

Course description

Course abbreviation:	KIV/UIR-E	Page:	1 / 3
Course name:	AI and Pattern Recognition		
Academic Year:	2023/2024	Printed:	03.06.2024 07:19

Department/Unit /	KIV / UIR-E			Academic Year	2023/2024
Title	AI and Pattern Recognition			Type of completion	Exam
Accredited/Credits	Yes, 6 Cred.			Type of completion	Combined
Number of hours	Lecture 3 [Hours/Week] Tutorial 2 [Hours/Week]			Course credit prior to	YES
Occ/max	Status A	Status B	Status C	Counted into average	YES
Summer semester	0 / -	0 / -	4 / 43	Min. (B+C) students	10
Winter semester	0 / -	0 / -	0 / -	Repeated registration	NO
Timetable	Yes			Semester taught	Summer semester
Language of instruction	English			Internship duration	0
Optional course	Yes			Ev. sc. – cred.	S/N
Evaluation scale	1 2 3 4				
No. of hours of on-premise					
Auto acc. of credit	No				
Periodicity	K				
Substituted course	None				
Preclusive courses	KIV/UIR and KKY/UI				
Prerequisite courses	N/A				
Informally recommended courses	N/A				
Courses depending on this Course	N/A				

Course objectives:

Students acquire basic methods and techniques used in main areas of artificial intelligence - problem solving, fundamentals of logic and logic programming, knowledge representation and knowledge systems, recognition methods and their applications.

Requirements on student

Credit - Students have to obtain a minimum amount of points from a seminar work and from a written test (60%).
Examination - A written examination. It is necessary to obtain a minimum amount of points (60%).

Due to the continuous updating of the course, approval from the course guarantor is required to obtain credit when re-enrolling in the course (see Article 24, Paragraph 3).

Notice:

The dates and form of verification for fulfilling the requirements may be adjusted in light of measures announced in connection with the development of the epidemiological situation in the Czech Republic.

Content

1. Introduction - basic concepts, motivation, (a little) history
- 2 - 3. Problem solving: uninformed and informed methods
4. Games, task decomposition, AND/OR graphs, evolutionary and genetic algorithms
5. Classification, recognition, clustering and regression - basic concepts
6. Feature-based recognition methods
7. Structural recognition methods
8. Neural networks
9. Introduction to knowledge representation
10. Nervous system, brain, senses, memory, language and speech
11. Intelligent agents

12. Natural language processing
13. Summary, discussion

Fields of study

Guarantors and lecturers

- **Guarantors:** Doc. Ing. Pavel Král, Ph.D. (100%)
- **Lecturer:** Doc. Ing. Pavel Král, Ph.D. (100%)
- **Tutorial lecturer:** Doc. Ing. Pavel Král, Ph.D. (100%)

Literature

- **Recommended:** Russell, Stuart J., Norvig, Peter. *Artificial intelligence : A modern approach*. 2nd ed. Prentice Hall, N.J., 2003. ISBN 0-13-080302-2.
- **Recommended:** Lukasová, Alena. *Formální logika v umělé inteligenci*. Vyd. 1. Brno : Computer Press, 2003. ISBN 80-251-0023-5.
- **Recommended:** Kubík, A. *Intelligentní agenty - tvorba aplikačního software na bázi multiagentových systémů*. Brno, 2007.
- **Recommended:** Nilsson, Nils J. *Principles of Artificial Intelligence*. Springer Verlag, Berlin, 1982.
- **Recommended:** Mařík, Vladimír. *Umělá inteligence (1)*. Academia, Praha, 1993. ISBN 80-200-0496-3.
- **Recommended:** Mařík, Vladimír a kol. *Umělá inteligence (2)*. Academia, Praha, 1997.
- **Recommended:** Mařík, Vladimír a kol. *Umělá inteligence (3)*. Academia, Praha, 2001.
- **Recommended:** Mařík, Vladimír a kol. *Umělá inteligence (4)*. Academia, Praha, 2003.
- **Recommended:** V. Mařík, O. Štěpánková, J. Lažanský a kol. *Umělá inteligence (5)*. 2007.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Preparation for laboratory testing; outcome analysis (1-8)	20
Contact hours	39
Preparation for an examination (30-60)	40
Preparation for formative assessments (2-20)	10
Practical training (number of hours)	26
Presentation preparation (report) (1-10)	5
Team project (50/number of students)	16
Total:	156

assessment methods

Knowledge - knowledge achieved by taking this course are verified by the following means:

- Combined exam
- Test
- Skills demonstration during practicum
- Individual presentation at a seminar

prerequisite

Knowledge - students are expected to possess the following knowledge before the course commences to finish it successfully:

Good knowledge of mathematical analysis, linear algebra, probability theory, and mathematical statistics. Students should be able to study specialized literature and recommended computer resources (manuals, Web pages etc.) and to create special program modules in higher programming languages (Java, C, C#, Prolog,...).

teaching methods

Knowledge - the following training methods are used to achieve the required knowledge:

- Interactive lecture
- Laboratory work
- E-learning
- Skills demonstration
- Self-study of literature

learning outcomes

Knowledge - knowledge resulting from the course:

The student obtains after the completion of this subject:

- basic knowledge about the artificial intelligence methods, methods of problem solving and recognition or classification methods,
- capabilities of effective use of techniques and programming tools for software development with the aim to create a specialized software for simulation and solving above mentioned methods,
- capabilities to propose simple logic systems and to verificate their features, to study the theory of logic systems and the implementation of such systems in specialized programming languages,
- capabilities to propose and develop knowledge based systems and procedures for knowledge derivation using the standard database systems,
- capabilities to apply modern systems for problem solving tasks (evolutionary and genetic algorithms, intelligent agents, modern software development techniques), to realize of such systems and verificate their properties.

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Design of Power Machines and Equipment	Postgraduate Master	Full-time	Digital Manufacturing	1	2021	2023	Povinně volitelné předměty 1. roč. LS	B	1	LS