

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	Computer Science
1.4 Field of study	Computer Science and Information Technology
1.5 Cycle of study	Master
1.6 Program of study / Qualification	Artificial Intelligence and Vision / Master
1.7 Form of education	Full time

2. Data about the subject

2.1 Subject name	Artificial Intelligence and Computer Vision Project 3			Subject code	18.00
2.2 Course responsible / lecturer	-				
2.3 Teachers in charge of seminars / Laboratory / project	Prof. dr. eng. Sergiu Nedevschi - Sergiu.Nedevschi@cs.utcluj.ro Prof. dr. eng. Potolea Rodica - Rodica.Potolea@cs.utcluj.ro Prof. dr. eng. Hangan Anca - Anca.Hangan@cs.utcluj.ro Assoc.prof.dr.eng. Mitrea Delia - Delia.Mitrea@cs.utcluj.ro Assoc.prof.dr.eng. Marginean Anca - Anca.Marginean@cs.utcluj.ro Assoc.prof.dr.eng. Giosan Ionel - Ionel.Giosan@cs.utcluj.ro				
2.4 Year of study	II	2.5 Semester	3	2.6 Type of assessment (E - exam, C - colloquium, V – verification)	C
2.7 Subject category	Formative category: DA – advanced, DS – speciality, DC – complementary				DS
	Optionality: DI – imposed, DO – optional (alternative), DF – optional (free choice)				DI

3. Estimated total time

3.1 Number of hours per week	2	of which:	Course	-	Seminars	-	Laboratory	-	Project	2
3.2 Number of hours per semester	28	of which:	Course	-	Seminars	-	Laboratory	-	Project	28
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										20
(b) Supplementary study in the library, online and in the field										10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										10
(d) Tutoring										10
(e) Exams and tests										5
(f) Other activities:										-
3.4 Total hours of individual study (suma (3.3(a)...3.3(f)))					55					
3.5 Total hours per semester (3.2+3.4)					125					
3.6 Number of credit points					4					

4. Pre-requisites (where appropriate)

4.1 Curriculum	Project 2 IVA
4.2 Competence	Related to the discipline above

5. Requirements (where appropriate)

5.1. For the course	It's not necessary
5.2. For the applications	Computers, equipment and specific software

6. Specific competence

6.1 Professional competences	C4 - Contextual integration and integrity of complex artificial intelligence and vision systems • C4.1 - Demonstration of knowledge and understanding of interoperability and integration elements specific to artificial intelligence and vision systems, taken both as a whole and on modules • C4.2 - Using interdisciplinary knowledge to adapt complex intelligence and artificial vision systems in relation to the dynamic requirements of the application field • C4.3 - The combined use of classic and original principles and methods for the integration of the components of artificial intelligence and vision systems • C4.4 - The use of quality, safety and security standards in information processing and in the integration of complex intelligence and artificial vision systems • C4.5 - Realization of interdisciplinary projects, including problem identification and analysis, elaboration of specifications, software design, implementation of functional testing and evaluation of specific quality, security and performance criteria, as well as validation of the integrated artificial intelligence and vision system C5 - The creative combination of multidisciplinary knowledge in the field of computer science and information technology in order to research, specify, design, optimize, implement, test and evaluate original theories, algorithms, techniques, methods and methodologies specific to complex systems of intelligence and artificial vision • C5.1 - Demonstrating knowledge of research methodology, design, implementation, optimization and testing of artificial intelligence and vision systems • C5.2 - Demonstrating the ability to analyze and interpret new situations through the prism of fundamental knowledge in the field of computers and information technology • C5.3 - The creative combination, based on the discovery of new semantic and functional links, of various modern design principles in the field of computers and information technology to solve optimization problems • C5.4 - Basing the research activity and innovative design in the field of computers on correct evaluation criteria • C5.5 - Carrying out research activities with practical purpose demonstrated through functional software and / or hardware prototypes
6.2 Cross competences	N/A

7. Expected Learning Outcomes

Knowledge	The student has knowledge of: • artificial neural networks • computer programming (Python) • computer simulation • digital data processing • principles of artificial intelligence • visual presentation techniques • machine learning (computer programming) • computer vision • lean project management • digital systems • image recognition • information structure • lean project management
Skills	The student is able to: • create data sets • define technical requirements • design processes • develop statistical software • use data processing techniques • build recommender systems • identify processes for re-engineering • manage ICT data classification • align software with system architectures • analyse business requirements • manage databases • use an application-specific interface
Responsibilities and autonomy	The student has the ability to work independently in order to: • develop an analytical approach • take a proactive approach • develop strategies to solve problems • be open-minded • coordinate engineering teams

8. Discipline objective (as results from the *key competences gained*)

8.1 General objective	The development of skills and abilities for the development of artificial vision systems in the field of intelligence and artificial vision, computers and information technology.
8.2 Specific objectives	Assimilation of knowledge and skills regarding: • developing the architecture of a software engineering application • designing the basic components of the application • elaboration of the design documentation

9. Contents

9.1 Lectures	Hours	Teaching methods	Notes
-			
Bibliography: -			
9.2 Applications - Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Introduction	2		
Implementation: Component Implementation (1)	2		

Implementation: Component Implementation (2)	2		
Implementation: Component Implementation (3)	2		
Implementation: Component Implementation (4)	2		
Implementation: Component Implementation (5)	2		
Implementation: Component Implementation (6)	2		
Component testing and troubleshooting (1)	2		
Component testing and troubleshooting (2)	2		
Integration and Installation	2		
Integration and validation testing (1)	2		
Integration and validation testing (2)	2		
Maintenance	2		
Elaboration and presentation of documentation and the final project	2		
Bibliography:			
[1] S.J. Russell, P. Norvig – Artificial Intelligence: A Modern Approach, Prentice Hall, 2009			
[2] D. Forsyth, J. Ponce „Computer Vision A Modern Approach”, Prentice Hall, USA, 2002			
[3] G.C. Burdea, P. Coiffet – Virtual Reality Technology (2nd edition), J. Wiley & Sons, 2003.			
[4] C. Manning and H. Schultze – Foundations of Statistical Natural Language Processing, MIT Press. Cambridge, MA: May 1999.			
[5] R.S. Pressman – Software Engineering, A Practitioner’s Approach, McGraw-Hill, 7/e, 2009			
[6] Convolutional Neural Networks for Visual Recognition, http://cs231n.stanford.edu/			
[7] Papers from A* conferences and Q1 Journals			

**Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.*

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

It is carried out through periodic meetings with representatives of the economic environment.

11. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	-	-	-
Seminar	-	-	-
Laboratory	-	-	-
Project	Based on the practical results and the elaborated report	Oral examination, Report evaluation	60% 40%
Minimum standard of performance: Both, Written examination and Oral examination, marks are bigger or equal with 5			

Date of filling in: 01.09.2025	Responsible	Title First name Last name	Signature
	Course	-	
	Applications	Prof. dr. eng. Sergiu NEDEVSCI	
		Prof. dr. eng. Rodica POTOLEA	
		Prof. dr. eng. Anca HANGAN	
		Assoc.prof.dr.eng. Delia MITREA	
		Assoc.prof.dr.eng. Anca MARGINEAN	
		Assoc.prof.dr.eng. Ionel GIOSAN	

Date of approval in the department 17.09.2025	Head of department, Prof.dr.eng. Rodica Potolea
Date of approval in the Faculty Council 19.09.2025	Dean, Prof.dr.eng. Vlad Mureşan