VIDZEMES AUGSTSKOLA

FACULTY OF ENGINEERING
STUDY COURSE DESCRIPTION

Course Title:	**Development of advanced 3D interactive environments (Unreal)**			
Course code (LAIS):	*DatZM021*			
Study programme:	**Virtual reality and smart technologies**			
Level of Study programme:	☐ Short-cycle professional higher education			
	☐ Professional Bachelor			
	☐ Professional Master			
	☒ Academic Master			
	☐ PhD level			
Type of Study programme:	☒ Compulsory course (Part A)			
	☐ Professional specialization courses (Part B, compulsory)			
	☐ Professional specialization optional courses (Part B, optional)			
	☐ Elective courses (Part C)			
Course Workload:	**Credits/ ECTS**	**Academic hours**	**Contact hours**	**Independent work hours**
	6	150	48	102
Course Author/ Tutor:	**Laura Ozoliņa**			
	Guest lecturer Mg.sc.comp.			
	Laura.Ozolina@va.lv			
	Consultation: according to the schedule for each semester			
Course Form:	Full time			
Study year, semester:	1st year, 1st semester			
Language:	Latvian, English			
Prerequisites for the Course:	Grounding knowledge in programming			
Course Summary:	Course's objective is to give a general view into a three-dimentional environment development cycle and its basic principles and theoretical and practical knowledge in development of virtual and augmented reality systems.			
Assessment:	Exam			
Requirements for Credits:	Final grade consists of oral and practical exam task grades.			
Abiding by the Academic Ethics	Students must abide by the academic and research ethics, Vidzeme University of Applied Sciences Ethics Regulations, incl.: - study papers must be independently developed; - the study work should reference all statements, ideas and data used that have been authored by someone else; - appropriate data acquisition methods should be used in the acquisition of data, the research ethics must be respected, empirical data must be collected independently and cannot be distorted or falsified; - the examination must be carried out by the student independently, without the use of supporting materials and/or consultations with other students, unless the lecturer states otherwise. In the event of non-compliance with the academic and research ethics, punishment is imposed in accordance with the ViA Ethics Regulations and the study course must be re-taken, unless the punishment is extramarital.			
Learning Outcomes; the evaluation methods and criteria	**Learning Outcomes**		**The evaluation methods and criteria**	
	Knowledge			

	Theoretical knowledge of how Unreal engine operates.	Individual oral exam
	Theoretical knowledge of basic principles of development of virtual and augmented reality systems.	Individual oral exam
	Theoretical knowledge of creation of different interactive content.	Individual oral exam
	Skills	
	Use and manage Unreal engine.	Individual oral and practical exam
	Develop interactive 3D experiences.	Individual oral and practical exam
	Create different virtual and augmented reality environments.	Individual oral and practical exam
	Competency	
	Use correct 3D development terminology	Individual oral exam
	Independently plan different 3D experience arhitectures, develop and support them, predict possible problemsituations.	Individual oral and practical exam
	Evaluate and analyse different possible approaches in creation of interactive 3D content.	Individual oral and practical exam
Course Compulsory literature:		
Course additional literature:	1. Marcos Romero, Brenden Sewell *Blueprints Visual Scripting for Unreal Engine - Second Edition 2nd ed. Edition* 2. Marcos Romero, Brenden Sewell, *Blueprints Visual Scripting for Unreal Engine 5: Unleash the true power of Blueprints to create impressive games and applications in UE5 3rd ed. Edition*, 2022	
Course confirmation date:	*22.05.2024*	
Date of course description update:	01.10.2024	

Study Course Plan:

Date	Theme	Academic hours		Study Form
		Contact hours	Independent work hours	
	Intro in Unreal and 3D engines. Unreal UI hierarchy entities and their components. Visualisation. Topical research on Unreal Enginge	**4**	**2**	*Theory, practical lession.*
	Perspective and orthographic camera projections. Unreal Physics.	**4**	**4**	*Theory, practical lession.*
	Unreal user inferface system.	**4**	**8**	*Theory, practical lession.*

	Unreal application programming interface (API).			
	Unreal Bluepring visual scripting Transformation mathematics.	**4**	**8**	*Theory, practical lession.*
	Optimisation. Coroutines. Interpolations and extrapolations.	**4**	**8**	*Theory, practical lession.*
	Surface shaders. Vert/Frag shaders.	**4**	**8**	*Theory, practical lession.*
	Virtual and augmented reality. Object recognition and tracking, Motion tracking. Image recognition and tracking.	**4**	**15**	*Theory, practical lession.*
	Rendering techniques. Postprocessing effects.	**4**	**10**	*Theory, practical lession.*
	Dynamic materials Surrounding light Lumen estimation and shaders	**4**	**15**	*Theory, practical lession.*
	Objektu atpazīšana. Kustības izsekošana. Attēla iezīmju atpazīšana. Facial recognision	**4**	**10**	*Theory, practical lession.*
	Environmental understanding. Environmental light estimation.	**4**	**14**	*Theory, practical lession.*
	Exam.	**4**	**-**	*Individual exam with oral questions and practical assignment.*
	Hours total	***48***	***102***	