UNIVERSIDADE DA CORUÑA

Academic Year: 2025/26

202003 - Video Game Development 1

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Teaching Guide Information

Subject code: 202003

Degree program: 10014 - Degree in Digital Creation, Animation and Video Games

Type: Compulsory

Year: 3

Number of ECTS: 6.0

Period: First term

Languages:

Degree coordination: Patricia Comesaña Comesaña

Subject coordination: Luís Antonio Hernández Ibáñez

Faculty: Luís Antonio Hernández Ibáñez

1. Overview

The student will gain expertise in utilising the various components of a video game engine. They'll learn to develop diverse elements that constitute the visual environment and to program core game mechanics. This involves applying real-time graphics techniques standard in the field and creating interactive elements through visual scripting.

2. Educational and learning outcomes (RD 822/2021 degree programs) or competences (RD 1393/2007 degree programs)

Competences (RD 1393/2007 degree programs)

- **[A06]** CE6 - Knowledge of the artistic and technical fundamentals that allow graphic conceptualization of elements for an animation or video game, with a focus on creating concept art documentation.
- **[A10]** CE10 - Understanding the main stages of the animation or video game production pipeline and their significance in the overall process.
- **[A23]** CE23 - Understanding of video game development environments and their use in creating the game world and components, applying specific modeling and material creation criteria for real-time graphics systems.
- **[A24]** CE24 - Ability to develop complex game maps, including territory and landscape, with interactive elements that respond appropriately to different gameplay scenarios.
- **[B01]** CB1 - Que os estudantes demostrasen posuir e comprender coñecementos nunha área de estudo que parte da base da educación secundaria xeral, e se atope a un nivel que, se ben se apoia en libros de texto avanzados, inclúe tamén algúns aspectos que implican coñecmentos procedentes da vanguarda do seu campo de estudo
- **[B02]** CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y

posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio

- **[B03]** CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética
- **[B04]** CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado
- **[B05]** CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía
- **[B06]** CG1 - Capacidad de organización y planificación. Especialmente en el planteamiento de trabajos conducentes a la creación de los contenidos audiovisuales digitales que componen una producción de animación o un videojuego.
- **[B07]** CG2 - Capacidad de resolver problemas de forma efectiva, principalmente de carácter tecnológico y en el campo de la creación de contenidos digitales interactivos y de animación.
- **[B08]** CG3 - Conocimientos informáticos, en especial los relativos al uso de tecnologías y programas de última generación en el campo de estudio.
- **[B09]** CG4 - Conocer los procedimientos, destrezas y metodologías necesarios para la adaptación del proceso creativo al medio digital y la producción de obras artísticas a través de tecnologías específicas.
- **[B10]** CG5 - Valorar críticamente el conocimiento, la tecnología y la información disponible para su aplicación en la resolución de problemas.
- **[B11]** CG6 - Capacidad crítica y autocrítica. Necesaria en todo proceso creativo en el que se busca un compromiso con la calidad del trabajo, los resultados y las soluciones propuestas.
- **[B12]** CG7 - Trabajo en equipo. Capacidad de abordar proyectos en colaboración con otros estudiantes, asumiendo roles y cumpliendo compromisos de cara al grupo.
- **[B13]** CG8 - Capacidad de aplicar los conocimientos en la práctica, integrando las diferentes partes del programa, relacionándolas y agrupándolas en el desarrollo de productos complejos.
- **[B14]** CG9 - Capacidad de diseño y gestión de proyectos, resolviendo los aspectos narrativos, técnicos y de gestión del proyecto de animación o videojuego.
- **[C01]** CT1 - Adequate oral and written expression in the official languages.
- **[C03]** CT3 - Using ICT in working contexts and lifelong learning.
- **[C04]** CT4 - Acting as a respectful citizen according to democratic cultures and human rights and with a gender perspective.
- **[C06]** CT6 - Acquiring skills for healthy lifestyles, and healthy habits and routines.
- **[C07]** CT7 - Developing the ability to work in interdisciplinary or transdisciplinary teams in order to offer proposals that can contribute to a sustainable environmental, economic, political and social development.
- **[C08]** CT8 - Valuing the importance of research, innovation and technological development for the socioeconomic and cultural progress of society.
- **[C09]** CT9 - Ter a capacidade de xestionar tempos e recursos: desenvolver plans, priorizar actividades, identificar as críticas, establecer prazos e cumprilos.

2.1. Learning outcomes (RD 1393/2007 degree programs)

Learning outcomes	Study programme competences / results		
Students will receive training on the various components of a video game engine, which will equip them to develop the different types of elements that make up the visual environment. They'll apply specific real-time graphics techniques prevalent in this field. Additionally, they'll learn to create interactive elements using visual programming.	A10 A23 A24	B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14	C1 C3 C4 C6 C7 C8 C9

3. Contents

Content unit	Description	Education and learning outcomes / competences	Teaching methodologie and training activities	Assessment systems
Topic	TOPIC 1.- Course Overview. Introduction: 1.1 Real-time 3D Interaction 1.2 Architecture and components of a game engine 1.3 Work environment. The map editor. Components. Movement, handling and edition 1.4 Video game specific modelling techniques. Model importing. Levels of Detail, Collision Geometry.	A06, A10, A23, A24, B01, B02, B03, B04, B05, B06, B07, B08, B09, B10, B11, B12, B13, B14, C01, C03, C04, C06, C07, C08, C09.	MAG00, MAG06, MAG19, MAG39, MAG41, MAG42.	SEG41, SEG42.
Topic	TOPIC 2.- BSP - Materials I: 2.1 BSP - Static Meshes. Simple and Complex Collision. Lightmaps. 2.2 Materials. Characteristics. Domain, Blend, Shading models. 2.3 Nodes, Textures, types and usage. 2.4 UV's handling. Variation over time. Flipbooks 2.4 Decals. Reflection capture.	A23, A24, B06, B07, B08, B09, B10, B11, B13.	MAG00, MAG06, MAG19, MAG39, MAG41, MAG42.	SEG41, SEG42.
Topic	TOPIC 3.- Materials II: 3.1 Parametrization. Parameter Collection 3.2 Instances. Hierarchies 3.3 Material Functions 3.4 Physical Materials	A23, A24, B06, B07, B08, B09, B10, B11, B13.	MAG00, MAG06, MAG19, MAG39, MAG41, MAG42.	SEG41, SEG42.
Topic	TOPIC 4.- Terrain and Landscape: 4.1 Terrain Modelling 4.2 Landscape Materials 4.3 Foliage and Landscape elements 4.4 Fog, Sky, Postprocess volumes 4.5 External models insertion.	A23, A24, B06, B07, B08, B09, B10, B11, B13.	MAG00, MAG06, MAG19, MAG39, MAG41, MAG42.	SEG41, SEG42.
Topic	TOPIC 5.- Interaction Programming I. Introduction: 5.1 Introduction to visual programming. Blueprint 5.2 Classes. Components. Construction Script. Event graph 5.3 Events.Timelines 5.4 Collision handling. Hits and Overlaps 5.5 Development of interactive elements I. Mobiles. Teletransport. Launching. Plataforms. Doors. Physics,	A23, A24, B06, B07, B08, B09, B10, B11, B13.	MAG00, MAG06, MAG19, MAG39, MAG41, MAG42.	SEG41, SEG42.
Topic	TOPIC 6.- Interactive Programming II. Scene elements: 6.1 Lights. Types and features. Point, Directional, Spotlight. Area. Skylight. 6.2 Movility. Static. Stationary. Mobile. 6.3 Cameras. 1st 3rd Person cameras. General, Follow camera, Camera to texture. 6.4 Camera management	A23, A24, B06, B07, B08, B09, B10, B11, B13.	MAG00, MAG06, MAG19, MAG39, MAG41, MAG42.	SEG41, SEG42.
Topic	TOPIC 7.- Interaction Programming III. Casting: 7.1 Communication between actors. Casting 7.2 Damage. Types and management. 7.3 Health and Ammunition systems 7.4 Dispensers.	A23, A24, B06, B07, B08, B09, B10, B11, B13.	MAG00, MAG06, MAG19, MAG39, MAG41, MAG42.	SEG41, SEG42.
Topic	TOPIC 8.- Interaction programming IV. Spawn:	A23, A24, B06, B07,	MAG00, MAG06,	SEG41, SEG42.

Content unit	Description	Education and learning outcomes / competences	Teaching methodologie and training activities	Assessment systems
	8.1 Spawn. Appearance of In-Game Elements 8.2 Line Tracing 8.3 Weapons. Projectiles 8.4 Spawn. NPC's. Navigation volume. Basic AI	B08, B09, B10, B11, B13.	MAG19, MAG39, MAG41, MAG42.	

4. Teaching methodologies and training activities

Modality In-person					
Methodology	**Description**	**In-person teaching hours**	**Virtual teaching hours**	**Independer study hours**	**Education and earning outcomes / competences**
Personalized attention [MAG00]	Continuous feedback and guidance for the student during the completion of their individual project. These methodologies will also be available to students with recognized part-time enrollment and those granted academic dispensation from attendance.	1,00	0,00	0,00	
Directed discussion [MAG06]	Identify and formally document commonalities between the subject matter and other disciplines within the degree program.	6,00	0,00	0,00	B11, C01, C04, C08.
ICT practicals [MAG19]	Utilization of computer programs and evaluation of outcomes.	2,00	0,00	18,00	B08, C03.
Guest lecture / keynote speech [MAG39]	Acquire, comprehend, and synthesize knowledge presented by the instructor via in-person class attendance.	20,00	0,00	30,00	A10, A23.
Problem solving [MAG41]	Identify and resolve problems pertaining to the acquired knowledge to grasp its practical application.	20,00	0,00	26,00	A24, B01, B02, B03, B07, B10, C01, C09.
Supervised projects [MAG42]	Undertake an individual coursework under the supervision of the instructor.	3,00	0,00	24,00	A24, B03, B04, B05, B06, B09, B12, B13, B14, C04, C06, C07.
	Sum of hours by type	**52,00**	**0,00**	**98,00**	
			Total hours	**150,00**	

5. Assessment

Modality In-person			
Assessment system	**Description**	**Weighting (%)**	**Education and learning outcomes / competences**
Problem solving [SEG41]	Solving problems associated with each of the topics.	30,00	A24, B01, B02, B03, B07, B10, C01, C09.
Supervised projects [SEG42]	Development of a project that compiles and showcases the entirety of the knowledge acquired throughout the course.	70,00	A24, B03, B04, B05, B06, B09, B12, B13, B14, C04, C06, C07.

Assessment system	Description	Weighting (%)	Education and learning outcomes / competences
	Total (%)	**100,00**	

All aspects related to academic exemption, study dedication, retention, and academic fraud will be governed in accordance with the current academic regulations of the UDC.

5.1. First opportunity

Students must submit the various assignments given throughout the course by their due dates and complete an individual project.

To pass the course, students are required to submit these assignments, which will account for 30% of the final grade, and the course project, which will weigh 70% of the final grade.

All matters related to "academic waiver," "study dedication," "attendance/enrollment," and "academic fraud" will be governed by the current academic regulations of the UDC.

5.2. Second opportunity

The assessment criteria for the second examination opportunity will be the same as those for the first. Grades obtained for completed practical assignments throughout the course will be carried over.

5.3. Early opportunity

The evaluation conditions for the early opportunity will be the same as those for the first or second opportunities of the corresponding course.

5.4. Academic exemption

Students granted academic exemption must submit the practical assignments and the course project to receive a grade.

All matters related to "academic exemption" will be governed by the UDC's current academic regulations.

6. Recommended bibliography

Basic bibliography

- Castillo, Travis., Novak, Jeannie, 1966- (2008). Game development essentials : game level design. Delmar. Book. [URL]
- Dunniway, Troy., Novak, Jeannie, 1966- (2008). Game development essentials : gameplay mechanics. Thomson Delmar Learning. Book. [URL]
- Epic Games Unreal Engine Documentation. Another. [URL]
- Hight, John, 1960-, Novak, Jeannie, 1966- (2008). Game development essentials : game project management. Thomson Delmar Learning. Book. [URL]
- Krawczyk, Marianne., Novak, Jeannie, 1966- (2006). Game development essentials : game story & character development. Thompson Delmar Learning. Book. [URL]
- Novak, Jeannie, 1966- (2012). Game development essentials : an introduction. Delmar Cengage Learning, 3rd ed.. Book. [URL]
- Romero, Marcos, autor, Sewell, Brenden, autor (2022). Blueprints visual scripting for Unreal Engine 5. Packt Publishing, Third edition. Book. [URL]
- Tavakkoli, Alireza (2019). Game development and simulation with unreal technology. CRC Press, 2nd ed.. Book. [URL]

Supplementary bibliography

- - (2010). 3D Interaction. Alphascript Publishing. Book. [URL]
- Foley, James D. (1996). Computer graphics : principles and practice. Addison-Wesley, 2nd ed. in C. Book. [URL]
- Lee, Joanna, author. (2016). Learning Unreal Engine game development : a step-by-step guide that paves the way for developing fantastic games with Unreal Engine 4. Packt Publishing, 1st edition. Book. [URL]
- Lengyel, Eric. (2018). Mathematics for 3D game programming and computer graphics. Course Technology Cengage Learning, 3rd edition. Book. [URL]
- Sewell, Brenden (2015). Blueprints Visual Scripting for Unreal Engine : build professional 3D games with Unreal Engine 4's Visual Scripting system. Packt Publishing. Book. [URL]
- Watt, Alan. (2000). 3D computer graphics. Addison-Wesley, 3rd ed.. Book. [URL]