COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computational Logic [S1Inf1>LOG]

Course

Field of study
Computing

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
16

Laboratory classes
16

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

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Prerequisites

Basic knowledge in mathematics and computing as required by the final secondary school examination.

Course objective

1. Provide students knowledge regarding computational logic, related in particular to methods and algorithms of reasoning in first order logic. 2. Develop students' skills in solving problems related to modelling and solving simple tasks of reasoning in first order logic. 3. Develop students' skills in applying algorithms of reasoning in firstorder logic. Course - related learning outcomes Knowledge Students acquire knowledge in logic and computational logic, in particular reasoning in first order logis; have wide and in - depth knowledge necessary to understand and effectively apply reasoning algorithms, be informed about trends and advances in computational logic andits aplications in computer engineering. Skills Students are able to acquire, integrate, interpret and evaluate information from literature, databases and WWW sources on reasoning in first order logic, are able to plan and arrange self - education process in particular covering issues of computational logic, are able to apply reasoning algorithms to solve simple problems, are able to integrate knowledge coming from bothdifferent sub - domains of computer sciences and computational logic to formulate and solve engineering tasks, are able to use available software to solve simple reasoning problems, are able to evaluate strong and weak points of algorithms and their implementation and asses their usefulness to IT tasks. Social competences Upon completion of the course the student will develop the following attitudes: understands that knowledge and skills related to computer science and computational logic quickly become insufficient, knows examples of applications of reasoning in first order logic and understands their limitations, is able to correctly assign priorities to own tasks.

Course-related learning outcomes

empty

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Formative assessment:
a) lectures: based on answers to question in the written colloquium
b) laboratory classes: evaluation of doing correctly assigned tasks and tests verifying basic knowledge required to complete the laboratory tasks,
Total assessment:
a) verification of assumed learning objectives related to lectures: evaluation of acquired knowledge on the basis of a written colloquium; discussion of correct answers in the colloquium;
b) verification of assumed learning objectives related to laboratoryclasses: monitoring students' activities during classes, introductory tests during the classes.
Additional elements cover: discussing more general and related aspects of the class topic, showing how to improve the instructions and teaching materials.

Programme content

Lecture: Syntax of first order logic: basic terminology (alphabet, logical symbol, term, predicate, formula, quantifiers). Structural induction. Relation as a logical function. Semantics of first order logic: basic terminology (value of a term, value of a formula, logical constants, equivalence of logical formulas, validity, satisfiability and logical consequence, model of a formula,model of a set of formulas). Tableau algorithm as a method of reasoning: alpha, beta, gamma and delta rules. Unification of formulas. Clause form of formulas. Resolution in first order logic. Propositional calculus. Binary decision diagrams. Herbrand models.
Tutorials: Basics of Datalog. Veryfing syntactic correctness of formulas. Analysis of satisfiability using tableau methods. Unification. Clause form. Binary decision diagrams.

Teaching methods

Lecture: multimedia presentation, presentation illustrated with examples presented on black board, solving tasks, multimedia show - case Tutorials: solving tasks, practical exercises, discussion, teamwork, multimedia showcase

Bibliography

Basic
1. Logika matematyczna w informatyce, M. Ben - Ari, WNT, Warszawa, 2005

2. Zadania z teorii mnogości, logiki matematycznej i teorii algorytmów, I.A. Ławrow, Ł.L. Maksimowa, PWN, Warszawa, 2004
3. Podstawy logiki, T. Batóg, Wyd. UAM, Poznań, 1999
Additional
1. A. R. Bradley, Z. Manna, The calculus of computation. Decision procedures with applications to verification. Springer ‑ Verlag Berlin Heidelberg 2007
2. R. L. Epstein, W. A. Carnielli, Computability. Computable functions, logic, and the foundations of mathematics, Wadworth 2000
3. D. Harel, Rzecz o istocie informatyki. Algorytmika, wyd. 2, WNT Warszawa 2000
4. A. Kościelski, Teoria obliczeń. Wykłady z matematycznych podstaw informatyki, Wyd. Uniw. Wrocławskiego, Wrocław 1997.

Breakdown of average student's workload

	Hours	ECTS
Total workload	77	3,00
Classes requiring direct contact with the teacher	32	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	1,00