

Recommended pass through the study plan

Name of the pass: Branch Artificial Intelligence - Passage through study

Faculty/Institute/Others: Faculty of Electrical Engineering

Department: Department of Computer Science

Pass through the study plan: Open Informatics - Artificial Intelligence

Branch of study guaranteed by the department: Artificial Intelligence

Guarantor of the study branch: prof. Ing. Filip Železný, Ph.D.

Program of study: Open Informatics

Type of study: Follow-up master full-time

Note on the pass:

Coding of roles of courses and groups of courses:

P - compulsory courses of the program, PO - compulsory courses of the branch, Z - compulsory courses, S - compulsory elective courses, PV - compulsory elective courses, F - elective specialized courses, V - elective courses, T - physical training courses

Coding of ways of completion of courses (KZ/Z/ZK) and coding of semesters (Z/L):

KZ - graded assesment, Z - assesment, ZK - examination, L - summer semester, Z - winter semester

Number of semester: 1

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BEZM	Safety in Electrical Engineering for a master's degree Vladimír Kůla, Radek Havlíček, Ivana Nová, Josef Čermohous, Petr Novák, Zdeněk Burian, Adam Bouřa, Pavel Mlejnek Vladimír Kůla Vladimír Kůla (Gar.)	Z	0	2BP+2BC	Z	P
B4M33PAL	Advanced algorithms Marko Genyk-Berezovskyj, Daniel Průša Daniel Průša Daniel Průša (Gar.)	Z,ZK	6	2P+2C	Z	P
B4M36MAS	Multi-agent Systems Tomáš Kroupa, Michal Pěchouček, Michal Jakob, Branislav Bošanský Branislav Bošanský Michal Pěchouček (Gar.)	Z,ZK	6	2P+2C	Z	PO
BE4M33SSU	Statistical Machine Learning Jan Dřchal, Vojtěch Franc, Boris Flach Vojtěch Franc Boris Flach (Gar.)	Z,ZK	6	2P+2C	Z	PO
2015_MOIVOL	Volitelné odborné předměty	Min. cours. 0	Min/Max 0/999			V

Number of semester: 2

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
B4M35KO	Combinatorial Optimization Zdeněk Hanzálek Zdeněk Hanzálek Zdeněk Hanzálek (Gar.)	Z,ZK	6	3P+2C	L	P
B4M01TAL	Theory of Algorithms Marie Demlová, Natalie Žukovec Marie Demlová Marie Demlová (Gar.)	Z,ZK	6	3P+2S	L	P
B4M36PUI	Artificial Intelligence Planning Branislav Bošanský, Lukáš Chřpa, Antonín Komenda Branislav Bošanský Michal Pěchouček (Gar.)	Z,ZK	6	2P+2C	L	PO
B4M36SMU	Symbolic Machine Learning Filip Železný, Ondřej Kuželka Filip Železný Filip Železný (Gar.)	Z,ZK	6	2P+2C	L	PO
2015_MOIVOL	Volitelné odborné předměty	Min. cours. 0	Min/Max 0/999			V

Number of semester: 3

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
B4MSVP	Software or Research Project Ivan Jelínek, Jaroslav Sloup, Martin Šipoš, Drahomíra Hejtmánová, Jana Zichová, Petr Pošík, Martin Hlinovský, Katarína Ťakušová Jaroslav Sloup	KZ	6		Z,L	P
B4M36LUP	Logical Reasoning and Programming Filip Železný, Karel Chvalovský Filip Železný Filip Železný (Gar.)	Z,ZK	6	2P+2C	Z	PO

B4M36UIR	Artificial Intelligence in Robotics <i>Pavel Rytíř, Tomáš Krajník, Jan Faigl Jan Faigl Tomáš Krajník (Gar.)</i>	Z,ZK	6	2P+2C	Z	PO
2015_MOIVOL	Volitelné odborné předměty	Min. cours. 0	Min/Max 0/999			V

Number of semester: 4

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
BDIP25	Diploma Thesis	Z	25	22s	L	P
2015_MOIVOL	Volitelné odborné předměty	Min. cours. 0	Min/Max 0/999			V

List of groups of courses of this pass with the complete content of members of individual groups

Kód	Name of the group of courses and codes of members of this group (for specification see here or below the list of courses)	Completion	Credits	Scope	Semester	Role
2015_MOIVOL	Volitelné odborné předměty	Min. cours. 0	Min/Max 0/999			V

List of courses of this pass:

Code	Name of the course	Completion	Credits
B4M01TAL	Theory of Algorithms The course brings theoretical background of the theory of algorithms with the focus at first on the time and space complexity of algorithms and problems, secondly on the correctness of algorithms. Further it is dealt with the theory of complexity; the classes P, NP, NP-complete, PSPACE and NPSpace are treated and properties of them investigated. Probabilistic algorithms are studied and the classes RP and ZPP introduced.	Z,ZK	6
B4M33PAL	Advanced algorithms Basic graph algorithms and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science - pattern matching.	Z,ZK	6
B4M35KO	Combinatorial Optimization The goal is to show the problems and algorithms of combinatorial optimization (often called discrete optimization; there is a strong overlap with the term operations research). Following the courses on linear algebra, graph theory, and basics of optimization, we show optimization techniques based on graphs, integer linear programming, heuristics, approximation algorithms and state space search methods. We focus on application of optimization in stores, ground transportation, flight transportation, logistics, planning of human resources, scheduling in production lines, message routing, scheduling in parallel computers.	Z,ZK	6
B4M36LUP	Logical Reasoning and Programming The course's aim is to explain selected significant methods of computational logic. These include algorithms for propositional satisfiability checking, logical programming in Prolog, and first-order theorem proving and model-finding. Time permitting, we will also discuss some complexity and decidability issues pertaining to the said methods.	Z,ZK	6
B4M36MAS	Multi-agent Systems The course provides an introduction to concepts, models, and algorithms for autonomous agents and multi-agent systems. The first part of the course introduces single-agent models and control architectures; the second part explains key multi-agent models and algorithms, both for cooperative and non-cooperative multi-agent settings. Upon successful completion of the course, students will be able to understand main multi-agent concepts, be able to map real-world multi-agent problems to multi-agent formal models and apply algorithmic techniques to solve them.	Z,ZK	6
B4M36PUI	Artificial Intelligence Planning The course covers the problematic of automated planning in artificial intelligence and focuses especially on domain independent models of planning problems: planning as a search in the space of states (state-space planning), in the space of plans (plan-space planning), heuristic planning, planning in graph representation of planning problems (graph-plan) or hierarchical planning. The students will also learn about the problematic of planning under uncertainty and the planning model as a decision-making in MDP and POMDP.	Z,ZK	6
B4M36SMU	Symbolic Machine Learning The course will explain methods through which an intelligent agent can learn, that is, improve its behavior from observed data and background knowledge. The learning scenarios will include on-line learning and learning from i.i.d. data (along with the PAC theory of learnability), as well as the active and reinforcement learning scenarios. Symbolic knowledge representations (mainly through logic and graphs) will be used where possible. The course is given in English to all students.	Z,ZK	6
B4M36UIR	Artificial Intelligence in Robotics The aim of the course is to acquaint students with the use planning approaches and decision-making techniques of artificial intelligence for solving problems arising in autonomous robotic systems. Students in the course will use the knowledge of planning algorithms, game theory, solving optimization problems and multi-agent negotiation in selected application scenarios of mobile robotics. Students first learn the basic architectures of autonomous systems based on reactive and behavioral models of autonomous systems. The considered application scenarios and robotic problems includes: path planning, persistent environmental monitoring, robotic exploration of unknown environments, online real-time decision-making, deconfliction in autonomous systems and solutions of antagonistic conflicts. In laboratory exercises, students will practice their problem formulations of robotic challenges and practical solutions in a realistic robotic simulator or using consumer mobile robots.	Z,ZK	6
B4MSVP	Software or Research Project	KZ	6

BDIP25	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			
BE4M33SSU	Statistical Machine Learning	Z,ZK	6
The aim of statistical machine learning is to develop systems (models and algorithms) able to learn to solve tasks given a set of examples and some prior knowledge about the task. This includes typical tasks in speech and image recognition. The course has the following two main objectives 1. to present fundamental learning concepts such as risk minimisation, maximum likelihood estimation and Bayesian learning including their theoretical aspects, 2. to consider important state-of-the-art models for classification and regression and to show how they can be learned by those concepts.			
BEZM	Safety in Electrical Engineering for a master's degree	Z	0
The course provides for students of all programs periodic training guidelines for health and occupational safety and gives knowledge of electrical hazard of given branch of study. Students receive indispensable qualification according to the current Directive of the Dean.			

For updated information see <http://bilakniha.cvut.cz/en/f3.html>

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