BASIC DETAILS:

Subject:	MODELADO GEOMETRICO		
Id.:	30083		
Programme:	GRADUADO EN INGENIERÍA INFORMÁTICA. PLAN 2008 (BOE 15/12/2008)		
Module:	INFORMATICA GRAFICA		
Subject type:	OPTATIVA		
Year:	4	**Teaching period:**	Primer Cuatrimestre
Credits:	3	**Total hours:**	75
Classroom activities:	34	**Individual study:**	41
Main teaching language:	Inglés	**Secondary teaching language:**	Castellano
Lecturer:	JIMENEZ CHAPESTRO, EDUARDO (T)	**Email:**	ejimenezch@usj.es

PRESENTATION:

Computer Graphics is the art and science of communicating information using images that are created through computation. This subject explores how pictures, in the broadest sense of the word, can be captured or generated, modeled and processed with a computer. It aims to provide the student with an understanding of how to describe mathematically and algorithmically the modelling techniques that allow us to represents different geometric models using a computer, both from a bidimensional (digital images) and tridimensional (3D scenes) point of view.

PROFESSIONAL COMPETENCES ACQUIRED IN THE SUBJECT:

General programme competences	G02	Innovative capacity to propose and find new and efficient ways to undertake any task and/ or function within the professional environment - highly motivated by quality.
	G04	Capacity to always commit to working responsibly - creating a strong sense of duty and fulfilment of obligations.
	G06	Capacity to analyse and find a solution to complex problems or unforeseen situations which may arise while working in any type of socio-economic organisation.
	G13	Capacity to use individual learning strategies aimed at continuous improvement in professional life and to begin further studies independently.
	G15	Capacity to structure reality by means of linking objects, situations and concepts through logical mathematical reasoning.
Specific programme competences	E02	Capacity to apply the intrinsic engineering principles based on mathematics and a combination of scientific disciplines.
	E03	Capacity to recognise the technical principles and apply the appropriate practical methods satisfactorily to analyse and solve engineering problems.
	E04	Capacity to maintain an open mind to innovation and creativity within the framework of the engineering profession.
	E07	Capacity to work effectively in project teams, where appropriate assuming executive responsibilities, and consider the human, technological and financial sides.
	E09	Capacity to maintain professional competences through independent learning and continuous improvement.
	E11	Capacity to remain up-to-date in the technological and business worlds in the area of information and communication technologies.
	E13	Capacity to identify, assess and use current and emerging technologies, considering how they apply in terms of individual or organisational needs.
	E16	Capacity to understand an application demesne so as to be able to develop suitable IT applications.
	E21	Capacity to perform tests that verify the validity of the project (functional, data integrity, performance of the computer applications, equipment, communications, etc.).
	E22	Capacity to undertake implementation tasks which require a high degree of technical awareness in different spheres (programming, configuration of hardware and communications equipment, etc.).
	E27	Capacity to write and maintain descriptive documentation of the origin, production and operability of IT systems.
Learning outcomes	R1	Be able to handle the terminology related to 2D and 3D Computer Graphics modeling.
	R2	To know, understand and be able to program the basic techniques used in digital image processing.

	R3	Be able to use different 3D modeling software and discuss its potentialities and drawbacks.
	R4	To know the different application fields of Computer Graphics modeling.

PRE-REQUISITES:

Everyone taking this subject should have taken courses in, or reasonable exposure to, basic calculus, linear algebra, algorithms and programming. Experience programming in C# is a plus, although experience with C++ or Java should be enough but it's up to the student to get up to speed with C# on their own.

SUBJECT PROGRAMME:

Observations:

Subject planning could be modified due unforeseen circumstances (group performance, availability of resources, changes to academic calendar etc.) and should not, therefore, be considered to be definitive.

Subject contents:

1 - Introduction
2 - Shape Drawing
3 - 2D Modeling
4 - 3D Modeling
5 - Fractals

Subject planning could be modified due unforeseen circumstances (group performance, availability of resources, changes to academic calendar etc.) and should not, therefore, be considered to be definitive.

TEACHING AND LEARNING METHODOLOGIES AND ACTIVITIES:

Teaching and learning methodologies and activities applied:

The teaching methodology is going to be focused on 4 methods:

- **Master classes**: The concepts are usually introduced through a master class where the theory and the mathematical or algorithmical foundations of the underlying workings of the introduced technique or concept are explained.
- **Practical classes**: After the concepts have been presented their implementation is explained using an example in class. A prepared exercise is given to the students and it's solved by the professor during the class providing useful insight into how the technique is actually implemented.
- **Individual work**: Once the concepts have been introduced both theoretically and practically, the student is required to complete some exercises individually to internalize and support the acquired knowledge.
- **Group work**: The students are required to select one of the subjects presented in class do some research on their own and do a presentation to the class with their findings and, where applicable, the results of their work (if some

development is involved)

Student work load:

Teaching mode	Teaching methods	Estimated hours
Classroom activities	Master classes	8
	Other theory activities	3
	Practical work, exercises, problem-solving etc.	5
	Coursework presentations	2
	Laboratory practice	10
	Other practical activities	2
	Assessment activities	2
	Extra-curricular activities (visits, conferences, etc.)	2
Individual study	Tutorials	10
	Individual study	12
	Individual coursework preparation	12
	Project work	4
	Compulsory reading	3
	Total hours:	75

ASSESSMENT SCHEME:

Calculation of final mark:

Individual coursework:	65	%
Group coursework:	35	%
TOTAL	100	%

*Las observaciones específicas sobre el sistema de evaluación serán comunicadas por escrito a los alumnos al inicio de la materia.

BIBLIOGRAPHY AND DOCUMENTATION:

Basic bibliography:

HUGHES, John F., VAN DAM, Andries, MCGUIRE, Morgan, SKLAR, David F., FOLEY, James D., FEINER, Steven K., AKELEY, Kurt. Computer Graphics: Principles and Practice. Addison-Wesley Professional. 2013

GALLIER, Jean. Curves and Surfaces in Geometric Modeling: Theory & Algorithms (The Morgan Kaufmann Series in Computer Graphics). Morgan Kaufmann. 1999

Recommended bibliography:

Recommended websites:

HARTMANN, Erich. Geometry and Algorithms for COMPUTER AIDED DESIGN. Department of Mathematics Darmstadt University of Technology. 2003	https://www2.mathematik.tu-darmstadt.de/~ehartmann/cdgen0104.pdf
Geeks for Geeks	https://www.geeksforgeeks.org/