

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	Semantic Web and Agents			Subject code	9.00
2.2 Course responsible / lecturer	Prof. dr. eng. Groza Adrian - Adrian.Groza@cs.utcluj.ro				
2.3 Teachers in charge of seminars / Laboratory / project	Lect. dr. eng. Feier Cristina - Cristina.Feier@cs.utcluj.ro				
2.4 Year of study	I	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V – verification)	E
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	3	of which:	Course	2	Seminars	-	Laboratory	1	Project	-
3.2 Number of hours per semester	42	of which:	Course	28	Seminars	-	Laboratory	14	Project	-
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										16
(e) Exams and tests										2
(f) Other activities:										-
3.4 Total hours of individual study (suma (3.3(a)...3.3(f)))					58					
3.5 Total hours per semester (3.2+3.4)					100					
3.6 Number of credit points					4					

4. Pre-requisites (where appropriate)

4.1 Curriculum	Sisteme de Agenti Inteligenti
4.2 Competence	Competences of above course

5. Requirements (where appropriate)

5.1. For the course	Projector, Computer
5.2. For the applications	Presence compulsory 100% for admission to final exam

6. Specific competence

6.1 Professional competences	C2 – Usage of computer technique in domains of artificial intelligence and its applications • C2.1 - Identification and description of the structure and functioning of the components of intelligent systems • C2.2 – Explanation of the role, interactions and functional characteristics of the components of most recent intelligent systems shown in the scientific literature for the web • C2.3 - Concepts for intelligent systems working on the web, using the description in OWL with the facilities based on description logics • C2.4 – Evaluation of functional characteristics of intelligent systems • C2.5 – Implementation of reasoning systems in OWL and various description logics to help users understand the knowledge available on the web C3 - Inovative projects of intelligent systems and software components used in specific applications • C3.1 – Demonstration of knowledge of technologies, programs and concepts specific to intelligent systems • C3.2 - Analysis and explanations of the roles, interactions and functioning of the components developed on the basis of the most new methodologies described in the scientific literature for intelligent systems • C3.3 - Analysis and discovery of aspects susceptible of optimization, followed by the application innovative solutions for the development of intelligent systems • C3.4 – Evaluation of comparative, synthetic, inclusive experimental alternatives for solving optimization performances, based on usage criteria • C3.5 - Development and implementation of original information solutions for problems specific to the domain, starting from a set of requirements informally specified C4 – Contextual integration and usage of dedicated information systems • C4.1 – Establish criteria relevant for the quality and security in information systems • C4.2 - Usage of multidisciplinary knowledge for the integration of information systems • C4.3 – Usage of concepts and new methods to ensure security and comfort in the age of integrated information systems • C4.4 - Development of tests, usage and adaptation of quality standards and security in dedicated information systems • C4.5 - Realisation of interdisciplinary research-development projects according to standards of quality, security and safety
6.2 Cross competences	N/A

7. Expected Learning Outcomes

Knowledge	The student has knowledge of: • business intelligence • information structure • principles of artificial intelligence • web programming
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Skills	- The student is able to: - creatively use digital technologies - assess ICT knowledge - use an application-specific interface - manage databases
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	Acquiring the fundamental notions of the semantic web and intelligent agents, as general logics used in the domain of computer science, on the line of modelling the representation of knowledge and reasoning on them
8.2 Specific objectives	Usage of intelligent agents available in reasoning and representation of knowledge

9. Contents

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9.1 Lectures	Hours	Teaching methods	Notes
Introduction to semantic reasoning	2		
Description logics	2		
Framework for semantic policy representation	2		
Contextualized knowledge repositories	2		
Services based on ontology for solving eterogeneity	2		
Relationship extraction methods and models for knowledge graph creation	2		
Representing and classifying arguments on the Semantic Web	2		
From keywords to semantic queries - Incremental query	2		
Ontology-based search and mining of biomedical resources	2		
Explaining and predicting abnormal expenses	2		
The SSN ontology of the W3C semantic sensor network incubator group	2		
Discovering semantic web services using SPARQL and intelligent agents	2		
Agents with foundation models	2		
Ontology for understanding the transittability of complex biomolecular networks	2		
Bibliography: Articles from journals on Artificial Intelligence and Web of Science.			
9.2 Applications - Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Description logics	2		
Information extraction for ontology mapping	2		
End-end composition of web services	2		
Tracking the normative state of contracts	2		
Norm management in multi-agent systems	2		
Multi-agent systems for information interchange	2		
Bibliography:			

**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

The semantic web and intelligent agents are increasingly used in the society based on knowledge, an important domain in the European Union, regarding software systems.

11. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Ability to solve problems specific to the domain.	Onsite	75%
Seminar	-	-	-
Laboratory	Knowledge of problems solved in the domain.	Onsite	
Project	-	-	-
Minimum standard of performance: Capacity to model/represent knowledge and reasoning at the level of the covered chapters.			

Date of filling in: 01.09.2025	Responsible	Title First name Last name	Signature
	Course	Prof.dr.eng. Adrian GROZA	
	Applications	Lect.dr.eng. Cristina FEIER	

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