Programme Specification

Bachelor in Design and Development of Video Games

CONTENIDOS

1. PROFESSIONAL COMPETENCES

1.1. General competences

G01: Ability to use learning strategies independently for use in the continuous improvement of professional practice.

G02: Ability to analyse and synthesise problems of their professional activity and apply in similar environments.

G03: Ability to achieve common results through teamwork in a context of integration, cooperation and encouraging critical discussion.

G04: Ability to critically think about information, data and lines of action and their implementation in relevant social, scientific ethical issues.

G05: Ability to communicate in Spanish and English for professional issues in oral and written form.

G06: Ability to solve complex problems or contingencies that arise during professional activity within any organisation and adapt to the needs and demands of their professional environment.

G07: Ability to handle different complex knowledge models through a process of abstraction and its application to approach and solve problems.

G08: Ability to understand the role of the scientific method in the generation of knowledge and its application to a professional environment.

G09: Ability to work with respect for the environment and society through the proper use of technology and its application in promoting a sustainable economy and environment.

G10: Ability to master information and communication technologies and their application in their professional field.

1.2. Specific competences

E01: Ability to solve mathematical problems inherent to engineering. Ability to apply knowledge about: algebra; geometry; differential and integral calculus; optimisation and numerical methods

E02: Ability to understand and master the concepts of the general laws of classical mechanics, fields, waves and electromagnetism and their application for solving video game development problems.

E03: Ability to develop the use and programming of computers, operating systems, databases and software and their application in the development of video games.

E04: Ability to understand and master the basic concepts of discrete logic, algorithmic mathematical and computational complexity, and their application for solving engineering problems.

E05: Ability to program applications both correctly, and efficiently, choosing the most appropriate paradigm and programming languages, applying knowledge of basic algorithmic procedures and using the types and structures of the most appropriate data.

E06: Ability to learn, understand and evaluate the structure and architecture of computers, as well as their basic components.

E07: Ability to design, analyse and implement applications based on the characteristics of the database.

E08: Ability to learn and master the features, functionality and structure of the Distributed Systems, Computer Networks and the Internet and design and implement applications based on them.

E09: Ability to learn and master the tools necessary for the storage, processing and access to information systems, including web-based.

E10: Ability to be familiar with the characteristics, functions and structure of operating systems.

E11: Ability to develop online games for multiple players.

E12: Ability to understand and analyse the structure, organisation, function and interconnection of the devices and systems in video game platforms.

E13: Ability to discover, design and assess the main foundations and techniques of player-computer interaction that guarantee the accessibility and userability of the systems, services and IT applications including video games.

E14: Ability to apply the main foundations and techniques of the smart systems and their practical application in diverse environments.

E15: Ability to apply the main foundations and techniques of programming in real time.

E16: Ability to fully manage and plan software projects and handle suitable tools to do so.

E17: Ability to understand and analyse the structure and function of the main hardware systems and peripherals in video game platforms.

E18: Ability to understand and apply the principles of ergonomy and "Design for everyone" in order to develop interfaces and devices accessible universally in the field of video games.

E19: Ability to recognise and apply the principles, methodologies and life cycle of software engineering.

E20: Ability to generate and analyse expressive and narrative resources and their application to video games.

E21: Ability to execute the art of video games, create characters and settings.

E22: Ability to manage techniques and tools used for artistic representation and expression.

E23: Ability to use creative processes in the design and development of video games.

E24: Ability to specially visualise and have knowledge of the graphical representation techniques, both in terms of traditional methods of metrical geometrics and descriptive geometrics using computer-assisted design application.

E25: Ability to design and create graphical elements and their application in the development of video games.

E26: Ability to perform the design and creation of animated characters and their application in the development of video games.

E27: Ability to apply the methods in the creation and preservation of synthetic images

E28: Ability to perform the design and construction of models with the information necessary for the creation and display interactive images.

E29: Ability to understand and apply the techniques of visualisation, animation, simulation and interaction on models

E30: Ability to design, develop, select and evaluate applications and systems, ensuring reliability, safety and quality, according to ethical principles and legislation and regulations.

E31: Ability to perform the evaluation of video games from their different approaches.

E32: Ability to evaluate, use and spread game engines.

E33: Ability to develop production developments in the field of video games.

E34: Ability to create and analyse games on their fundamentals and develop the understanding of what are the keys that determine how they work and their development.

E35: Ability to know and understand the video game industry from a business point of view

E36: Ability to identify and implement legal and ethical aspects of the gaming industry

E37: Ability to design and create sounds and sound environments and their application in game development

E38: Ability to produce an original project that integrates the skills acquired throughout the degree along with its presentation and defence before a university tribunal that relates to the field of design and game development.

2. PROGRAMME STRUCTURE

2.1. Basic and compulsory modules

MODULE	TYPE	SEMESTER	ECTS CREDITS
Year one			
Civic humanism	OB	I	6
Basic IT	MB	I	6
Graphic and artistic expression	MB	I	6
Mathematics	MB	I	6
English I	MB	Annual	6
Video game narrative	OB	Annual	6
2D design	OB	II	6
Programming basics	MB	II	6
Algebra	MB	II	6
Economics and business administration	MB	II	6
			60
Year two			
Analysis and calculation	MB	III	6
Object-oriented programming	MB	III	6
Operating systems	OB	III	6
Data structures and algorithms	OB	III	6
Video game design: Script and storyboard	OB	III	3
English II	OB	Annual	6
Basics of physics	MB	IV	6
3D design	OB	IV	6
Business initiative	OB	IV	3
Video game consoles and devices	OB	IV	6
IT systems	OB	IV	6
			60
Year three			
Software engineering	OB	V	6
Computer graphics	OB	V	6
Design and development of web games	OB	V	6
Legislation and ethics of video games	OB	V	6
Game engines	OB	V	6
Character design and animation	OB	VI	6
Networks and multiplayer systems	OB	VI	6
Human-computer interaction	OB	VI	6
Animation and simulation	OB	VI	6
Developments for mobile devices	OB	VI	6
			60
Year four			
Sound production	OB	VII	3
Real-time programming	OB	VII	3
Intelligent systems	OB	VII	6
Video games and simulation for research and education	OB	VII	6
Elective 1	OP	VII	6
Elective 2	OP	VII	6
Video game production	OB	VIII	6
Work placement	OB	VIII	6
Final project	OB	VIII	12
Elective 3	OP	VIII	6
			60

2.2. Elective modules

MODULE	TYPE	SEMESTER	ECTS CREDITS
Advanced interaction techniques	OP	VII	6
Advanced programming for the Internet	OP	VII	6
Augmented reality	OP	VII	6
Multi-platform laboratory	OP	VII	6
Artificial intelligence applied to video games	OP	VIII	6
Video game localisation	OP	VII	6
Video game aesthetics	OP	VII	6
Video games in social networks	OP	VII	6
Designing educational video games	OP	VIII	6
Advanced 3D design	OP	VIII	6

3. MODULE DESCRIPTORS

YEAR ONE

3.1. Civic humanism

Credits: 6   **Type:** Compulsory
Contact hours: 72   **Study hours:** 78

Summary: The subject gives a central role to education in the Humanities, committed to the defence of the dignity of the person and respect for their freedom, from an interdisciplinary perspective, contextualised in a democratic and multicultural plural society. It aims to promote moral intelligence, i.e. the ability to deal effectively and honestly to the challenges and commitments involved in contemporary life. It also lays the foundations for a better human being in a fairer society from the scientific rigour required by all university reflection.

Learning outcomes:

After completing this subject, students will be able to:

- Understand the main principles of ideological reductionism and their influence on history.
- Understand the concept of person applied to human beings in their individual and social dimensions, and their individualistic and collectivist restrictions.
- Learn about the habits of self-control that allow individuals to devise life projects and implement them.
- Become aware of the main components of human interdependence, the foundation of the attitudes of social and professional commitment.
- Distinguish the cultural foundations and policies that enable the development of the principles of solidarity, participation, subsidiarity and authority in civil society.
- Detect ideological influences to which professionals are exposed in the normal course of their career.

3.2. Basic IT

Credits: 6   **Type:** Basic

Contact hours: 72   **Study hours:** 78

Summary:

Basic IT covers the knowledge of the structure and operation of a computer. It introduces the fundamental concepts of programming, teaches the basic operation of a personal computer (operating system), basic principles of communication between computers (networks and Internet), application usage often used on the Internet (communication tools) and the basic principles of web design.

Learning outcomes:

After completing this subject, students will be able to:

- Be familiar with the structure and basic operation of a computer.
- Learn about the basic principles of communication between computers.
- Learn about PC hardware, especially input and graphical output devices.
- Create simple programs using a programming language.
- Learn about the principles of web design and the use of the main Internet communication tools.

3.3. Graphic and artistic expression

Credits: 6   **Type:** Basic

Contact hours: 72   **Study hours:** 78

Summary:

The perspective and the different methods of spatial representation. Freehand drawing: the importance of sketching. Proportions and methods of drawing geometric shapes: the human figure. The clear dark: light and shadow. Theory of colour and painting. Textures and methods of representing materials. Notes and representation of actions and movement. Settings for video games. Atmosphere of scenarios: lights, textures and shadows.

Learning outcomes:

After completing this subject, students will be able to:

- Formally analyse the elements of a drawing (control of proportions, composition, etc.).
- Control the laws of proportion and composition.
- Produce freehand sketches of the elements of video games.
- Properly represent the proportions and postures of the human figure and other elements that may be included in video games (animals, objects).
- Understand the different methods of three-dimensional representation on a flat surface.
- Develop spatial representations both with graphical tools and IT tools.
- Produce scenarios for video games based on different spatial perspectives.

3.4. Mathematics

Credits: 6   **Type:** Basic

Contact hours: 72   **Study hours:** 78

Summary:

Introduction to set theory. Functions and relations (relations of equivalence and order and relational databases). Counting techniques. Logic. Modular arithmetic.

Real and complex numbers. Vector algebra. Matrices and determinants. Systems of equations. Analytic geometry.

Learning outcomes:

After completing this subject, students will be able to:

- Explain the basics of Boolean algebra and identify the properties of the algebra of sets and propositional logic.
- Understand the concept of relationship, identify order or equivalence relationships and relate it to the concept of function or relational databases.
- Apply basic counting techniques in solving different types of problems.
- Apply the basic concepts and techniques of propositional and predicate logic to different arguments and demonstrations.
- Know about the fundamental properties of the ring of integers and apply the concepts of whole and modular arithmetic to solve specific problems.
- Operate and geometrically interpret different types of numbers and vectors.
- Solve all types of systems of linear equations, understanding their practical use in different contexts.
- Integrate and collaborate actively in achieving common goals in a group environment
- Effectively communicate different developments and formal structures, using accurate and correct language and different symbolic, formal and technical mathematics.
- Reason and select among several, the option that best fits the characteristics of a particular problem.
- Use specific bibliography, supplementary materials and software used to aid the understanding of different topics.

3.5. English I

Credits: 6   **Type:** Basic

Contact hours: 72   **Study hours:** 78

Summary:

The following skills will be covered in English: Introduction to technical English Learn to learn. Understanding. Basic reports. Note-taking. Description of products and processes. Basic communication in English in a social and a professional international environment. Cultural differences. Social-professional situations. Master-classes and professional presentations.

Learning outcomes:

After completing this subject, students will be able to:

- Understand the main points of clear texts in standard language on everyday matters, either in work, school or leisure situations.
- Produce simple, coherent text on topics which are familiar or of personal interest.
- Describe experiences, events, desire and ambitions and briefly give reasons and explanations for opinions and plans.
- Apply your knowledge of the English language in tasks, projects and presentations with video games.

3.6. Video game narrative

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Study of the basic knowledge to develop creative writing applied to the audiovisual environment. The subject will focus primarily on establishing the basic principles necessary to write in different formats for audiovisual media. The main rules governing creative writing will be studied in a practical, ongoing way. They will become progressively more difficult in terms of writing different texts in relation to the audiovisual environment. The main objective is for students to acquire the primary knowledge and basic rules to develop their writing ability in the audiovisual field.

Learning outcomes:

After completing this subject, students will be able to:

- Identify and analyse the predominant textual models in the audiovisual environment.
- Write, according to the professional script format, covering the minimum requirements for the development of a dramatic conflict.
- Identify and suggest the narrative pulse in certain media formats.
- Recognise the underlying narrative structure in certain media formats.
- Develop ideas creatively and structured texts adapted to different media formats.

3.7. 2D design

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary: Vector drawing. 2D animation. Definition and context. Laws of motion. Animation principles. Textures. Composition of the scene.

Learning outcomes:

After completing this subject, students will be able to:

- Analyse the technical characteristics of 2D design tools.
- Explain the principles that define two-dimensional graphics.
- Use vector drawing applications, imaging and 2D animation.
- Understand concepts, procedures and principles of 2D animation.
- Design animations from motion analysis using the 2D program.

3.8. Programming basics

Credits: 6   **Type:** Basic

Contact hours: 72   **Study hours:** 78

Summary:

Basics of programming. Variables and operators. Expressions and assignments. Control structures. Algorithms and pseudocode. Vectors and matrices. Memory. Basic input and output. Simple and structured data types. Files.

Learning outcomes:

After completing this subject, students will be able to:

- Propose and design algorithmic solutions to specific problems.
- Use development environments and tools with which to implement the designed algorithms.
- Identify, locate and correct errors that may appear in the solutions to the problems.
- Efficiently implement algorithms.
- Quality source code comment.
- Properly document programming jobs.

3.9. Algebra

Credits: 6   **Type:** Basic

Contact hours: 72   **Study hours:** 78

Summary:

Vector space. Linear arrays and applications. Diagonalisation of endomorphisms. Euclidean vector space. Geometry. Linear programming: Simplex method.

Learning outcomes:

After completing this subject, students will be able to:

- Understand and manage with ease the concepts of vector space and linear mapping, studying the structures associated with both, and in particular their relationship with matrices, linear systems of equations and vector calculus.

- Use matrices for the representation and processing of data and transformations and apply them to solve geometry problems in the plane and in space.

- Manage the concept of scalar product, its matrix expressions and the concept of orthonormalisation for application in solving various geometric problems.

- Formulate and solve linear programs using the simplex method.

- Integrate and collaborate actively in achieving common goals in a group environment

- Effectively communicate different developments and formal structures, using accurate and correct language and different symbolic, formal and technical mathematics.

- Reason and select among several, the option that best fits the characteristics of a particular problem.

- Use specific bibliography, supplementary materials and software used to aid the understanding of different topics.

3.10. Economics and business administration

Credits: 6   **Type:** Basic

Contact hours: 72   **Study hours:** 78

Summary:

Graduates in Video Game Design and Development not only have to master technological aspects, but also they must be able to understand the environment of the economy, administration, companies and clients to identify their needs and provide optimal solutions. This subject will address issues related to the economy, aimed at training students in understanding the basic techniques to analyse economic and financial calculation problems and to enable them to develop and assess projects and investment alternatives. Also, issues will be tackled to provide students with the ability to apply their knowledge to leadership and management tasks, as well as teamwork in different areas related to business administration. The main objective of this subject is to introduce students to the world of economics and business administration, so they can make the most appropriate decisions in each case and recognise the special circumstances of the business environment.

Learning outcomes:

After completing this subject, students will be able to:

- Analyse the costs within the company.

- Evaluate investment alternatives.

- Understand financial statements.

- Understand the organisational structure of a company.

- Analyse the planning and organisation of a company.

- Develop a business plan according to the model explained in the classroom.

- Make a basic market analysis.

- Know about the basic tools of management and human resources planning.

YEAR TWO

3.11. Analysis and calculation

Credits: 6   **Type:** Basic
Contact hours: 72   **Study hours:** 78

Summary: Real functions of real variables, vectors and functions of several variables. Differential calculus and applications. Integral calculus and applications. Numerical sequences and series. Introduction to numerical calculation.

Learning outcomes:

After completing this subject, students will be able to:

- Analyse and draw functions of one and several variables, and deduce properties of a function from its graph.

- Work intuitively, geometrically and formally with the concepts of limit, derivative and integral.

- Apply differential calculus in solving optimisation problems.

- Apply integral calculus to solve problems that involve calculating areas, volumes or lengths.

- Manipulate numerical sequences and series of functions and apply to solving specific problems.

- Use numerical computation algorithms to solve problems and implement them using appropriate tools on a computer.

- Integrate and collaborate actively in achieving common goals in a group environment

- Effectively communicate different developments and formal structures, using accurate and correct language and different symbolic, formal and technical mathematics.

- Reason and select among several, the option that best fits the characteristics of a particular problem.

- Use specific bibliography, supplementary materials and software used to aid the understanding of different topics.

3.12. Object-oriented programming

Credits: 6   **Type:** Basic

Contact hours: 72   **Study hours:** 78

Summary:

Introduction to Object-Oriented Programming. Modelling. Classes, objects, methods and messages. Inheritance, polymorphism. Genericity. Handling errors and exceptions. Data and collections. Input and output flows.

Learning outcomes:

After completing this subject, students will be able to:

- Design object models that meet established needs
- Design programs to meet identified needs, applying the concepts of object-oriented programming
- Develop robust programs and deal with exceptions that occur during the execution of a program.
- Use development environments and tools with which to implement the algorithms designed with a particular programming language
- Identify, locate and correct errors that may appear in the resulting solutions to the problems.
- Implement, test and debug programs in an object-oriented language.
- Know about quality source code.
- Properly document programming jobs.

3.13. Operating systems

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Theoretical aspects of design, use and basic administration of operating systems. The role of the operating system as an extended machine and process management from its creation, memory access and planning.

Learning outcomes:

After completing this subject, students will be able to:

- Learn the basics of operating system design.
- Acquire concepts of design, management and programming of operating systems.
- Install, configure and use different environments and operating systems.
- Perform basic system administration tasks.
- Begin to develop system programs.

3.14. Data structures and algorithms

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Arrays, structures, pointers, and strings. ADT (Abstract Data Type). Lists. Stacks. Queues. Dispersion tables. Trees. Graphs. Algorithm.

Learning outcomes:

After completing this subject, students will be able to:

- Create a set algorithms that meet needs and optimally meet specific standards of quality.
- Efficiently implement algorithms.
- Discuss quality source code.
- Check implementation errors.
- Manage programming development environments.
- Create and manage data structures.
- Optimise and evaluate algorithms.

3.15. Video game design: Script and storyboard

Credits: 3   **Type:** Compulsory

Contact hours: 36   **Study hours:** 39

Summary:

In this subject students will study a theoretical base on the different forms of narrative for video games, considering the strategies required for writing a script for a video game. The aim is that students specialise in the main rules to develop structures, characters and dialogue for a video game script and be able to draw a storyboard.

Learning outcomes:

After completing this subject, students will be able to:

- Analyse the narrative of a game and write a script for a video game
- Identify prevailing arguments in different frames of video games.
- Rewrite and correct mistakes in the scriptwriting process for games.
- Create structures, characters and dialogue that can be developed in the script of a video game.
- Draw a storyboard of a video game.

3.16. English II

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

The following skills will be covered in English: Technical English. Description of products and processes. Essay writing. Abstracts. Efficient communication in English in an academic and professional environment. Participation in meetings. Troubleshooting and decision-making. Efficient negotiations. The following professional skills will be covered in English: Job search, job interview, effective presentations II, reports, projects and articles, professional portfolio.

Learning outcomes:

After completing this subject, students will be able to:

- Understand the main ideas of complex texts about specific and abstract topics, even if they are of a technical nature, provided they are within their field of expertise.
- Interact with native speakers with a degree of fluency and spontaneity that makes communication effortless.
- Produce clear, detailed text on a variety of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.
- Deal with most situations that may arise in areas where the English language is used.
- Apply your knowledge of the English language in tasks, projects and presentations with video games.

3.17. Basics of physics

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

The basics of physics are the cornerstones for understanding the different phenomena of nature. The mechanics of the particle, particle systems and continuous mediums are studied in this subject. As well as an introduction to electromagnetic and optical phenomena.

Learning outcomes:

After completing this subject, students will be able to:

- Suggest, solve and interpret physical problems through individual and team work
- Prepare, present, defend and value in Spanish, theoretical and/or practical topics, system-related content, both orally and in writing.
- Understand the role of the scientific method in the generation of knowledge and its applicability to a professional environment.

3.18. 3D design

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Properties of a 3D object. Polygonal and subdivision modelling. Rendering. Surface models. Textures and materials. Visualisation.

Learning outcomes:

After completing this subject, students will be able to:

- Explain the principles that define three-dimensional graphics.
- Use three-dimensional modelling applications for video games.
- Analyse the technical characteristics of modelling tools and 3D character animation.

3.19. Business initiative

Credits: 3   **Type:** Compulsory

Contact hours: 36   **Study hours:** 39

Summary:

New companies and sustainable economic development. Creativity techniques and generating ideas. Identification of business opportunities. Strategic viability of the idea Business creation strategies.

Learning outcomes:

After completing this subject, students will be able to:

- Acquire business initiative, weighing up risks and opportunities and assuming the consequences.
- Explain the different sources to create new business ideas.
- Develop processes to generate business ideas in different business contexts from the perspective of equality between men and women.
- Identify successful strategies for new businesses in global environments.
- Execute processes to implement entrepreneurial strategies.

3.20. Video game consoles and devices

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

History of video game platforms. Mechanics of video games on various platforms. Architectures of mobile devices and gaming platforms. Types and basic operation of input/output peripherals. Operating systems and development kits.

Learning outcomes:

After completing this subject, students will be able to:

- Describe the basic components of different video game platforms.
- Know about the main design implications of different platforms.
- Learn about the function of the operating system and development kits for mobile devices and video game platforms.
- Understand the basic operation of the main devices/input/output peripherals.
- Explain the basic components of different mobile platforms.

3.21. IT systems

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Information systems are, nowadays, essential for all companies, which keep all their important information in databases which are then displayed to the user. The incorporation and recovery in real-time of data such as payroll, invoices, inventory, all the information that a company needs today to be competitive, is stored in databases that need to be designed, built, managed and operated. Database technology is one of the most developed across the field of IT, with over 40 years of research and development in the field of information systems, epitomised by the so-called Database Management System (DBMS), a powerful software tool that lets you create and maintain huge amounts of data efficiently and persistent. DBMS software are among the most complex systems ever built. In this subject, we will learn to design databases, to write programs using information stored in a DBMS and administer a DBMS.

Learning outcomes:

After completing this subject, students will be able to:

- Understand and apply the theory of relational database design information systems data.
- Understand and apply the theory of semi-structured data modelling to the design of information systems.
- Understand and shape the reality for its representation in an information system.
- Learn the language of communication with databases (SQL).
- Install, manage and streamline a commercial DBMS.

YEAR THREE

3.22. Software engineering

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

This subject covers the following contents:

Software development methodologies applied to the creation of video games. Agile methods. Basics of game design. Assessment strategies (testing) game. Management principles of multidisciplinary teams.

Learning outcomes:

After completing this subject, students will be able to:

- Design video games.
- Properly implement agile methodologies in video game development.
- Define video game development plans.
- Explain the challenges of software engineering and management that the development of video games involve

3.23. Computer graphics

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Introduction to the basic concepts of computer graphics. Hardware and software. Adequate representation models for creating and viewing 2D and 3D synthetic images. Programming with graphic libraries.

Learning outcomes:

After completing this subject, students will be able to:

- Explain the basic principles of the generation of 2D and 3D synthetic images.
- Compare the technical specifications of the graphic libraries most used in the creation of synthetic images in video games.
- Use graphic libraries for creating synthetic images for video games.

3.24. Design and development of web games

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

This subject will provide students with the knowledge of technologies for the design and development of web applications and interactive video games. The importance of creating designs that guarantee the principles of accessibility and "Design for everyone" will be transmitted.

Learning outcomes:

After completing this subject, students will be able to:

- Design and develop games and interactive web applications and in web environments and the corresponding documentation.
- Design web games to ensure the principles of universal accessibility
- Evaluate the main characteristics of games and interactive web applications in web environments
- Be familiar with technical characteristics of current technologies to develop games for the web
- Communicate in a professional manner correctly.
- Be able to select the right tools for each specific project.

3.25. Legislation and ethics of video games

Credits: 6   **Type:** Compulsory

Contact hours: 70   **Study hours:** 80

Summary:

The ethics of image and video games faces questions concerning the truth and the moral burden that certain images transmit. Video game professionals cannot ignore their commitment to the truth and the centrality of the images they create. These issues are further enhanced with new technologies, and have turned, for many, the virtual world into the "real" world, with the questions that this dichotomy holds.

This subject will invite the student to discover the great challenges of the world of images and video games and give committed and truly human responses. It will force them to ask questions about their own relationship with truth and encourage their critical view.

The main aspects of intellectual property, patents, content regulation and legislation on game development will be analysed in the development of video games.

Learning outcomes:

After completing this subject, students will be able to:

- Identify the main ethical issues in the world of video games.
- Cultivate intellectual and practical habits to judge and act accordingly.
- Build a set of values consistent with their worldview, further highlighting the importance of image and the video game.
- Describe the main legal aspects of intellectual property, licensing, patents and contracts in the video game industry.
- Explain the main issues related to content regulation of gaming.

3.26. Game engines

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Fundamentals of game engine design. Basic architectures. Programming with game engines.

Learning outcomes:

After completing this subject, students will be able to:

- Explain the operation and architecture of a game engine.

- Build simple game engines.

- Assess the basic features of a game engine.

- Expand or modify existing game engines.

- Use game engines to create video games.

3.27. Character design and animation

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Design and modelling of characters. Modelling techniques with few polygons. Computer animation. Skeleton-based animation. Facial, hair and clothes animation. Direct and inverse kinematics. Direct and inverse dynamics. Motion function.

Learning outcomes:

After completing this subject, students will be able to:

- Learn the principles of creating characters.
- Use applications of character modelling and animation in the context of video games.
- Know how to define character skeletons and use them to control their movement
- Learn the techniques of motion capture.
- Know about the basics of inverse kinematics and its application to animation.
- Discover the special animation techniques such as face, hair and fabric elements.
- Learn how to make textured characters

3.28. Networks and multi-player systems

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Networking basics. Introduction to TCP/IP architecture. Wireless networks. Safety on the net. Network game engines. Game servers.

Learning outcomes:

After completing this subject, students will be able to:

- Explain the TCP/IP architecture.
- Describe the fundamentals in computer networks.
- Describe the basic operation of wireless networks.
- Describe how game servers work.
- Describe the main problems related to security in networked environments.
- Use current multi-player game engines.
- Develop network applications.

3.29. Human-computer interaction

Credits: 6   **Type:** Compulsory
Contact hours: 72   **Study hours:** 78

Summary:

The aim of this subject is to provide students with the theoretical tools required to design and evaluate human-computer interfaces that guarantee accessibility and usability of the systems, services and applications. Specifically video games and interactive applications. This subject covers the basics of user interfaces, models and metaphors of interaction, design and evaluation of interfaces. Accessibility and interfaces will also be studied for users with special needs to take into account factors such as: different capabilities based on their age, visual impairment or different levels of technological knowledge.

Learning outcomes:

After completing this subject, students will be able to:

- Learn the fundamental principles of user interfaces.
- Design and evaluate human-computer interfaces that guarantee access to systems, services and applications.
- Design and evaluate interfaces in the field of video games.
- Know about the principles of user-centred design to ensure the usability and accessibility of applications, paying special attention to the development of video games and interactive applications

3.30. Animation and simulation

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Computer animation and simulation techniques applied to video games, systems of virtual reality and cinematic effects. Efficient numerical simulation methods for both interactive and offline, physical phenomena: quaternion, inverse kinematics, dynamics of rigid bodies, deformable objects, fluids, character animation using skeletons (Character Rigging), motion capture and 3D sound simulation.

Learning outcomes:

After completing this subject, students will be able to:

- Create an animation character by skeleton in a video game.
- Capture a movement and use it as the basis for the animation of a character in a video game.
- Explain the fundamental physical principles to simulate in a video game.
- Apply the basic techniques of physical simulation.
- Use libraries of animation and physical simulation in video games.
- Use animation software for sound.

3.31. Developments for mobile devices

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

The aim of the subject is to explain the technology for the design and creation of video games and interactive applications for mobile devices using libraries or implementation frameworks.

Learning outcomes:

After completing this subject, students will be able to:

- Learn about the basics of technologies supporting the creation of video games and interactive applications on mobile devices.
- Use libraries to create games and interactive applications in mobile devices.
- Explain technologies for the design and creation of video games and applications for mobile devices**.**
- Analyse the technical characteristics of the technologies to create video games and applications for mobile devices and select the most suitable for each project.
- Develop and plan a project for mobile devices and its corresponding documentation.
- Monitor a project.
- Work in a team to achieve defined objectives.

YEAR FOUR

3.32. Sound production

Credits: 3   **Type:** Compulsory
Contact hours: 36   **Study hours:** 39

Summary: Sound elements in video games: music, sound and effects. Theory and technique of digital sound. **Production and realisation of interactive sound products. Software tools for sound editing. Sound effects.**

Learning outcomes:

After completing this subject, students will be able to:

- Learn about the sound elements of video games, their importance and the impact of integrating them into the end products.
- Acquire the skills necessary to manage the technical equipment used for the production and realisation of audio products.
- Independently develop projects in video games audio production.
- Learn about and assimilate the fundamental theoretical concepts and technical procedures and tools (software and hardware) that successfully manage sound resources in the field of video games.

3.33. Real-time programming

Credits: 3   **Type:** Compulsory

Contact hours: 36   **Study hours:** 39

Summary:

Structure of computer systems in real time. Analogue signals and devices. Planning and synchronisation of multiprocessor systems, reliability and availability. Operating systems and programming languages in real time.

Learning outcomes:

After completing this subject, students will be able to:

- Explain the basic concepts of computer systems in real time.
- Analyse the time constraints of a real-time system.
- Select treatment devices of signals appropriate to the needs of a real-time system.
- Explain the basic features of a real-time operating system that differentiate it from a traditional operating system.
- Explain the key features of a programming language in real time that differentiate it from traditional programming language.

3.34. Intelligent systems

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Introduction to Artificial Intelligence. Representation, algorithms, planning and learning.

Learning outcomes:

After completing this subject, students will be able to:

- Learn the basics of knowledge representation in artificial intelligence.
- Learn about artificial intelligence algorithms and methods.
- Understand planning methods and algorithms.
- Understand machine learning algorithms and methods.

3.35. Video games and simulation for research and education

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary: This subject presents the approach known as serious games that use video games in fields such as medicine, training, therapeutic and general areas unrelated to pure entertainment. The subject covers the major success stories related to research and education and discusses how pedagogy and simulation integrate with video games.

Learning outcomes:

After completing this subject, students will be able to:

- Know about representative serious games in the fields of education and research.
- Describe the main characteristics of a serious game.

3.36. Video game production

Credits: 6   **Type:** Compulsory

Contact hours: 72   **Study hours:** 78

Summary:

Video games are one of the most complex forms of software. Their development and publication are complex and collaborative projects. This subject will address the various milestones in the process of producing a video game: software development technical challenges, problems of design documentation, content creation, team roles, group dynamics, risk analysis, people management and processes. Audio applications in creating video games. **Sound production and realisation of products**

Learning outcomes:

After completing this subject, students will be able to:

- Understand the complexity of the production process of a video game, distinguishing the main actors involved in the project, their roles and relationships between them.
- Acquire the skills and tools needed to manage teams of people in collaborative development projects and coordinate the efforts of different departments involved in the production of a video game (development, quality control, sales, marketing, public relations and finance).
- Explain the development life cycle of a video game and select the best approach to the production process.
- Understand the need to document the design and development of video games and know the different tools to carry out this work.
- Understand the need for different test types and their characteristics.
- Use video game production techniques appropriate in the development of specific projects and game productions.
- Use audio tools in interactive environments.

3.37. Work placement

Credits: 6   **Type:** Compulsory

Contact hours: 0   **Study hours:** 180

Summary:

The main objective of San Jorge University's degree programmes is to fully prepare professionals to successfully enter the business world. To obtain this goal, excellent academic background and training in personal values of quality is not enough; it is also essential that students experience this business world so they can learn to develop all the required personal and instrumental skills that they are really going to require for their professional future. In the subject "Work Placement" the student will experience daily work in a company and will have to use the resources that have been acquired during their time at San Jorge University on a scientific and technical level and on a human level.

Learning outcomes:

After completing this subject, students will be able to:

- Work responsibly and adapt to the standards established in the company
- Apply and understand the principles of the video game industry to serve society
- Teamwork and communicate properly with colleagues, customers and users
- Know the impact of their work on society and the importance of industry standards and regulations
- Implement the process comprising a project in the field of video games, including economical and innovative aspects
- Work efficiently at the various development stages of a software project
- Understand and analyse user requirements and design and develop solutions that meet their needs
- Understand, identify and evaluate innovative products and services in the field of video games and systems
- Know, understand, design and implement quality and safety policies
- Project documentation in the field of design and game development during its various stages

3.38. Final Project

Credits: 12   **Type:** Compulsory

Contact hours: 30   **Study hours:** 270

Summary:

This subject is the culmination of all the training that the student has received throughout the Video Game Design and Development degree. During the Final Project, students will practice the skills that have been acquired throughout the training process. Students must prepare a piece of work that reflects their personal and professional maturity over the years studying at the Polytechnic School.

Learning outcomes:

After completing this subject, students will be able to:

- Individually plan and complete an original project of a professional nature in the field of video games showcasing the skills acquired in the degree.
- Prepare, present and defend orally, before a university tribunal, an original project of a professional nature in the field of video games.

Elective modules

3.39. Advanced interaction techniques

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

Students will learn in this subject the various existing hardware solutions for advanced user interaction, analysing which solution is best suited to the needs of the interactive application or game developed. Special attention is placed on the most innovative input/output devices that provide new user interaction, using these new hardware platforms for a more intuitive and efficient computer person interaction that allows a more effective adaptation of these platforms to users with special needs.

Learning outcomes:

After completing this subject, students will be able to:

- Know about the different systems of interaction with the user.
- Be able to use the most suitable interaction system for a program and a specific user.
- Understand the proper use of the new systems of interaction with the user.
- Design and evaluate interfaces for advanced interaction that guarantee access to systems, services and applications, with special attention to video games and interactive applications

3.40. Advanced programming for the Internet

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

Advanced programming Internet skills: architecture, transactions, components, characteristics to apply for a secure and robust web application. Knowledge related to the server side programming of the Internet and business systems.

Learning outcomes:

After completing this subject, students will be able to:

- Develop solutions to problems using the Object-Oriented Programming (OOP) in the Internet environment.
- Know about the components of a web application.
- Understand and apply features that provide robust, high availability and security in a web application.
- Know how transactions are used in web applications.
- Learn about the architecture of the business to consumer (B2C) and business-to-business (B2B)
- Understand the n-tier architectures and application servers

3.41. Augmented reality

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

This subject provides basic concepts to learn, understand and evaluate augmented reality systems, applications, simulations and their impact on video games and user interfaces.

Learning outcomes:

After completing this subject, students will be able to:

- Understand the basic principles of augmented reality.
- Evaluate current software and hardware augmented reality.
- Identify and describe applications of augmented reality.
- Identify and describe factors and social and psychological impact on augmented reality applications.

3.42. Multi-platform laboratory

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

This subject deals with the practical development of a video game simultaneously for more than one platform through specific environments (such as Unity) with special emphasis on the current limitations of multi-platform environments.

Learning outcomes:

After completing this subject, students will be able to:

- Use development environments for cross-platform applications.
- Assess the implications of adopting a multi-platform environment to speed up their development.

3.43. Artificial intelligence applied to video games

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

Introduction to the use of artificial intelligence in video games. Basic techniques of decision-making (decision trees, state machines, scripting, basic pathfinding). Advanced Techniques (behaviour trees, autonomous movement, scheduling, machine learning).

Learning outcomes:

After completing this subject, students will be able to:

- Explain the artificial intelligence paradigms most used in video games.
- Apply methods and techniques of artificial intelligence to video games.
- Evaluate different artificial intelligence techniques applied to video games.
- Propose advanced alternatives to the basic techniques of artificial intelligence in video games.

3.44. Video game localisation

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

This subject aims to advise and reflect on certain issues affecting the sale and marketing of video games, especially in their exportation. Thus, the subject will refer to elements such as socio-cultural and aesthetic issues that creators should keep in mind when designing product sales. Location of on-screen text and textual graphics. Location of cinema and audio components: dubbing and subtitling. Quality control.

Learning outcomes:

After completing this subject, students will be able to:

- Identify the elements that should be adapted in the introduction of video games in certain markets
- Adapt all aspects of a video game to different cultures
- Assess the importance of the socio-cultural elements in video games.
- Ability to use ICT in the field of translation and localisation of video games.

3.45. Video game aesthetics

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

The main objective of this subject is to address the aesthetic evolution of video games from their origin to the present day. To do so, the historical view of this phenomenon will offer the student a series of keys to understanding their progress over the years.

Learning outcomes:

After completing this subject, students will be able to:

- Understand the importance of the aesthetics of video games
- Learn the basics of the history and aesthetics of video games
- Assess the aesthetic evolution of video games
- Describe the implications of the development of technologies (optical, electronic, digital) in the evolution of video creation.
- Understand the evolution of audiovisual forms, linking methods of film representation to social, political, cultural and ideological transformations that have occurred since the middle of the twentieth century.

3.46. Video game in social networks

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

This subject introduces the student to design based applications and social networking games. Students will be able to understand and develop strategies and designs for games and applications that leverage the capabilities of social networking platforms.

Learning outcomes:

After completing this subject, students will be able to:

- Learn the structure of social networks
- Develop basic applications that leverage the capabilities of social networks

3.47. Designing educational video games

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

The subject will go further back in the history of educational games, their importance in the market and future applications of the future. Peculiarities of the design and development of video games and multimedia systems for education. Learning theories and their application to video games and multimedia systems. Adaptation to the ages and stages of cognitive and social development. Key elements of educational games.

Learning outcomes:

After completing this subject, students will be able to:

- Know about the main educational games throughout history
- Understand the importance and usefulness of these games in the market and especially in certain sectors
- Design and develop video games and multimedia systems adapted to different ages and stages of cognitive and social development.
- Design and develop video games and multimedia systems aimed at the acquisition of competences, knowledge and skills aligned with the school curriculum of the various stages of education, including web-based
- Analyse and enhance educational opportunities for gaming entertainment.

3.48. Advanced 3D design

Credits: 6   **Type:** Elective

Contact hours: 72   **Study hours:** 78

Summary:

Particle systems. Special effects. Lights. Cameras. Maps Materials. Kinematics. Virtual tours. Render. Video Post. Funds and representational purposes.

Learning outcomes:

After completing this subject, students will be able to:

- Understand and manage advanced tools for 3D design.
- In-depth study and editing of complex natures, double and triple curvature surfaces.
- Create environments and atmospheres for a fully digital world.

  Learn communication and graphic-plastic persuasion through 3-D information technology and post-production support for final viewing.