UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Uvod v virtualno in razširjeno resničnost
Course title:	Introduction to virtual reality and augmented reality

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Računalništvo in spletne tehnologije, visokošolski strokovni študijski program prve stopnje	-	Drugi ali Tretji	Četrti ali šesti
Computer Science and Web Technologies, first cycle Professional Study Programme	-	Second or third	Fourth or sixth

Vrsta predmeta / Course type	Izbirni / Elective
Univerzitetna koda predmeta / University course code:	2-RST-VS-IP-UVRR-2022-12-16

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	-	45	-	-	105	6

Nosilec predmeta / Lecturer:	

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovenian, angleški / English
	Vaje / Tutorial:	slovenski / Slovenian, angleški / English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Zaželeno je, da ima študent temeljno znanje 3D animacije in 3D modeliranja, znanje programskega jezika C# in temeljno znanje s področja oblikovanja grafičnih uporabniških vmesnikov (GUI), vendar to niso pogoji.	Students should have the basic knowledge of 3D animation & 3D modeling, C# and design of graphical user interfaces (GUI), although it is not conditional.

Vsebina:

- Namestitev programskega okolja Unreal Engine in ustvarjanje novega projekta
- Pregled pogona: Uvod in uporaba urejevalnika Unreal Editor: navigacija, izbirni načini, vsebinski brskalniki , paneli, itd.
- Pozicioniranje in preoblikovanje različnih »akterjev« (kamera, statični mrežni objekti ali začetna lokacija igralca)
- Gradnja igralnega okolja in uporaba Nanita
- Ustvarjanje in apliciranje senčil in materialov s pomočjo urejevalnika materialov
- Osvetlitev »sveta« in uporaba Lumena
- Postavitev in vključevanje 3d animacije likov
- Osnove Unreal interaktivnega / prostorskega zvoka
- Dodajanje in oblikovanje zvokov in zvočnih učinkov z uporabo MetaSounds sistema
- Uvod v fiziko in sile za simulacijo
- Osnovni pregled sistema delcev
- Osnovna orodja in principi vizualnih učinkov: Chaos Engine, Niagara Particles
- Animacija in gibanje kamere
- Blueprint: vizualno skriptiranje
- Dobre prakse pri oblikovanju iger

Content (Syllabus outline):

- Installing the Unreal Engine programming environment and creating a new project
- Drive overview: Introduction and use of the Unreal Editor: navigation, selection modes, content browsers, panels, etc.
- Positioning and reshaping of various "actors" (camera, static mesh objects or starting location of the player)
- Building a gaming environment and using Nanite
- Creating and applying shaders and materials using the material editor
- Illumination of the "world" and the use of Lumen
- Layout and inclusion of 3d animation of characters
- Basics of Unreal interactive/surround sound
- Adding and designing sounds and sound effects using the MetaSounds system
- Introduction to physics and forces for simulation
- Basic overview of the particle system
- Basic tools and principles of visual effects: Chaos Engine, Niagara Particles
- Animation and camera movement
- Blueprint: visual scripting
- Good practices in game design

Temeljni literatura in viri / Readings:

- Sargey R. (2023). Unreal Engine 5: Dive into the world of game development with Unreal Engine 5 to build amazing 3d games
- Marcos R., Brenden S. (2022). Blueprints Visual Scripting for Unreal Engine 5: Unleash the true power of Blueprints to create impressive games and applications in UE 5
- LaViola J., Kruijff E, Bowman D., Poupyrev I., McMahan R.: 3D User Interfaces: Theory and Practice

Drugi viri:
https://dev.epicgames.com/community/learning?application=unreal_engine

Cilji in kompetence:

Učna enota prispeva k razvoju naslednjih splošnih in predmetno-specifičnih kompetenc:

Splošne kompetence:

- poznavanje osnov računalništva in informacijske tehnologije
- usposobljenost za izvajanje vseh faz razvoja računalniških aplikacij: načrtovanje, razvoj, zagon, prodaja, vzdrževanje

Predmetno-specifične kompetence:

- Sposobnost ustvarjanja interaktivnega prototipa
- Sposobnost vključevanja (AR&VR) žanrsko specifičnih konvencij
- Obvladovanje temeljnih postavitev za ustvarjanje ravni računalniške igre
- Sposobnost zaznave in oblikovanj različnih elementov igranja (postavitve luči in kamere, animacija, posebni učinki, zvok)
- Sposobnost oblikovanja in implementacije ustreznih 2d in 3d arhiv objektov, ki bodo uporabljeni v interaktivnem prototipu
- Testiranje in preoblikovanje interaktivnega prototipa; učinkovito reševanje problemov

Objectives and competences:

The instructional unit contributes to the development of the following general and subject-specific competences:

General competences:

- familiarity with the basics of computer science and information technology
- competence to carry out all phases in the development of computer applications: planning, development, start-up, sales, maintenance

Subject-specific competences:

- The ability to build an interactive prototype
- The ability to incorporate (AR&VR) genre specific conventions
- Mastering the fundamental layouts for creating computer game level
- Demonstrating the ability to identify and create different gameplay elements (lighting and camera settings, animation, VFX, sound)
- Demonstrating the ability to implement and finalize relevant 2D and 3D assets for use in interactive prototype.
- Interactive prototype testing and redesign; effective problem solving

Predvideni študijski rezultati:

Znanje in razumevanje:

Študent/študentka:

- zna učinkovito uporabljati ključne elemente vmesnika za ustvarjanje osnovnih interaktivnih okolij
- zna uvoziti 3-D predmete iz drugih programskih okolij
- zna uporabljati urejevalnik materialov
- zna uporabiti statično in dinamično osvetlitev

Intended learning outcomes:

Knowledge and understanding:

The student:

- Knows how to effectively use the key interface elements to create basic interactive environments
- knows how to import 3-D objects and from other programs
- Knows how to use the material editor to set up materials
- Knows how to apply static and dynamic lighting

• pridobi osnovne veščine kodiranja za gradnjo poglobljene interaktivne funkcionalnosti. • zna uporabiti temeljna načela pri ustvarjanju PBR materialov znotraj programskega okolja Unreal Engine • zna ustvariti fiziko in sile za simulacijo • zna uporabljati orodja za animacijo, preoblikovanje in simulacijo blaga.	• gains basic coding skills for building immersive interactive functionality. • Knows how to apply essential principles for building PBR Materials inside of the Unreal Engine • Knows how to create physics and forces for simulation • Knows how to use the tools for animations, morphs and cloth simulation.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predmet je organiziran kot kombinacija predavanj, vaj, samostojnega učenja in mentorstva. Poučevanje na skupnih predavanjih in posameznih delovnih / individualnih nalogah.	The lectures are structured as a combination of lectures, practical exercises, weekly projects, self-study and supervision. Teaching in group sessions and individual work/individual assignments

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
• domače naloge	40 %	• homeworks
• končni interaktivni prototip	60 %	• final interactive prototype (VR & AR application)