00

Observations
The evaluation will comply with the regulations of the University of Cantabria on copyright and plagiarism situations. All material used that is not of own elaboration must be properly identified and cited, with clear mention of the original source of the material.
Observations for part-time students
Part-time students unable to attend the classroom activities can ask for alternative assignments for assessment of such activities.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

David F. Rogers, J. Alan Adams: "Mathematical Elements for Computer Graphics". MacGrawHill (1995).

A. Rockwood, P. Chambers: "Interactive Curves and Surfaces. A Multimedia Tutorial on CAGD". Morgan Kaufmann, San Francisco (1996).

R.S. Ferguson: "Practical Algorithms for 3D Computer Graphics". AK Peters, Massachussetts (2001).

James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes: "Computer Graphics: Principles and Practice" (2nd ed). Addison-Wesley, Reading, Mass (1992).

David F. Rogers: "Procedural Elements for Computer Graphics". MacGrawHill (1998).