

# Recommended pass through the study plan

## Name of the pass: Specialization Software Engineering - Passage through study

Faculty/Institute/Others: Faculty of Electrical Engineering

Department:

Pass through the study plan: Open Informatics - Software Engineering

Branch of study guaranteed by the department: Welcome page

Guarantor of the study branch:

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, <b>authors</b> and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BEZM	<b>Safety in Electrical Engineering for a master's degree</b> Vladimír K la, Radek Havlí ek, Ivana Nová, Josef ernohous, Pavel Mlejnek <b>Radek Havlí ek</b> Vladimír K la (Gar.)	Z	0	2BP+2BC	Z	P
B4M33PAL	<b>Advanced algorithms</b> Marko Genyk-Berezovskyj, Daniel Pr ša, Ond ej Drbohlav <b>Daniel Pr ša</b> Daniel Pr ša (Gar.)	Z,ZK	6	2P+2C	Z	P
B4M36DS2	<b>Database Systems II</b> Yuliia Prokop <b>Yuliia Prokop</b> Yuliia Prokop (Gar.)	Z,ZK	6	2P+2C	Z	PO
B4M36ZKS	<b>Software Quality Assurance</b> Karel Frajták, Miroslav Bureš, Mat j Klíma <b>Miroslav Bureš</b> Miroslav Bureš (Gar.)	Z,ZK	6	2P+2C	Z	PO
2018_MOIVOL	<b>Volitelné odborné p edm ty</b>	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, <b>authors</b> and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
B4M35KO	<b>Combinatorial Optimization</b> Zden k Hanzálek <b>Zden k Hanzálek</b> Zden k Hanzálek (Gar.)	Z,ZK	6	3P+2C	L	P
B4M01TAL	<b>Theory of Algorithms</b> Marie Demlová, Natalie Žukovec <b>Marie Demlová</b> Marie Demlová (Gar.)	Z,ZK	6	3P+2S	L	P
B4M36ESW	<b>Effective Software</b> Michal Sojka, David Šišlák <b>David Šišlák</b> David Šišlák (Gar.)	Z,ZK	6	2P+2C	L	PO
B4M36SWA	<b>Software Architectures</b> Karel Frajták, Miroslav Bureš <b>Miroslav Bureš</b> (Gar.)	Z,ZK	6	2P+2C	L	PO
2018_MOIVOL	<b>Volitelné odborné p edm ty</b>	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, <b>authors</b> and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
B4MSVP	<b>Software or Research Project</b> Ji í Šebek, Ivan Jelínek, Jaroslav Sloup, Martin Šipoš, Drahomíra Hejtmánová, Jana Zichová, Petr Pošík, Martin Hlinovský, Katarína Žmolíková, ..... <b>Ivan</b> <b>Jelínek</b> Ivan Jelínek (Gar.)	KZ	6		Z,L	P

B4M36BSY	<b>Introduction to Computer Security</b> <i>Sebastián García, Tomáš Pevný, Verónica Valeros, Maria Rigaki, Ondřej Lukáš, Martin Štěpánek, Lukáš Forst, Muris Sladić</i> <b>Tomáš Pevný</b> Tomáš Pevný (Gar.)	Z,ZK	6	2P+2C	Z	PO
B4M35PAG	<b>Parallel algorithms</b> <i>P emysl Š cha P emysl Š cha P emysl Š cha (Gar.)</i>	Z,ZK	6	2P+2S	Z	PO
2018_MOIVOL	<b>Volitelné odborné předměty</b>	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	<b>Diploma Thesis</b>	Z	25	22s	L	P
2018_MOIVOL	<b>Volitelné odborné předměty</b>	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
2018_MOIVOL	<b>Volitelné odborné předměty</b>	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	Z,ZK	6
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.			
B4M33PAL	Advanced algorithms	Z,ZK	6
Basic graph algorithms and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science - pattern matching.			
B4M35KO	Combinatorial Optimization	Z,ZK	6
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.			
B4M35PAG	Parallel algorithms	Z,ZK	6
In the introductory lectures, we will focus on general approaches to design of parallel algorithms and their properties important for understanding the fundamental principles of parallel and distributed algorithms. Subsequently we will talk about fundamental parallel algorithms; typically, constituting cornerstones of algorithms for real-world problems. The laboratory exercise will be aimed at hardware platform commonly used in practice.			
B4M36BSY	Introduction to Computer Security	Z,ZK	6
This course aims to teach students cybersecurity fundamentals by combining penetration testing with defense strategies. Using an innovative blend of lectures and practical tutorials, students engage in highly interactive classes. Each new concept is immediately reinforced with hands-on exercises, allowing students to apply what they have learned in real-time. Throughout the semester, the course integrates both attack and defense techniques. In realistic scenarios accessed via a cyber range, students will practice a wide range of skills: reconnaissance, scanning, exploiting vulnerabilities, privilege escalation, lateral movement, exfiltration, malware analysis, network security forensics, binary reversing, log analysis, intrusion detection systems, honeypots, and applications of machine learning and AI in cybersecurity. Classes are in English. Teachers speak English, Czech, Spanish, Greek, and Bosnian.			
B4M36DS2	Database Systems II	Z,ZK	6
The aim is to introduce new trends in database systems to students. We will focus primarily on the current issues of Big Data and the associated problems of distributed storage and processing of data. We will introduce a so-called basic types of NoSQL databases and also the related issue of cloud computing, data storage and distributed computations over large data files.			
B4M36ESW	Effective Software	Z,ZK	6
Within the course of Efficient software you will get familiar with the area of software and algorithm optimization under limited resources. The course is focused on the efficient usage of modern hardware architectures - multi-core and multi-processor systems with shared memory. Students will practically implement and use presented techniques in C and Java. Main topics are: code optimization, effective data structures and processor cache usage, data structures in multi-threaded applications and implementation of efficient network servers.			

<b>B4M36SWA</b>	<b>Software Architectures</b> In this course students become familiar with the general requirements for software (SW) architecture and related quality parameters that are monitored by software architectures. Individual requirements and parameters are discussed in the context of current architectural standards and design patterns that students practically learn through exercises. In this course, besides the technology perspective on software architecture is also taken into an account the management aspect.	<b>Z,ZK</b>	<b>6</b>
<b>B4M36ZKS</b>	<b>Software Quality Assurance</b>	<b>Z,ZK</b>	<b>6</b>
<b>B4MSVP</b>	<b>Software or Research Project</b>	<b>KZ</b>	<b>6</b>
<b>BDIP25</b>	<b>Diploma Thesis</b> 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.	<b>Z</b>	<b>25</b>
<b>BEZM</b>	<b>Safety in Electrical Engineering for a master's degree</b> 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.	<b>Z</b>	<b>0</b>

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

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