SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Automation and Computer Science
1.3	Department	Automation
1.4	Field of study	Systems Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Cyber-phisical systems
1.7	Form of education	Full time
1.8	Subject code	8.00

2. Data about the subject

2.1	Subject name			Augemented and virtual reality				
2.2	Subject area			Engineering				
2.2	Course responsible/lecturer			Assoc prof. dr. ing. Levente Tamas				
2.3	Teachers in charge of seminars			Assoc prof. dr. ing. Levente Tamas				
2.4 Year of study		1	2.5 Semester	2	2.6 Assessment			E
2.7 Subject category		Formative category						DS
		Optionality						DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	1	3.3 Seminar		3.3 Laborator	2	3.3 Proiect	0
3.4 Total hours in the curriculum	100	of which	3.5 Course	14	3.6 Seminar		3.6 Laborator	28	3.6 Proiect	0

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	15
(b) Supplementary study in the library, online and in the field	15
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	15
(d) Tutoring	
(e) Exams and tests	3
(f) Other activities	10

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	General engineering knowledge. Advanced mathematics.
4.2	Competence	Software engineering, system analysis and design

5. Requirements (where appropriate)

5.1	For the course	Optional
5.2	For the applications	Compulsory

6. Specific competences

Professional competences	The design/adaptation/usage of the augmented/virtual reality systems in the Industry X.0 specific contexts. Innovative solutions for industrial perception/robot interaction with AR/VR systems Learning, practising and using AI based robotics systems
Cross competences	Cross competences for desing/analysis/solving of real life problems for autonomous robots with AR/VR interfaces Communication competences for using AI based robotics terminology and scientific language The cross-domain ability of adopting innovative solutions for the emerging robotics and AI domain

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	The adaption and usage of augmenter/virtual reality solutions for the Industry X.0
7.2	Specific objectives	Robotics and AI specific technologies

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. General aspects of the design/implementation of the AR/VR systems in the era of Industry X.0	2	Presentation using beamer/online shareing possible	The presentations include real life examples as well as case studies.
2. Main principles and architecture for augmented and virtual robotics&AI systems	2		
3. Main components of the AR/VR systems	2		
4. AI based AR/VR systems Echipamente specifice a unui sistem AR/VR	2		
5. AI based perception for the AR/VR	2		
6. Advaced localization and mapping in the 3D space	2		
7. AI based 3D reasoning within industrial systems	2		
Bibliography 1. A. Blaga, L. Tamas: AR applications în MES, 2021 2. D. Scaramuzza et.al. Autonomous mobile robots. MIT Press 2008. 3. Gh.Sebesteyen –Informatica industriala.Ed. Albastra Cluj-N. 2006 4. S. Thrun et. al.: Probabilistic Robotics, MIT, 2006			

8.2. Laboratory	Number of hours	Teaching methods	Notes
Introduction to AR/VR frameworks	4	Practical work including	Encouraging team work
Environment perception for the augmented world	4		

3D perception of the industrial environments	4	computation and discussion/or online variant on Teams	2-3 students in a group
Localization and tracking for AR/VR applications	2		

Bibliography
Bibliografie
www.rocon.utcluj.ro/arvr

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Lucrări practice pentru agenți cu AR/VR în mediul Industry X.0
Comunicarea cu roboți în era IA
Sisteme de percepție bazate pe IA

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Principii teoretice Capacitatea de a rezolva aplicații Capacitatea de analiza și sinteza.	Examen scris / în caz de forță majoră, on-line platforma Teams	0,6 (6 pts from 10)
10.5 Laboratory	Parcurgerea lucrărilor de laborator. Capacitatea de a finaliza și interpreta datele lucrării	Test pe baza aplicațiilor laborator/ în caz de forță majoră, on-line platforma	0,4 (4 pts from 10)
10.6 Minimum standard of performance			
5 out of 10			

Date of filling in: 16.03.2023		Title Surname Name	Signature
	Lecturer	Conf. dr. ing. Levente Tamas	
	Teachers in charge of application	Conf. dr. ing. Levente Tamas	

Date of approval in the department Automation	Head of department Prof.dr.ing. Honoriu Vălean
_____	
Date of approval in the faculty of Automation and Computer Science	Dean Prof.dr.ing. Liviu Miclea
_____	