

### BASIC DETAILS:

<b>Subject:</b>	INFORMÁTICA GRÁFICA Y PROGRAMACIÓN		
<b>Id.:</b>	33504		
<b>Programme:</b>	GRADUADO EN DISEÑO DIGITAL Y TECNOLOGÍAS CREATIVAS. PLAN 2020		
<b>Module:</b>	FORMACIÓN BÁSICA		
<b>Subject type:</b>	MATERIA BASICA		
<b>Year:</b>	2	<b>Teaching period:</b>	Primer Cuatrimestre
<b>Credits:</b>	6	<b>Total hours:</b>	150
<b>Classroom activities:</b>	65	<b>Individual study:</b>	85
<b>Main teaching language:</b>	Inglés	<b>Secondary teaching language:</b>	Castellano
<b>Lecturer:</b>		<b>Email:</b>	

### PRESENTATION:

This subject is an introduction to the development of interactive applications and virtual worlds. Students will learn how to prototype, design and implement a fully interactive 3D world using professional tools. Basic concepts about the inner workings of computers and 3D graphics will be explained with practical examples. With the knowled acquired, students will be able to build their own interfaces and interactive systems using state-of-the-art engines and programming languages. Multiplatform application development will be used as a starting point to approach different user experiences on multiple pieces of hardware and varied input systems.

### PROFESSIONAL COMPETENCES ACQUIRED IN THE SUBJECT:

<b>General programme competences</b>	G06	Use English properly according to the scientific and academic terminology of the world of art, digital design and applied arts.
<b>Specific programme competences</b>	E02	Dominar lenguajes informáticos de programación para ejecutar tareas de forma automatizada a través de la edición de los contenidos motores de las herramientas dedicadas al dibujo digital empleadas en el diseño.
	E09	Capacidad para la creación y explotación de mundos virtuales, y para la creación, gestión y distribución de contenidos multimedia, a partir del empleo de medios informáticos especializados.
	E13	Prototipar un sistema interactivo a través de un diseño digital y saber visualizar y comunicar visualmente la información mediante el dominio de las técnicas propias de la expresión gráfica en 2D y 3D, estática y animada, y de la informática gráfica, sabiendo presentar los resultados en base a cánones estéticos.
<b>Learning outcomes</b>	R01	Conocer la estructura y el funcionamiento de los equipos hardware empleados en el campo del diseño digital.
	R02	Conocer los principios básicos de comunicación entre ordenadores y los lenguajes de programación más adecuados para cada caso en el ámbito de la imagen.
	R03	Conocer las especificidades de los equipos hardware orientados a la entrada y la salida de flujos de información gráfica.
	R04	Realizar programas específicos vinculados al diseño mediante un lenguaje de programación adecuado y coherente.
	R05	Aprender los principios de diseño de páginas web y el uso de las principales herramientas de comunicación gráfica en internet.

### PRE-REQUISITES:

It is recommended to have studied all subjects in previous semesters. Very basic knowledge will be required in fields like design and programming.

### SUBJECT PROGRAMME:

#### Subject contents:

<b>1 - Programming 101</b>
1.1 - Flowcharts
1.2 - Variables and data types

1.3 - Control structures
1.4 - Functions
1.5 - Data structures and algorithms
1.6 - Programming examples
<b>2 - Advanced Programming</b>
2.1 - Encapsulation
2.2 - Object Oriented Programming
2.2.1 - Classes
2.2.2 - Inheritance
2.2.3 - Basic UML
2.3 - Component Oriented Programming
2.3.1 - Components
2.3.2 - Composition
2.3.3 - Composition VS Inheritance
<b>3 - Real Time Applications</b>
3.1 - Time control
3.2 - Discretization
3.3 - Initialization and Update
3.4 - Object Management
3.5 - Example applications
<b>4 - Unity + C#</b>
4.1 - Introduction and interface
4.2 - Scripting
4.3 - 3D geometry concepts
4.4 - Physics
4.5 - Prefabs
4.6 - Scenes
4.7 - User Interface programming
4.8 - Development of interactive applications
<b>5 - Human-Computer Interaction</b>
5.1 - Designing User Interfaces
5.2 - Multiplatform development
5.3 - Classic interaction systems
5.4 - Browser applications
5.5 - Mobile applications
5.6 - The future of interaction
<b>6 - Final project</b>

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:

- **Master classes**
  - Lecturer will explain the theoretical part of the subject supported by ICT resources (computer, projector, internet) and a whiteboard.
  - Students will ask questions found during individual work sessions.
  - Student involvement, discussions, questions and concerns will be valued and will be added to final marks.
- **Practical work**
  - Practical sessions will lay out different problems with the aim on solving real world situations with the help of the lecturer.

- **Project based learning**
  - An important part of the learning process of the subject, and the final marks, will be obtained by solving practical problems while working individually and in groups. Students will receive the initial wording of the problem and a deadline. The main objective is to prepare the students to face real world problems and reach the learning outcomes of the subject easily and seamlessly.
- **Tutorial**
  - Students will be able to ask the lecturer those questions that were not answered during the master classes or the ones that showed up during individual study. Students may ask for additional bibliography about a specific matter and any other kind of information related with this subject. On the other hand, along this sessions, students will be monitored and oriented in their way to complete the assigned tasks. Tutorial sessions will be set up by mutual agreement between the parts involved.

**Student work load:**

Teaching mode	Teaching methods	Estimated hours
<b>Classroom activities</b>	Master classes	20
	Practical exercises	35
	Laboratory practice	10
<b>Individual study</b>	Tutorials	5
	Individual study	25
	Individual coursework preparation	10
	Group coursework preparation	10
	Project work	30
	Compulsory reading	5
<b>Total hours:</b>		150

**ASSESSMENT SCHEME:**

**Calculation of final mark:**

Written tests:	30	%
Individual coursework:	20	%
Group coursework:	10	%
Final exam:	30	%
Involvement:	10	%
<b>TOTAL</b>	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:**

SCHNEIDERMAN, Ben. Designing the User Interface: Strategies for Effective Human-Computer Interaction. Pearson, 1998
JOHNSON, Jeff. Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines. Morgan Kaufman, 2014
SCHELL, Jesse. The Art of Game Design: A Book of Lenses. CRC Press, 2014
VAN VERTH, James M. Essential Mathematics for games and interactive applications. CRC Press, 2016
HOCKING, Joe. Unity in Action, Second Edition: Multiplatform game development in C#. Manning Publications, 2018

**Recommended bibliography:**

BROOKS, Frederick P. The Mythical Man-Month: Essays on Software Engineering. Addison WesleyProfessional, 1995
HUNT, Andrew. The Pragmatic Programmer: From Journeyman to Master. Addison-Wesley Professional, 1999
GAMMA, HELM, JOHNSON, VLISSIDES, BOOCH. Design Patterns: Elements of Reusable Object-Oriented Software. Addison-

Wesley Professional, 1994

KOSTER, Raph. Theory of Fun for Game Design. O Reilly Media, 2013

**Recommended websites:**

Gamasutra	<a href="http://gamasutra.com/">http://gamasutra.com/</a>
GameDev	<a href="http://www.gamedev.net/">http://www.gamedev.net/</a>
Unity	<a href="https://unity3d.com">https://unity3d.com</a>
Unreal Engine	<a href="https://www.unrealengine.com">https://www.unrealengine.com</a>

\* Guía Docente sujeta a modificaciones