COURSE DATA

DATA SUBJECT

Code: 34845
Name: Animation
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	Escola Tècnica Superior d'Enginyeria	3	First quarter

SUBJECT-MATTER

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

COORDINATION

GARCIA FERNANDEZ IGNACIO

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.

COMPETENCES / LEARNING OUTCOMES

1405 -

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.

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.

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.

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.

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.

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

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	3,00
Individual or group project	30,00
Independent study and work	22,00
Preparation of lessons	24,00
Preparation for assessment activities	6,00
Resolution of case studies	5,00
Total hours	**90,00**

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.

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EVALUATION

The course will use a continuous assessment model. Three main parts will be considered:

A) During the development of the course, part of the individual or group activities will be assessed. This grade cannot be recovered.

B) A written individual final exam, about the theoretical contents and the work done in the activities of part A). This exam can establish minimum grades for its parts.

C) The students with 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 the exam of part B).

In second call, the students will do an exam to recover part B). In order to pass the course, the grade of this exam must be 5 or higher. In case the exam 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

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

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

REFERENCES

- 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.
- K. Erleben et al. Physics Based Animation. Charles River Media, 2005.
- M.J. Langford. Fotografía básica. Barcelona: Omega, 2003
- 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

- 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