Recomended pass through the study plan

Name of the pass: Master specialization Computer Science, in English, 2021

Faculty/Institute/Others:
Department:
Pass through the study plan: Master specialization Computer Science, in English, 2021
Branch of study guranteed by the department: Welcome page
Guarantor of the study branch:
Program of study: Informatics
Type of study: Follow-up master full-time
Note on the pass: ~Compulsory courses of neighboring specializations can be enrolled as optional ones.

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
NIE-MPI	**Mathematics for Informatics** *Francesco Dolce **Štěpán Starosta** Štěpán Starosta (Gar.)*	Z,ZK	7	3P+2C	Z	PP
NIE-EVY	**Efficient Text Pattern Matching** *Jan Holub **Jan Holub** Jan Holub (Gar.)*	Z,ZK	5	2P+1C	Z	PS
NIE-NON	**Nonlinear Continuous Optimization and Numerical Methods** *Jaroslav Kruis **Jaroslav Kruis** Jaroslav Kruis (Gar.)*	Z,ZK	5	2P+1C	Z,L	PS
NIE-SYP	**Parsing and Compilers** *Jan Janoušek **Jan Janoušek** Jan Janoušek (Gar.)*	Z,ZK	5	2P+1C	Z	PS
NIE-V.21	**Purely elective master's courses** *NIE-BLO,NIE-CPX,..... (see the list of groups below)*	Min. cours. 0 Max. cours. 31	Min/Max 0/136			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
NIE-PDP	**Parallel and Distributed Programming** *Pavel Tvrdík **Pavel Tvrdík** Pavel Tvrdík (Gar.)*	Z,ZK	6	2P+2C	L	PP
NIE-VSM	**Selected statistical Methods** *Petr Novák **Pavel Hrabák** Pavel Hrabák (Gar.)*	Z,ZK	7	4P+2C	L	PP
NIE-KOD	**Data Compression** *Jan Holub **Jan Holub** Jan Holub (Gar.)*	Z,ZK	5	2P+1C	L	PS
NIE-ADM	**Data Mining Algorithms** *Rodrigo Augusto Da Silva Alves **Rodrigo Augusto Da Silva Alves** Pavel Kordík (Gar.)*	Z,ZK	5	2P+1C	L	PS
NIE-GAK	**Graph theory and combinatorics** *Michal Opler **Tomáš Valla** Tomáš Valla (Gar.)*	Z,ZK	5	2P+2C	L	PS
NIE-V.21	**Purely elective master's courses** *NIE-BLO,NIE-CPX,..... (see the list of groups below)*	Min. cours. 0 Max. cours. 31	Min/Max 0/136			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
NIE-KOP	**Combinatorial Optimization** *Petr Fišer, Jan Schmidt* ***Petr Fišer*** *Petr Fišer (Gar.)*	Z,ZK	6	3P+1C	Z	PP
NIE-MPR	**Master Project** ***Zdeněk Muzikář*** *Zdeněk Muzikář (Gar.)*	Z	7		Z,L	PP
NIE-MVI	**Computational Intelligence Methods** *Pavel Kordík, Miroslav Čepek* ***Pavel Kordík*** *Pavel Kordík (Gar.)*	Z,ZK	5	2P+1C	Z	PS
NIE-V.21	**Purely elective master's courses** *NIE-BLO,NIE-CPX,..... (see the list of groups below)*	Min. cours. 0 Max. cours. 31	Min/Max 0/136			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)*** *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
NIE-DIP	**Diploma Thesis** *Zdeněk Muzikář* ***Zdeněk Muzikář*** *Zdeněk Muzikář (Gar.)*	Z	30	270ZP	L,Z	PP

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
NIE-V.21	**Purely elective master's courses**	**Min. cours. 0 Max. cours. 31**	**Min/Max** 0/136			**V**

NIE-BLO	Blockchain	NIE-CPX	Complexity Theory	NIE-VYC	Computability
NIE-MVI	Computational Intelligence Metho ...	NIE-ARI	Computer arithmetic	NIE-SCE1	Computer Engineering Seminar Mas ...
NIE-SCE2	Computer Engineering Seminar Mas ...	NI-DSW	Design Sprint	NI-DID	Digital drawing
NIE-EVY	Efficient Text Pattern Matching	NI-GLR	Games and reinforcement learning	NI-GRI	Grid Computing
NIE-HMI	History of Mathematics and Infor ...	NIE-DVG	Introduction to Discrete and Com ...	FITE-EHD	Introduction to European Economi ...
MIE-MZI	Mathematics for data science	NIE-AM2	Middleware Architectures 2	NIE-OSY	Operating Systems and Systems Pr ...
NIE-PAM	Parameterized Algorithms	NIE-SYP	Parsing and Compilers	NIE-ROZ	Pattern Recognition
NIE-PML	Personalized Machine Learning	NI-AML	Advanced machine learning	NIE-PDL	Practical Deep Learning
NIE-VPR	Research Project	NIE-SWE	Semantic Web and Knowledge Graph ...	MI-SCE1	Computer Engineering Seminar Mas ...
NIE-HSC	Side-Channel Analysis in Hardwar ...	NIE-DDW	Web Data Mining	NIE-BPS	Wireless Computer Networks
NIE-SEP	World Economy and Business	FITE-SEP	World Economy and Business		

List of courses of this pass:

Code	Name of the course	Completion	Credits
FITE-EHD	Introduction to European Economic History	Z,ZK	3
The course introduces a selection of themes from the European economic history. It gives the student basic knowledge about forming of the global economy through the description of the key periods in history. As European countries have been dominant actors in this process it focuses predominantly on their roles in the economic history. From large economic area of Roman Empire to fragmentation of the Middle Ages, from destruction of WWII to the current affairs, the development of modern financial institutions is deciphered. The course does not cover detailed economic history of particular European countries but rather the impact of trade and role of particular events, institutions and organizations in history. Class meetings will consist of a mixture of lecture and discussion.			
FITE-SEP	World Economy and Business	Z,ZK	4
The course introduces students of technical university to the international business. It does that predominantly by comparing individual countries and key regions of world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as indexes of economic freedom, corruption and economic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form of discussions based on individual readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.			

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<tr><td>MI-SCE1</td><td>Computer Engineering Seminar Master I</td><td>Z</td><td>4</td></tr>
<tr><td colspan="4">The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to failures and attacks. Students are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the subject is work with scientific articles and other professional literature and/or work in KČN laboratories. The capacity of the subject is limited by the possibilities of the seminar teachers. The topics are new for each semester.</td></tr>
<tr><td>MIE-MZI</td><td>Mathematics for data science</td><td>Z,ZK</td><td>4</td></tr>
<tr><td colspan="4">In this course, the students are introduced to the domains of mathematics necessary for understanding the standard methods and algorithms used in data science. The studied topics include mainly: linear algebra (matrix factorisations, eigenvalues, diagonalization), continuous optimisation (optimisation with constraints, duality principle, gradient methods) and selected notions from probability theory and statistics.</td></tr>
<tr><td>NI-AML</td><td>Advanced machine learning</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">The course introduces students to selected advanced topics of machine learning and artificial intelligence. The topics present techniques in the field of recommendation systems, image processing, control and interconnection of physical laws with the field of machine learning. The aim of the exercise is to familiarize students with the methods discussed.</td></tr>
<tr><td>NI-DID</td><td>Digital drawing</td><td>Z</td><td>2</td></tr>
<tr><td colspan="4">The course will introduce students to the basic principals of digital drawing and graphical design. Students will gain understanding of composition, perspective and color theory, which they will practically apply in their own design works. Students will also gain experience in drawing and painting with digital and analog tools. The course is fit for anyone who wants to practice or learn drawing and painting. The course is organized as a thematic practices covering parts of theory and practical exercise to practice gained knowledge.</td></tr>
<tr><td>NI-DSW</td><td>Design Sprint</td><td>Z</td><td>2</td></tr>
<tr><td colspan="4">Students will work on projects using the Design Sprint method, developed by Google. THanks to this method the teams are able to go from idea to validated prototype in 5 days. During the course the students will get familiar with the method as participants. Through practical challenges they will try the whole 5 day process starting with research and finishing with testing the prototypes (plus final presentation).</td></tr>
<tr><td>NI-GLR</td><td>Games and reinforcement learning</td><td>Z,ZK</td><td>4</td></tr>
<tr><td colspan="4">The field of reinforcement learning is very hot recently, because of advances in deep learning, recurrent neural networks and general artificial intelligence. This course is intended to give you both theoretical and practical background so you can participate in related research activities. Presented in English.</td></tr>
<tr><td>NI-GRI</td><td>Grid Computing</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Grid computing and gain knowledge about the world-wide network and computing infrastructure.</td></tr>
<tr><td>NIE-ADM</td><td>Data Mining Algorithms</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">The course focuses on algorithms used in the fields of machine learning and data mining. However, this is not an introductory course, and the students should know machine learning basics. The emphasis is put on advanced algorithms (e.g., gradient boosting) and non-basic kinds of machine learning tasks (e.g., recommendation systems) and models (e.g., kernel methods).</td></tr>
<tr><td>NIE-AM2</td><td>Middleware Architectures 2</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Students will learn new trends and technologies on the Web including theoretical foundations. They will gain an overview of Web application architectures, concepts and technologies for microservices, distrubuted cache and databases, smart contracts, realtime communication and web security.</td></tr>
<tr><td>NIE-ARI</td><td>Computer arithmetic</td><td>Z,ZK</td><td>4</td></tr>
<tr><td colspan="4">Students will learn various data representations used in digital devices and will be able to design arithmetic operations implementation units.</td></tr>
<tr><td>NIE-BLO</td><td>Blockchain</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Students will understand the foundations of blockchain technology, smart contract programming, and gain an overview of most notable blockchain platforms. They will be able to design, code and deploy a secure decentralized application, and assess whether integration of a blockchain is suitable for a given problem. The course places an increased emphasis on the relationship between blockchains and information security. It is concluded with a defense of a research or applied semester project, which prepares the students for implementing or supervising implementation of blockchain-based solutions in both academia and business.</td></tr>
<tr><td>NIE-BPS</td><td>Wireless Computer Networks</td><td>Z,ZK</td><td>4</td></tr>
<tr><td colspan="4">Students will learn about the modern technologies, protocols, and standards for wireless networks. They will understand the routing mechanisms in ad-hoc networks, multicast and broadcast mechanisms, and data flow control mechanisms. They will also learn about principles of communication in sensor networks. They get knowledge of security mechanisms for wireless networks and get skills of configuration of wireless network elements and simulation of wireless networks using suitable tools.</td></tr>
<tr><td>NIE-CPX</td><td>Complexity Theory</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Students will learn about the fundamental classes of problems in the complexity theory and different models of algoritms and about implications of the theory concerning practical (in)tractability of difficult problems.</td></tr>
<tr><td>NIE-DDW</td><td>Web Data Mining</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Students will learn latest methods and technologies for web data acquisition, analysis and utilization of the discovered knowledge. Students will gain an overview of Web mining techniques for Web crawling, Web structure analysis, Web usage analysis, Web content mining and information extraction. Students will also gain an overview of most recent developments in the field of social web and recommendation systems.</td></tr>
<tr><td>NIE-DIP</td><td>Diploma Thesis</td><td>Z</td><td>30</td></tr>
<tr><td>NIE-DVG</td><td>Introduction to Discrete and Computational Geometry</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">The course intends to introduce the students to the discipline of Discrete and Computational Geometry. The main goal of the course is to get familiar with the most fundamental notions of this discipline, and to be able to solve simple algorithmic problems with a geometric component.</td></tr>
<tr><td>NIE-EVY</td><td>Efficient Text Pattern Matching</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Students get knowledge of efficient algorithms for text pattern matching. They learn to use so called succinct data structures that are efficient in both access time and memory complexity. They will be able to use the knowledge in design of applications that utilize pattern matching.</td></tr>
<tr><td>NIE-GAK</td><td>Graph theory and combinatorics</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">The goal of the class is to introduce the most important topics in graph theory, combinatorics, combinatorial structures, discrete models and algorithms. The emphasis will be not only on undestanding the basic principles but also on applications in problem solving and algorithm design. The topics include: generating functions, selected topics from graph and hypergraph coloring, Ramsey theory, introduction to probabilistic method, properties of various special classes of graphs and combinatorial structures. The theory will be also applied in the fields of combinatorics on words, formal languages and bioinformatics.</td></tr>
<tr><td>NIE-HMI</td><td>History of Mathematics and Informatics</td><td>Z,ZK</td><td>3</td></tr>
<tr><td colspan="4">The course focuses on selected topics from calculus, general algebra, number theory, numerical mathematics and logic - useful for today computer science The topics are selected for finding some relations between computer science and mathematical methods. Some examples of applications of mathematics to computer sciences will be showed.</td></tr>
<tr><td>NIE-HSC</td><td>Side-Channel Analysis in Hardware</td><td>Z,ZK</td><td>4</td></tr>
<tr><td colspan="4">This course is dedicated to so-called side-channel information leakage in hardware devices. It focuses on both theoretical analysis and practical attacks. Students get familiar with various kinds of side channels and they get deeper insight in power attacks. Students learn to implement various profiled and non-profiled attacks and get familiar with higher-order attacks. They also get practice in both designing the SCA countermeasures and analyzing the amount and characteristics of the side-channel information leakage.</td></tr>
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<tr><td>NIE-KOD</td><td>Data Compression</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Students are introduced to the basic principles of data compression. They will learn the necessary theoretical background and get an overview of data compression methods being used in practice. The overview covers principles of integer coding and of statistical, dictionary, and context data compression methods. In addition, students learn the fundamentals of lossy data compression methods used in image, audio, and video compression.</td></tr>
<tr><td>NIE-KOP</td><td>Combinatorial Optimization</td><td>Z,ZK</td><td>6</td></tr>
<tr><td colspan="4">The students will gain knowledge and understanding necessary deployment of combinatorial heuristics at a professional level. They will be able not only to select and implement but also to apply and evaluate heuristics for practical problems.</td></tr>
<tr><td>NIE-MPI</td><td>Mathematics for Informatics</td><td>Z,ZK</td><td>7</td></tr>
<tr><td colspan="4">The course focuses on selected topics from general algebra with emphasis on finite structures used in computer science. It includes topics from multi-variate analysis, smooth optimization, and multi-variate integration. The third large topic is computer arithmetics and number representation in a computer along with error manipulation. The last topic includes selected numerical algorithm and their stability analysis. The topics are completed with the demonstration of applications in computer science. The course focuses on clear presentation and argumentation.</td></tr>
<tr><td>NIE-MPR</td><td>Master Project</td><td>Z</td><td>7</td></tr>
<tr><td colspan="4">1. At the beginning of the semester, a student reserves her/his final thesis topic and gets together with its supervisor. Together they decide on partial tasks that should be carried out during the semester. If the requirements they agreed upon are met, the supervisor awards the student an assessment for the course MI-MPR at the end of the semester. 2. The external supervisor enters the information on granting the credit using the form "Granting credit from the external supervisor of the final thesis" (http://fit.cvut.cz/student/studijni/formulare). The completed and signed form must be delivered in person or by email to the SZZ coordinator, who will arrange for the credit to be granted. 3. If the FT topic that the student has reserved is rather general, the immediate tasks the supervisor assigns to the student for the upcoming semester should aim at fine-tuning the FT topic so that the FTT will be complete and approvable at the end of the semester.</td></tr>
<tr><td>NIE-MVI</td><td>Computational Intelligence Methods</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Students will understand the basic methods and techniques of computational intelligence, which are based on traditional artificial intelligence, are parallel in nature and are applicable to solving a wide range of problems. The subject is also devoted to modern neural networks and the ways in which they learn and neuroevolution. Students will learn how these methods work and how to apply them to problems related to data extraction, management, intelligence in games and optimisation, etc.</td></tr>
<tr><td>NIE-NON</td><td>Nonlinear Continuous Optimization and Numerical Methods</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Students will be introduced to nonlinear continuous optimization, principles of the most popular methods of optimization and applications of such methods to real-world problems. They will also learn the finite element method and the finite difference method used for solving ordinary and partial differential equations in engineering. They will learn to solve systems of linear algebraic equations that arise from discretization of the continuous problems by direct and iterative algorithms. They will also learn to implement these algorithms sequentially as well as in parallel.</td></tr>
<tr><td>NIE-OSY</td><td>Operating Systems and Systems Programming</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">This course is focused on the design and implementation of the basic components that make up modern operating systems. This includes threads, processes, switching context, virtual memory, system calls, interrupts and interactions of SW and HW using drivers. Students will learn the theory of the concept of operating system architecture with emphasis on the kernel architecture. Within the course, they will gain practical experience with the development of a small but fully functional operating system.</td></tr>
<tr><td>NIE-PAM</td><td>Parameterized Algorithms</td><td>Z,ZK</td><td>4</td></tr>
<tr><td colspan="4">There are many optimization problems for which no polynomial time algorithms are known (e.g. NP-complete problems). Despite that it is often necessary to solve these problems exactly in practice. We will demonstrate that many problems can be solved much more effectively than by naively trying all possible solutions. Often one can find a common property (parameter) of the inputs from practice-e.g., all solutions are relatively small. Parameterized algorithms exploit that by limiting the time complexity exponentially in this (small) parameter and polynomially in the input size (which can be huge). Parameterized algorithms also represent a way to formalize the notion of effective polynomial time preprocessing of the input, which is not possible in the classical complexity. Such a polynomial time preprocessing is then a suitable first step, whatever is the subsequent solution method. We will present a plethora of parameterized algorithm design methods and we will also show how to prove that for some problem (and parameter) such an algorithm (presumably) does not exist. We will also not miss out the relations to other approaches to hard problems such as moderately exponential algorithms or approximation schemes.</td></tr>
<tr><td>NIE-PDL</td><td>Practical Deep Learning</td><td>KZ</td><td>5</td></tr>
<tr><td colspan="4">This course is designed to provide students with a comprehensive understanding of Deep Learning using PyTorch, a popular open-source machine learning framework. Throughout the course, students will develop practical skills in building and training deep neural networks, using PyTorch to solve real-world problems in fields such as computer vision and natural language processing.</td></tr>
<tr><td>NIE-PDP</td><td>Parallel and Distributed Programming</td><td>Z,ZK</td><td>6</td></tr>
<tr><td colspan="4">21st century in computer architectures is primarily influenced by the shift of the Moore's law into parallelization of CPUs at the level of computing cores. Parallel computing systems are becoming a ubiquitous commodity and parallel programming becomes the basic paradigm of development of efficient applications for these platforms. Students get acquainted with architectures of parallel and distributed computing systems, their models, theory of interconnection networks and collective communication operations, and languages and environments for parallel programming of shared and distributed memory computers. They get acquianted with fundamental parallel algorithms and on selected problems, they will learn the techniques of design of efficient and scalable parallel algorithms and methods of performance evaluation of their implementations. The course includes a semester project of practical programming in OpenMP and MPI for solving a particular nontrivial problem.</td></tr>
<tr><td>NIE-PML</td><td>Personalized Machine Learning</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">Personalized machine learning (PML) is a sub-field of machine learning that aims to create models and predictions based on the unique characteristics and behaviors of individual entities. While PML is commonly used in applications such as recommender systems, which recommend items to users based on their personal interests, its principles can be applied to a wide range of other fields, including education, medicine, and chemical engineering. In this course, we will explore the latest PML methods from theoretical, algorithmic, and practical perspectives. Specifically, we will focus on cutting-edge models that are of interest to both the research and commercial communities.</td></tr>
<tr><td>NIE-ROZ</td><td>Pattern Recognition</td><td>Z,ZK</td><td>5</td></tr>
<tr><td colspan="4">The aim of the module is to give a systematic account of the major topics in pattern recognition with emphasis on problems and applications of the statistical approach to pattern recognition. Students will learn the fundamental concepts and methods of pattern recognition, including probability models, parameter estimation, and their numerical aspects.</td></tr>
<tr><td>NIE-SCE1</td><td>Computer Engineering Seminar Master I</td><td>Z</td><td>4</td></tr>
<tr><td colspan="4">The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to failures and attacks. Students are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the subject is work with scientific articles and other professional literature and/or work in KČN laboratories. The capacity of the subject is limited by the possibilities of the seminar teachers. The topics are new for each semester.</td></tr>
<tr><td>NIE-SCE2</td><td>Computer Engineering Seminar Master II</td><td>Z</td><td>4</td></tr>
<tr><td colspan="4">The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to failures and attacks. Students are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the subject is work with scientific articles and other professional literature and/or work in KČN laboratories. The capacity of the subject is limited by the possibilities of the seminar teachers. The topics are new for each semester.</td></tr>
<tr><td>NIE-SEP</td><td>World Economy and Business</td><td>Z,ZK</td><td>4</td></tr>
<tr><td colspan="4">The course introduces students of technical university to the international business. It does that predominantly by comparing individual countries and key regions of world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as indexes of economic freedom, corruption and economic</td></tr>
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development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form of discussions based on individual readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.			
NIE-SWE	Semantic Web and Knowledge Graphs	Z,ZK	5
The students will learn the most recent concepts and technologies of the Semantic Web. The course will provide an overview of the Semantic Web technologies, methods and best practices for modelling, integration, publishing, querying and consumption of semantic data. The students will also gain skills in creation of knowledge graphs and their systematic quality assurance.			
NIE-SYP	Parsing and Compilers	Z,ZK	5
The module builds upon the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge of various variants and applications of LR parsing and are introduced to special applications of parsers, such as incremental and parallel parsing.			
NIE-VPR	Research Project	Z	5
1. At the beginning of the semester, a student reserves her/his final thesis topic and gets together with its supervisor. Together they decide on partial tasks that should be carried out during the semester. If the requirements they agreed upon are met, the supervisor awards the student an assessment for the course MI-MPR at the end of the semester. 2. External Master these (MT) supervisor fills his/her assessment into the paper "Form to award assessment by an external Final theses (FT) supervisor" (for the courses BIE-BAP, MIE-MPR, MIE-DIP). Students, then, ensure that the assessment is registered into the information system (IS) by asking their internal FT opponent to award the assessment to the IS based on the confirmation of the external MT supervisor. In the case the FT opponent is external as well, the assessment will be registered to the IS by the head of the department responsible for the topic of the MT. 3. If the FT topic that the student has reserved is rather general, the immediate tasks the supervisor assigns to the student for the upcoming semester should aim at fine-tuning the FT topic so that the FTT will be complete and approvable at the end of the semester.			
NIE-VSM	Selected statistical Methods	Z,ZK	7
Summary of probability theory; Multivariate normal distribution; Entropy and its application to coding; Statistical tests: T-tests, goodness of fit tests, independence test; Random processes - stacionarity; Markov chains and limiting properties; Queuing theory			
NIE-VYC	Computability	Z,ZK	4
Classical theory of recursive functions and effective computability.			

For updated information see http://bilakniha.cvut.cz/en/FF.html
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