COURSE DATA

Data Subject	
Code	34845
Name	Animation
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	School of Engineering	3	First term

Subject-matter

Degree	Subject-matter	Character
1407 - Degree in Multimedia Engineering	12 - Animación y Simulación por Computador	Obligatory

Coordination

Name	Department
GARCIA FERNANDEZ, IGNACIO	240 - Computer Science

SUMMARY

Animation is a compulsory subject of the animation and computer simulation track that is taught in the first semester of the third year of the degree in Multimedia Engineering. It focuses on the development of the mathematics and algorithms employed in the production of animations by using 2D and 3D computer graphics.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Having passed the following courses: Physics, Mathematics, Programming, Design of Interactive Projects, Fundamentals of Computer Graphics, and Computer Graphics. It is recommended that you are enrolled in Audiovisual Production and Edition.

OUTCOMES

1405 - Grado en Ingenieria Multimedia

- G1 - Be able to relate and structure information from different sources and to integrate ideas and knowledge. (RD1393/2007)
- G4 - Be able to integrate into working groups and collaborate in multidisciplinary environments and be able to communicate properly with professionals from all fields.
- I10 - e able to design and evaluate human-computer interfaces that ensure accessibility and usability of computer systems, services and applications.
- MM1 - Have knowledge and ability to understand essential facts, concepts, principles and theories related to multimedia systems including all the disciplines covered by these systems.
- MM2 - Be able to understand and manage the different technologies involved in multimedia systems, both from the point of view of hardware and electronics and of software.
- MM3 - Be able to implement methodologies, technologies, processes and tools for the professional development of multimedia products in a real context of use by applying the appropriate solutions for each environment.
- MM7 - Be able to apply the principles of audiovisual graphic design and communication to multimedia products.
- MM8 - Integrate knowledge of different multimedia technologies to create products that offer global solutions that are appropriate to each context.
- MM9 - Program correctly in the different specific languages of multimedia systems taking into account time and cost restrictions.
- MM10 - Be able to analyse and integrate software components to develop multimedia applications.
- MM17 - Know the animation systems most commonly used in multimedia applications, both in local and in remote environments.
- MM19 - Be able to perform animation of virtual characters through various techniques, including motion capture, for its integration into multimedia applications.
- MM21 - Communicate effectively, both in writing and verbally, knowledge, procedures, results and ideas related to ICT and specifically to multimedia, and know their socioeconomic impact.
- MM22 - Have knowledge and ability to understand essential facts, concepts, principles and theories related to multimedia and to the spectrum of reference disciplines.

- MM24 - Be able to design, develop, evaluate and ensure the accessibility, ergonomics, usability and security of multimedia systems, services and applications and of the information that these manage.
- MM28 - Be able to solve problems with initiative, decision-making and creativity and to communicate and transmit the knowledge, abilities and skills of a multimedia engineer.

LEARNING OUTCOMES

This course allows for the following learning outcomes

1. Knowing the time-related concepts in a multimedia system.
2. Provide the basics for defining, designing and implementing graphic animation.
3. Meet the simulation models used in the graphic animation of complex systems.
4. Having the tools to plan, edit, and produce animations with current multimedia systems.
5. Apply the principles and narrative techniques in the development of multimedia systems.
6. Understanding the phases of the animation process and the need for each of its components.
7. Analyze and properly characterize the performance problems associated with the production of animations.
8. Meet the framework of simulation and graphical animation
9. Join a creative team

To complement the above results, this subject also to acquire the following skills and social skills:

1. Teamwork
2. Autonomous work
3. Communication skills

DESCRIPTION OF CONTENTS

1. Introduction

Introduction to animation.
History. Classical techniques.
Production.
Introduction to 3D animation tools.

2. Interpolation based animation

Function interpolation.
Key-frame techniques.
Interpolation based animation techniques.
Position, velocity and acceleration control.

3. Articulated characters animation

Definition of the pose of a huma figure.
Dependent and independent coordinates.
Direct kinematics.
Inverse kinematics.
Motion capture.

4. Curves in space

Differentiable curves in space. Frenets trihedron.
Arclength of a curve.
Reparemtrization of a curve by its arclenght.
Control of the velocity of an object following a path.

5. Quaternions

Rotation representation using quaternions.
Basic operations.
Calculation of a quaternion from a reference system.
Quaternion interpolation.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Attendance at events and external activities	3,00	0
Development of group work	20,00	0
Development of individual work	10,00	0
Study and independent work	15,00	0
Readings supplementary material	7,00	0
Preparation of evaluation activities	5,00	0

Preparing lectures	12,00	0
Preparation of practical classes and problem	12,00	0
Resolution of case studies	5,00	0
Resolution of online questionnaires	1,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The course uses a project based learning methodology.

Teaching will be a combination of theoretical lessons and practice work, aimed to the development of a project. The activities in the classroom will be complemented with personal and group workout.

Practical activities will consist of documentation elaboration and problem solving to complement theoretical lectures. Moreover, the proposed techniques will be implemented by the students to achieve the proposed goals of each stage of the course.

The completion of the proposed activities will lead to the preparation of a final project.

EVALUATION

The course will se a continuous assesment model. Three main parts will be considered:

A) During the develppment of the course, part of the individual or group activities will be assesed. The grade of this part will be a weighted sum of these assesments. This grade cannot be recovered.

B) Several written individual exams will be done, regarding the theoretical contents and the work done in the activities of part A). The grade will be a weighted sum of the grades in these exams.

C) The students ith a grade of 5 or more in part A) will deliver a final project including a written report. This grade cannot be recovered.

The grade of the course in first call will be the weighted sum of the grades of the three parts. In order to pass the course in first call it will be required: a grade of 5 or more in part A); and a grade of 4,5 or more in every exam of part B).

In second call, the students will do an exam regarding the theoretical contents and the work done in the activities of part A). In order to pass the course, the grade of this exam must be 5 or higher. In case the course is passed, the final grade in second call will be a weighted sum of the grade of this exam and the grades of parts A) and C) (if available) obtained during the course.

Plagiarism

If a student incurs in plagiarism in any of the assesment activities or if she fails to follow the related rules, that activity will be assesd as 0. Moreover, the corresponding disciplinary procedure will be carried out whenenever it is consedered appropriate, with the possibility of a global grade of “Fail” as the result.

In any case, the evaluation of this subject will be done in compliance with the University Regulations in this regard, approved by the GoverningCouncil on 30th May 2017 (ACGUV 108/2017)

REFERENCES

Basic

- Rick Parent, Computer Animation Algorithms and Techniques Morgan Kaufmann 2008.
- E. Lengyel. Mathematics for 3D game programming and computer graphics. Charles River Media. 2004
- I. Kerlow, The art of 3D computer animation and effects. John Wiley & Sons, 2009.
- Wright, Jean Ann, Guionización y desarrollo de la animación : desarrollar el guión para su venta. Escuela de Cine y Vídeo, 2006
- Anne Roche and Marie-Claude Taranger, Taller de guión cinematográfico: elementos de análisis fílmico Abada, 2006

Additional

- K. Erleben et al. Physics Based Animation. Charles River Media, 2005.
- M.J. Langford. Fotografía básica. Barcelona: Omega, 2003
- Christie Marx, Write your way into animation and games: create a writing career in animation and games Burlington, MA : Focal Press/Elsevier, 2010
- Katatikarn, Jasmine; Tanzillo, Michael. Lighting for Animation: The Art of Visual Storytelling, 2016