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	Data Science / Master
1.7 Form of education	Full time

2. Data about the subject

2.1 Subject name	***Research Practice***			Subject code	**22.00**
2.2 Course responsible / lecturer	Not necessary.				
2.3 Teachers in charge of seminars / Laboratory / project	Not necessary.				
2.4 Year of study	II	2.5 Semester	4	2.6 Type of assessment (E - exam, C - colloquium, V – verification)	V
2.7 Subject category	Formative category: DA – advanced, DS – speciality, DC – complementary				SD
	Optionality: DI – imposed, DO – optional (alternative), DF – optional (free choice)				MD

3. Estimated total time

3.1 Number of hours per week	7	of which:	Course	-	Seminars	-	Laboratory	-	Project	7
3.2 Number of hours per semester	98	of which:	Course	-	Seminars	-	Laboratory	-	Project	98
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										20
(b) Supplementary study in the library, online and in the field										20
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										90
(d) Tutoring										20
(e) Exams and tests										2
(f) Other activities:										-

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	152
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, Project 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	**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** - Knowing 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 **C5** - Research, development, optimization and implementation of communication networks and complex distributed systems by creatively combining multidisciplinary knowledge in the field of computers and information technology • **C5.1** - Demonstration of thorough knowledge of the fundamental principles of organization and operation of complex distributed and communication systems • **C5.2** - Using the ability to analyze and interpret new situations through the lens of multidisciplinary 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 different modern design principles in

	the field of computers and information technology to solve communication problems between systems • **C5.4** - Use of criteria and methods for evaluating the quality and security of communication systems and distributed systems • **C5.5** - Carrying out research activities with practical purpose
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: • cloud technologies • computer science • data warehouse • statistics • blockchain application security principles • blockchain architecture • blockchain-based business models
Skills	The student is able to: • manage data • manage research data • process data • store digital data and systems
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

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

8.1 General objective	Elaboration of the dissertation
8.2 Specific objectives	Assimilation of knowledge and skills regarding: • critical evaluation of the current state of knowledge in the field of artificial intelligence and vision addressed • developing own solutions for a scientific or technical problem • analysing the problem, designing a software system, testing and evaluating the results • synthesizing a research/development activity • development of a product documentation • elaboration and support of a scientific presentation

9. Contents

9.1 Lectures	Hours	Teaching methods	Notes
Not necessary			
Bibliography: Not necessary			
9.2 Applications - Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Bibliographic documentation regarding the actuality and necessity of the elaborated work		Individual work and periodic checks	
Critical analysis of existing models and systems			
Developing an own solution			
Comparative analysis of methodologies and/or technologies potentially to be used			
Elaboration of project specifications			
Implementing and installing the hardware or software system			
Product testing and validation			
Product documentation			
Evaluation of the results of the work, of the connecting elements that may be useful for a possible continuation of the theme, of the original aspects, the advantages and limits of the offered solution			
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	Not necessary	-	-
Seminar	-	-	-
Laboratory	-	-	-
Project	Based on the practical results and the elaborated dissertation thesis	Oral assessment Dissertation thesis assessment	100%
Minimum standard of performance: Average 6			

Date of filling in: 01.09.2025	**Responsible**	**Title First name Last name**	**Signature**
	Course	-	
	Applications	-	

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