

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	Research Activity 2			Subject code	12.00
2.2 Course responsible / lecturer	-				
2.3 Teachers in charge of seminars / Laboratory / project	-				
2.4 Year of study	I	2.5 Semester	2	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	14	of which:	Course	-	Seminars	-	Laboratory	-	Project	14
3.2 Number of hours per semester	196	of which:	Course	-	Seminars	-	Laboratory	-	Project	196
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										-
(b) Supplementary study in the library, online and in the field										10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										25
(d) Tutoring										15
(e) Exams and tests										4
(f) Other activities:										-
3.4 Total hours of individual study (suma (3.3(a)...3.3(f)))					54					
3.5 Total hours per semester (3.2+3.4)					250					
3.6 Number of credit points					10					

4. Pre-requisites (where appropriate)

4.1 Curriculum	Research Activity 1
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	C3 - Specification, analysis, modeling, design, verification, testing, validation, and maintenance of advanced artificial intelligence and vision systems and software components, using field-specific tools • C3.1 - Demonstrating knowledge of the domain, programming environments, and concepts of artificial intelligence and vision systems • C3.2 - Analysis of the interactions and mode of operation of the components of complex artificial vision systems proposed in the scientific literature • C3.3 - Analysis, modeling and innovative design of artificial intelligence and vision systems, of related hardware and software components • C3.4 - Comparative, synthetic, including experimental evaluation of solution alternatives for performance optimization, based on usability criteria • C3.5 - Developing and implementing original solutions for domain-specific problems, starting from a set of informally specified requirements 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
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	Development of research and design skills and competencies in the field of intelligence and artificial vision, computers and information technology
8.2 Specific objectives	Assimilation of knowledge and skills regarding: • elaboration of the general scheme or the architecture of the artificial intelligence and vision system to be developed • performing experiments, tests and checks • stating some working hypotheses and validating them through experiments • designing the components of an application system

9. Contents

9.1 Lectures	Hours	Teaching methods	Notes
-			
Bibliography. Not necessary			
9.2 Applications - Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Establishing the theme of the dissertation project;			
Establishing the main chapters;			

Documentation on the dissertation topic;			
Creating a synthesis regarding the bibliographic documentation			
Bibliography: Established by each advisor in accordance with the research topics			

**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: Average 5			

Date of filling in: 01.09.2025	Responsible	Title First name Last name	Signature
	Course	-	
	Applications	Dissertation Thesis Advisor	

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 Mureșan