# Study plan

# Name of study plan: Open Informatics - Computer Engineering

Faculty/Institute/Others: Faculty of Electrical Engineering
Department:
Branch of study guaranteed by the department: Welcome page
Garantor of the study branch:
Program of study: Open Informatics
Type of study: Follow-up master full-time
Required credits: 85
Elective courses credits: 35
Sum of credits in the plan: 120
Note on the plan:

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Name of the block: Compulsory courses in the program
Minimal number of credits of the block: 49
The role of the block: P

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Code of the group: 2018_MOIDIP
Name of the group: Diploma Thesis
Requirement credits in the group: In this group you have to gain 25 credits
Requirement courses in the group: In this group you have to complete 1 course
Credits in the group: 25
Note on the group:

| 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 |
|------|---|---|---|---|---|---|
| BDIP25 | **Diploma Thesis** | Z | 25 | 22s | L | P |

Characteristics of the courses of this group of Study Plan: Code=2018_MOIDIP Name=Diploma Thesis

| 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. | | | |

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Code of the group: 2018_MOIP
Name of the group: Compulsory subjects of the programm
Requirement credits in the group: In this group you have to gain 24 credits
Requirement courses in the group: In this group you have to complete 4 courses
Credits in the group: 24
Note on the group:

| 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** | Z,ZK | 6 | 3P+2C | L | P |
| B4M33PAL | **Advanced algorithms** *Marko Genyk-Berezovskyj, Daniel Pr ša* **Daniel Pr ša** *Daniel Pr ša (Gar.)* | Z,ZK | 6 | 2P+2C | Z | P |
| B4MSVP | **Software or Research Project** *Ivan Jelínek, Ji í Šebek, Martin Šipoš, Drahomíra Hejtmanová, Jaroslav Sloup, Jana Zichová, Petr Pošík, Martin Hlinovský, Katarína Žmolíková, .....* **Ivan Jelínek** *Ivan Jelínek (Gar.)* | KZ | 6 | | Z,L | P |
| B4M01TAL | **Theory of Algorithms** | Z,ZK | 6 | 3P+2S | L | P |

Characteristics of the courses of this group of Study Plan: Code=2018_MOIP Name=Compulsory subjects of the programm

| 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. | | | |

| B4M33PAL | Advanced algorithms | Z,ZK | 6 |
|---|---|---|---|
| Basic graph algorithms and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science - pattern matching. | | | |
| B4MSVP | Software or Research Project | KZ | 6 |
| 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 ZZP introduced. | | | |

# Name of the block: Compulsory courses of the specialization
Minimal number of credits of the block: 36
The role of the block: PO

Code of the group: 2018_MOIPO4
Name of the group: Compulsory subjects of the branch
Requirement credits in the group: In this group you have to gain 36 credits
Requirement courses in the group: In this group you have to complete 6 courses
Credits in the group: 36
Note on the group:

| 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 |
|---|---|---|---|---|---|---|
| B4M38AVS | **Embedded Systems Application** | Z,ZK | 6 | 2P+2L | L | PO |
| B4M36ESW | **Effective Software** | Z,ZK | 6 | 2P+2C | L | PO |
| B4M34ISC | **Systems on Chip** *Tomáš Teplý, Ji í Jakovenko, Vladimír Janí ek, Jan Novák* **Ji í Jakovenko** *Ji í Jakovenko (Gar.)* | Z,ZK | 6 | 2P+2L | Z | PO |
| B4M38KRP | **Computer Interfaces** *Ji í Novák* **Ji í Novák** *Ji í Novák (Gar.)* | Z,ZK | 6 | 2P+2L | Z | PO |
| B4M35PAG | **Parallel algorithms** *P emysl Š cha* **P emysl Š cha** *P emysl Š cha (Gar.)* | Z,ZK | 6 | 2P+2S | Z | PO |
| B4M35PAP | **Advanced Computer Architectures** *Pavel Píša, Karel Ko í* **Pavel Píša** *Pavel Píša (Gar.)* | Z,ZK | 6 | 2P+2C | Z | PO |

**Characteristics of the courses of this group of Study Plan: Code=2018_MOIPO4 Name=Compulsory subjects of the branch**

| B4M38AVS | Embedded Systems Application | Z,ZK | 6 |
|---|---|---|---|
| This course presents applications of embedded systems and their specifics. It is expected that the students have had a programming course, and thus the course is more oriented on explaining and describing the blocks and functions of embedded systems and their use in signal processing, rather than writing code. After completing this course, students should have an overview of usability and power of available processors, and their peripherals, on the basis of which, they should be able to independently design embedded systems for a wide spectrum of applications. | | | |
| 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 implmenet 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. | | | |
| B4M34ISC | Systems on Chip | Z,ZK | 6 |
| Main responsibilities of integrated circuits designer; design abstraction levels - Y chart. Specification designation, feasibility study, criteria for technology and design kits selection. Analogue and digital integrated systems design and simulation methodologies. Main features of application specific ICs - full custom design, gate arrays, standard cells, programmable array logic. Design aspects mobile and low power systems. Hardware Description languages (HDL). Logic and physical synthesis. Frond End and Back End design. Floorplanning, place and route, layout, parasitic extraction, time analysis, testbenche construction and verification. | | | |
| B4M38KRP | Computer Interfaces | Z,ZK | 6 |
| Students are acquainted with functional principles of computers and embedded systems communication interfaces and with a design of typical peripherals. Technologies like USB, PCI, and PCI Express, wired and wireless computer and sensor networks as well as industrial distributed systems like CAN and LIN are introduced. Project oriented laboratories will allow students to become familiar with implementation of communication hardware and software into the real devices, including their support in operating systems. | | | |
| 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. | | | |
| B4M35PAP | Advanced Computer Architectures | Z,ZK | 6 |

# Name of the block: Elective courses
Minimal number of credits of the block: 0
The role of the block: V

Code of the group: 2018_MOIH
Name of the group: Humanities subjects
Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

| 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 |
|---|---|---|---|---|---|---|
| B0M16FIL | *Peter Zamarovský* **Peter Zamarovský** *Peter Zamarovský (Gar.)* | Z,ZK | 5 | 2P+2S | Z,L | V |
| B0M16HVT | **History of science and technology 2** *Marcela Efmertová, Jan Mikeš* **Marcela Efmertová** *Marcela Efmertová (Gar.)* | Z,ZK | 5 | 2P+2S | Z,L | V |
| B0M16HSD1 | **History of economy and social studies** **Marcela Efmertová** | Z,ZK | 5 | 2P+2S | Z,L | V |
| B0M16PSM | **Psychology** | Z,ZK | 5 | 2P+2S | Z,L | V |
| B0M16TEO | **Theology** *Vladimír Sláme ka* **Vladimír Sláme ka** *Vladimír Sláme ka (Gar.)* | Z,ZK | 5 | 2P+2S | Z,L | V |

**Characteristics of the courses of this group of Study Plan: Code=2018_MOIH Name=Humanities subjects**

| B0M16FIL | | Z,ZK | 5 |
|---|---|---|---|
| B0M16HVT | History of science and technology 2 | Z,ZK | 5 |
| This subject traces historical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate students' interest in the history and traditions of the subject, while highlighting the developments in technical education and professional organizations, the process of shaping scientific life and the influence of technical engineers | | | |
| B0M16HSD1 | History of economy and social studies | Z,ZK | 5 |
| This subject deals with the history of the Czech society in the 19th - 21st centuries. It follows the forming of the Czech political representation, its aims and achieved results as well as the social and cultural development and coexistence of the various ethnical groups in the Czech countries. | | | |
| B0M16PSM | Psychology | Z,ZK | 5 |
| B0M16TEO | Theology | Z,ZK | 5 |
| This subject provides to students the basic orientation in christian theology and requires no special previous education. After short philosophic lecture the basic theologic disciplines are gone through. The subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones who want to get know Christianity - religion from which graws our civilization up. | | | |

Code of the group: MTV

Name of the group: Physical education

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

| 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 |
|---|---|---|---|---|---|---|
| TVV | **Physical education** | Z | 0 | 0+2 | Z,L | V |
| A003TV | **Physical Education** *Ji í Drnek* | Z | 2 | 0+2 | L,Z | V |
| TV-V1 | **Physical education** | Z | 1 | 0+2 | Z,L | V |
| TVV0 | **Physical education** | Z | 0 | 0+2 | Z,L | V |
| TVKLV | **Physical Education Course** | Z | 0 | 7dní | L | V |
| TVKZV | **Physical Education Course** | Z | 0 | 7dní | Z | V |

**Characteristics of the courses of this group of Study Plan: Code=MTV Name=Physical education**

| TVV | Physical education | Z | 0 |
|---|---|---|---|
| A003TV | Physical Education | Z | 2 |
| TV-V1 | Physical education | Z | 1 |
| TVV0 | Physical education | Z | 0 |
| TVKLV | Physical Education Course | Z | 0 |
| TVKZV | Physical Education Course | Z | 0 |

Code of the group: 2018_MOIVOL

Name of the group: Elective subjects

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group: ~The offer of elective courses arranged by departments can be found on the website https://fel.cvut.cz/en/education/volitelne-predmety.html\\

# List of courses of this pass:

| Code | Name of the course | Completion | Credits |
|---|---|---|---|
| A003TV | Physical Education | Z | 2 |
| B0M16FIL | | Z,ZK | 5 |
| B0M16HSD1 | History of economy and social studies | Z,ZK | 5 |
| | This subject deals with the history of the Czech society in the 19th - 21st centuries. It follows the forming of the Czech political representation, its aims and achieved results as well as the social and cultural development and coexistence of the various ethnical groups in the Czech countries. | | |
| B0M16HVT | History of science and technology 2 | Z,ZK | 5 |
| | This subject traces historical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate students' interest in the history and traditions of the subject, while highlighting the developments in technical education and professional organizations, the process of shaping scientific life and the influence of technical engineers | | |
| B0M16PSM | Psychology | Z,ZK | 5 |
| B0M16TEO | Theology | Z,ZK | 5 |
| | This subject provides to students the basic orientation in christian theology and requires no special previous education. After short philosophic lecture the basic theologic disciplines are gone through. The subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones who want to get know Christianity - religion from which graws our civilization up. | | |
| 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 ZZP 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. | | |
| B4M34ISC | Systems on Chip | Z,ZK | 6 |
| | Main responsibilities of integrated circuits designer; design abstraction levels - Y chart. Specification designation, feasibility study, criteria for technology and design kits selection. Analogue and digital integrated systems design and simulation methodologies. Main features of application specific ICs - full custom design, gate arrays, standard cells, programmable array logic. Design aspects mobile and low power systems. Hardware Description languages (HDL). Logic and physical synthesis. Frond End and Back End design. Floorplanning, place and route, layout, parasitic extraction, time analysis, testbenche construction and verification. | | |
| 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. | | |
| B4M35PAP | Advanced Computer Architectures | Z,ZK | 6 |
| 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 implmenet 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. | | |
| B4M38AVS | Embedded Systems Application | Z,ZK | 6 |
| | This course presents applications of embedded systems and their specifics. It is expected that the students have had a programming course, and thus the course is more oriented on explaining and describing the blocks and functions of embedded systems and their use in signal processing, rather than writing code. After completing this course, students should have an overview of usability and power of available processors, and their peripherals, on the basis of which, they should be able to independently design embedded systems for a wide spectrum of applications. | | |
| B4M38KRP | Computer Interfaces | Z,ZK | 6 |
| | Students are acquainted with functional principles of computers and embedded systems communication interfaces and with a design of typical peripherals. Technologies like USB, PCI, and PCI Express, wired and wireless computer and sensor networks as well as industrial distributed systems like CAN and LIN are introduced. Project oriented laboratories will allow students to become familiar with implementation of communication hardware and software into the real devices, including their support in operating systems. | | |
| 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. | | |
| TV-V1 | Physical education | Z | 1 |
| TVKLV | Physical Education Course | Z | 0 |
| TVKZV | Physical Education Course | Z | 0 |
| TVV | Physical education | Z | 0 |
| TVV0 | Physical education | Z | 0 |

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