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	**20.00**
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)	V
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										25
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										25
(d) Tutoring										-
(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 1,2 and 3
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	**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 artificial intelligence and vision systems. • **C5.1** - Demonstrated knowledge of artificial intelligence and vision systems research, design, implementation, optimization and testing methodologies • **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	**CT1** - Demonstrating knowledge of the economic, ethical, legal and social context of exercising the profession for identifying tasks, planning activities and opting for responsible decisions, culminating in the conception, drafting and presentation of a scientific paper **CT2** - The clear and concise description of the flow of activities, tasks and results in the field of activity, obtained either after assuming the role of leader / project manager, or as a member of a research team, thanks to: the ability to synthesize information from the field, the overall global vision, communication skills with collaborators, the ability to define activities by stages **CT3** - Practicing the continuous self-education and demonstrating critical, innovative and research skills

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: • integration of the components of the completed application system • testing and validating the completed application • development of product documentation • development of the user manual • elaboration of a scientific presentation

9. Contents

9.1 Lectures	Hours	Teaching methods	Notes
-			
Bibliography. Not necessary			
9.2 Applications - Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Realization of at least one validation of the obtained results			
Elaboration of conclusions resulting from a research activity			
Evidence of personal contributions obtained as a result of a research activity;			
Evidencing the possibilities of continuing research through a doctorate			
Documentation on the dissertation topic;			
Creation of a report summarizing the activities carried out.			
Bibliography: Establishd 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