POLYTECHNIC OF MEĐIMURJE IN ČAKOVEC

COURSE SYLLABUS

ACADEMIC YEAR: 2021/2022

1. GENERAL COURSE INFORMATION				
1.1 Course name	**Computer visualizations**			
1.2 Study program/s	Undergraduate professional study Sustainable Development			
1.3 Course status (O,E)	Obligation	**1.6 Mode of instruction (number of hours)**	**Lectures**	15
1.4 Course code			**Exercises**	30
1.5 Course abbreviation	RV		**Seminars**	
1.6 Semester	VI		**E-learning**	
1.7 ECTS	4	**1.7 Place and time of instruction**	Premises of the Polytechnic of Međimurje in Čakovec, according to the schedule published on the website	
2. TEACHING STAFF				
2.1 Course leader/s-title	prof. Sarajko Baksa, Ph.D.	**contact**	sbaksa@mev.hr	
	- - -	**contact**	- - -	
2.2 Assistant/s- title	- - -	**contact**	- - -	
	- - -	**contact**	- - -	
2.3 Instruction held by- title	- - -	**contact**	- - -	
3. COURSE DESCRIPTION				
3.1 Course goals	The aim of the course is to firmly define and adopt the principles of work that are differentiated into a 3D visualization segment of visuals. Also a key aspect is the ultimate goal, which is static and dynamic spatial visualization of virtual environmental systems.			
3.2 Prerequisites	Passed courses; Technical drawing and Structural modeling.			
3.3 Course outcomes	After successfully passing the course, the student will be able to: 1. Select and apply work methodology, basic adjustment and project formulation. 2. Design and guide modeling in classical ways, and recognize the specifics of 3D objects. 3. Calculate and dimension the spatial hierarchy and use of maps and materials. 4. Identify and adjust 3D lighting and system operation. 5. Design and build animation segments of visuals. 6. Generate classic rendering as well as project rendering. 7. Valorize and explain advanced topological modeling as well as hard surface optimized modeling. 8. Construct and determine the optimization of texture maps and materials. 9. Create realistic virtual simulations of rigid and elastic bodies. 10. Edit the render elements in the finished visual.			
3.4 Course content	The course presents contents related to the performance of visuals of buildings, created using modern 3D application computer programs.			

3.5 Types of coursework

x	Lectures	x	Exercises	x	Blended e-learning	x	Individual activities		Laboratory
x	Seminars and workshops	x	Distant learning	x	Field classes	x	Multimedia and network	x	Mentorship
	Other								

3.6 Language of instruction

Croatian / English

3.7 Monitoring students' work (enter the number of ECTS credits for each activity so that the total number of ECTS credits is equal to the total ECTS value of the course, 1 ECTS = 30 hours)

1,5	Class attendance	0,2	Seminars		Essay
	Class activity	0,2	Project		Report/paper
0,2	Midterm exams	0,2	Practical task	0,2	Continuous knowledge check
1,0	Written exam		Experimental work		
0,5	Oral exam		Research		

3.8 Assessment and evaluation of students' work during classes and at the final exam

Activity specification	Percent %	Points
Assessment during instruction		
Attendance	5%	5
Class activity	5%	5
Project / Practical work	20%	20
Seminar / Colloquium I	20%	20
Seminar / Colloquium II	20%	20
Oral exam	30%	30
Exam assessment for the students who failed to fullfil all the obligatory requirements during the semester		
Written exam	*60%*	*60*
Total:	**100%**	**100**

3.9 Assessment criteria – analysis per learning outcomes

Ways of evaluating learning outcomes							
	Atten-dance	**Activity**	**Project**	**Mid-term exam 1**	**Mid-term exam 2**	**Practic work**	**Total**
Outcome 1			2	4		3	9
Outcome 2			2	4		3	9
Outcome 3			2	4		3	9
Outcome 4			2	4		3	9
Outcome 5			2	4		3	9
Outcome 6			2		4	3	9
Outcome 7			2		4	3	9
Outcome 8			2		4	3	9
Outcome 9			2		4	3	9
Outcome 10			2		4	3	9
Outcome not-related	5	5					10
Total	**5**	**5**	**20**	**20**	**20**	**30**	**100**

The course has defined 10 learning outcomes, a system of scoring outcomes, in order to pass the exam the student must achieve at least 50% points for each learning outcome.

	The grade is calculated as follows: • 87.51-100.00 points: rating Excellent (5) • 75.01- 87.5 points: rating Very good (4) • 62.51 -75.00 points: rating Good (3) • 50.01- 62.5 points: rating Pass (2) • 00.00- 50.00 points: rating Fail (1)	
3.10 Specific features related with taking the course	If the student collects 50% of the points of each outcome, he / she directly takes the exam, provided that he / she has done practical work (seminars / project). During the exam, it is possible to orally check the knowledge from practical work (seminars / project). Once earned points for each learning outcome are no longer deleted unless the student, with the express approval of the course leader, decides to correct the result for each learning outcome, whereby the points won are deleted and newly earned points for that learning outcome are entered. The final grade is obtained on the exam period and is the sum of points earned during classes. Students who did not take the colloquium access the written part of the exam where all learning outcomes are checked, and are required to have completed practical work (seminars / project) before taking the exam.	
3.11 Students obligations	Full-time students are required to attend at least 70% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. Part-time students are required to attend at least 30% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. If the student has not fulfilled all the obligations set by the course, he is obliged to attend the lectures again and meet the conditions for taking the exam. Attendance can be offset by online tuition, organised webinars and added assignments given by teachers. One lesson lasts 45 minutes, and several hours form a teaching unit. Absence from one teaching unit is counted as one absence. Delays and apologies are recorded separately. In that case, if the student missed more than 50% of classes, and has a justifiable reason/apology, the request should be submitted to the Department Council, which then decides on the justification of student absences with the obligatory opinion of the course leader.	
3.12 Written assignments	Seminars / Projects	
3.13 Required reading	1.	Igor S. Pandžić: Virtualna okruženja, Računalna grafika u stvarnom vremenu i njene primjene Element d.o.o. Zagreb, 2004.
	2.	
3.14 Additional reading	1.	
	2.	

4 ADDITIONAL COURSE INFORMATION	
4.1 Quality control	The quality of the program, teaching process, teaching skills and level of mastery of the material will be established by conducting a written evaluation based on questionnaires, and in other standardised ways and in accordance with the by-laws of the Polytechnic of Međimurje in Čakovec.
4.2 Contact the teacher	Students can contact the teacher during the office hours and during classes, while for short questions and explanations they can contact him/her any day during working hours by coming in person or by landline. It is possible to ask questions and e-mail which will be answered as soon as possible.
4.3 Information about the course	It is the obligation of each student to be regularly informed about the course. All relevant information and notices related to classes and exams, maintenance or any year, will be reported in a timely manner on the bulletin board and on the website of the Polytechnic of Međimurje in Čakovec.
4.4 Course contribution to the study program	Course contribution to the study program in generic learning outcomes; I1 - Interpret information, ideas, problems and solutions to professional and General public, I2 - Use new technologies and techniques as part of a lifelong process Learning. The contribution of the course to the study program in specific learning outcomes; I6 - Solve engineering problems of sustainable development by applying mathematics, physics, chemistry and biology, I7 - Analyze collected data in the field of sustainable development, I8 - Interdisciplinary to solve engineering problems of sustainable development, I11 - Apply basics of thermoenergetics, thermodynamics and hydromechanics in spatial design of thermodynamic systems, I12 - Develop a technical plan in the field of design of Mechanical Thermotechnical System, I14 - Apply and monitor conventional heating, cooling, and ventilation systems and devices, I15 - Maintain thermotechnical systems and thermal distribution networks I16 - Propose technical changes and upgrades to conventional ones thermotechnical systems in the direction of sustainable development.

5. ANALYSIS OF COURSE TOPICS (the number of hours is equal to the number of lectures and exercises of the course)

LECTURES

Hours	Topic and description	Method • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes…	Learning outcomes	Course outcome
1.	Introduce students to the lecture program, teaching conditions, literature and criteria for evaluating knowledge. Methodology of work, basic adjustment and formulation of the project.	Lecture, Discovery learning, Presentation	Use project knowledge of perspective projection 3D visuals	I1

2.	Modeling in classical ways, and elaboration of the specifics of mesh / poly objects	Lecture, Discovery learning, Presentation	Distinguish systems and features of various modeling methods.	I2
3.	Hierarchy and use of matter, dependence on final visualization, and lighting and render calculations.	Lecture, Discovery learning, Presentation	Distinguish principles and hierarchy of material parameters	I3
4.	Understanding of lighting and work systems, and the impact on the duration of the project.	Lecture, Discovery learning, Presentation	Use 3D virtual lighting features	I4
5.	Animation from objects and materials, to parameters and lighting.	Lecture, Discovery learning, Presentation	Use the principles of dependent animation	I5
6.	Classic rendering as well as project rendering.	Lecture, Discovery learning, Presentation	Apply a variety of rendering models	I6
7.	Advanced modeling, work with topology, preparation of models for animation, hard surface optimized modeling.	Lecture, Discovery learning, Presentation	Apply and distinguish input and output 3D modeling features	I7
8.	Elaboration of texture maps, mental ray materials and shaders, optimization through texture maps.	Lecture, Discovery learning, Presentation	Apply and distinguish features of optimized 2D and 3D folders	I8
9.	Lighting via 3point light system, light array, global illumination and indirect illumination and HDRI lighting.	Lecture, Discovery learning, Presentation	Apply and distinguish input and output 3D lighting features	I9
10.	Preparation of models for animation, rigging, FK and IK solvers, morphing.	Lecture, Discovery learning, Presentation	Apply and distinguish features of expanded animation models	I9
11.	Particles, particle flow, scripting.	Lecture, Discovery learning, Presentation	Apply a variety of 3D spatial particle scripting models	I9
12.	Creating realistic simulations of solid and elastic bodies.	Lecture, Discovery learning, Presentation	Use and explain a realistic simulation of solid and elastic physical 3D systems.	I9
13.	Lighting effects, particles.	Lecture, Discovery learning, Presentation	Explain the preparation and use of 3D spatial effects factors	I10
14.	Use of masks and layers for correction; creating backgrounds for models.	Lecture, Discovery learning, Presentation	Explain the construction elements of the use of masks and layers	I10
15.	Merging render elements into a finished visual.	Lecture, Discovery learning, Presentation	Apply engineering merging render elements into the final ambiguous visual	I10
EXERCISES/ SEMINARS				
Hours	**Topic and description**	**Method** • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes…	**Learning outcomes**	**Course outcome**

1.	Introduce students to the lecture program, teaching conditions, literature and criteria for evaluating knowledge. Methodology of work, basic adjustment and formulation of the project.	Lecture, Discovery learning, Presentation	Use project knowledge of perspective projection 3D visuals	I1
2.	Modeling in classical ways, and elaboration of the specifics of mesh / poly objects	Lecture, Discovery learning, Presentation	Distinguish systems and features of various modeling methods.	I2
3.	Hierarchy and use of matter, dependence on final visualization, and lighting and render calculations.	Lecture, Discovery learning, Presentation	Distinguish principles and hierarchy of material parameters	I3
4.	Understanding of lighting and work systems, and the impact on the duration of the project.	Lecture, Discovery learning, Presentation	Use 3D virtual lighting features	I4
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8.	Elaboration of texture maps, mental ray materials and shaders, optimization through texture maps.	Lecture, Discovery learning, Presentation	Apply and distinguish features of optimized 2D and 3D folders	I8
9.	Lighting via 3point light system, light array, global illumination and indirect illumination and HDRI lighting.	Lecture, Discovery learning, Presentation	Apply and distinguish input and output 3D lighting features	I9
10.	Preparation of models for animation, rigging, FK and IK solvers, morphing.	Lecture, Discovery learning, Presentation	Apply and distinguish features of expanded animation models	I9
11.	Particles, particle flow, scripting.	Lecture, Discovery learning, Presentation	Apply a variety of 3D spatial particle scripting models	I9
12.	Creating realistic simulations of solid and elastic bodies.	Lecture, Discovery learning, Presentation	Use and explain a realistic simulation of solid and elastic physical 3D systems.	I9
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14.	Use of masks and layers for correction; creating backgrounds for models.	Lecture, Discovery learning, Presentation	Explain the construction elements of the use of masks and layers	I10
15.	Merging render elements into a finished visual.	Lecture, Discovery learning, Presentation	Apply engineering merging render elements into the final ambiguous visual	I10