

# 4IZ410 TEORIE INFORMACE A INFERENCE

Course code	4IZ410
Course title in language of instruction	Teorie informace a inference
Course title in Czech	Teorie informace a inference
Course title in English	Information and Inference Theory
Mode of completion and number of credits	Credit (4 credits), Exam ECTS (6 credits), Exam (4 credits) One ECTS credit corresponds to 26 hours of workload for an average student.
Type of course	Daily attendance: 2/2 (hours of lectures per week / hours of seminars per week)
Language of instruction	Czech
Level of course and year of study	bachelor: 3; master: 4; master continuing: 1
Semester	Sklad FIS – FIS
Name of lecturer	doc. RNDr. Jiří Ivánek, CSc. (supervisor)
Prerequisites	none

## Aims of the course

To provide to students an introduction to information theory and logical inference systems with emphasis on algorithmic solutions. Tutorials will be devoted mainly to mastering of selected algorithms.

## Learning outcomes and competences

Upon successful completion of this course, students will be able to apply selected algorithms of coding, decision trees construction, and inference in logical systems and networks and to follow development in these fields.

## Course contents

1. Measure of information and entropy
  - \* Shannon measure of information
  - \* entropy
  - \* effective coding
  - \* Shannon theorems on information transmission
2. Decision tables and trees
  - \* logical properties of decision tables
  - \* construction of decision trees
  - \* selected algorithms (top-down, branch-and-bound)
3. Inference in two-valued logic
  - \* deduction systems of propositional and predicate calculus
  - \* analytical tables
  - \* resolution principle
4. Inference in fuzzy logic
  - \* many-valued logic
  - \* fuzzy logic
  - \* weighted inference rules
5. Inferential networks
  - \* uncertainty processing in rule bases
  - \* Bayesian networks

## Teaching methods and student workload

Type of teaching method	Hours of workload
	daily attendance
Participation in lectures	26
Preparation for lectures	13
Attendance at seminars/workshops/tutorials	26
Preparation for seminars/workshops/tutorials	13
Preparation for mid-term test(s)	26
Preparation for final test	26
Preparation for final oral exam	26
<b>Total</b>	<b>156</b>

## Assessment methods

Requirement type	Weight
	daily attendance
Mid-term test(s)	30 %
Final test	30 %
Final oral exam	40 %
<b>Total</b>	<b>100 %</b>
<b>Special requirements and details: none</b>	

## Recommended reading

Type*	Author	Title	Published in	Publisher	Year	ISBN
R	JIROUŠEK, R.	Principy digitální komunikace	Voznice	Leda	2006	80-7335-084-X
R	JIROUŠEK, R.	Metody reprezentace a zpracování znalostí v umělé inteligenci	Praha	Vysoká škola ekonomická	1995	80-7079-701-0
R	JIRKŮ, P. – VEJNAROVÁ, J.	Formální logika : neformální výklad základů formální logiky	Praha	Vysoká škola ekonomická	2000	80-245-0054-X
R	IVÁNEK, J.	Základy matematické informatiky. [Část] 1, Informace a automaty	Praha	Státní pedagogické nakladatelství	1991	80-7079-673-1
A	SVÁTEK, V.	Logické programování. I, Základy programování v jazyce Prolog	Praha	Oeconomica	2003	80-245-0627-0
A	LUKASOVÁ, A.	Formální logika v umělé inteligenci	Brno	Computer Press	2003	80-251-0023-5
A	HÁJEK, P. – HAVRÁNEK, T. – JIROUŠEK, R.	Uncertain information processing in expert systems	Boca Raton	CRC Press	1992	0-8493-6368-3

\* R – required reading, A – additional reading