# Name of study plan: Open Informatics - Artificial Intelligence and Computer Science 2018 

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: Bachelor full-time
Required credits: 152
Elective courses credits: 28
Sum of credits in the plan: 180
Note on the plan:
Name of the block: Compulsory courses in the program
Minimal number of credits of the block: 122
The role of the block: $P$
Code of the group: 2018_BOIBAP
Name of the group: Bachelor Project
Requirement credits in the group: In this group you have to gain 20 credits
Requirement courses in the group: In this group you have to complete 1 course
Credits in the group: 20
Note on the group:

| Code | Name of the course /Name of the group of courses <br> (in case of groups of courses the list of codes of their <br> members) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: |
| BBAP20 | Bachelor thesis <br> Roman Čmejla Roman Čmejla (Gar.) | Z | 20 | $12 S$ | L,Z | P |

Characteristics of the courses of this group of Study Plan: Code=2018_BOIBAP Name=Bachelor Project

| BBAP20 | Bachelor thesis | Z | 20 |
| :--- | :--- | :--- | :--- |

Code of the group: 2018_BOIBBE
Name of the group: Safety of the bachelor's studies
Requirement credits in the group:
Requirement courses in the group: In this group you have to complete at least 2 courses
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) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| BEZB | Safety in Electrical Engineering for a bachelor's degree Ivana Nová, Radek Havlíček, Vladimír Kúla Radek Havliček Vladimír Kủla (Gar.) | Z | 0 | 2BP+2BC | Z,L | P |
| BEZZ | Basic health and occupational safety regulations Ivana Nová, Radek Havliček, Vladimír Küla Radek Havliček Vladimír Kủla (Gar.) | Z | 0 | 2BP+2BC | Z | P |


| BEZB | , |  |  |
| :---: | :---: | :---: | :---: |
| The purpose of the safety course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from operation of it. This introductory course contains fundamentals of Safety Electrical Engineering. In this way the students receive qualification of instructed person that enables them to work on electrical equipment. |  |  |  |
| BEZZ | Basic health and occupational safety regulations |  |  |
| The guidelines were worked out based on The Training Scheme for Health and Occupational Safety designed for employees and students of the Czech Technical University in Prague, which was provided by the Rector's Office of the CTU. Safety is considered one of the basic duties of all employees and students. The knowledge of Health and Occupational Safety regulations forms an integral and permanent part of qualification requirements. This program is obligatory. |  |  |  |

Code of the group: 2018_BOIP
Name of the group: Compulsory subjects of the programme
Requirement credits in the group: In this group you have to gain 102 credits
Requirement courses in the group: In this group you have to complete 17 courses
Credits in the group: 102
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) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| B4B33ALG | Algorithms <br> Marko Genyk-Berezovskyj, Daniel Průša Marko Genyk-Berezovskyj Marko Genyk-Berezovskyj (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | Z | P |
| B0B35APO | Computer Architectures <br> Pavel Píša, Richard Šusta, Petr Štěpán Pavel Píša Pavel Píša (Gar.) | Z,ZK | 5 | 2P+2L | L | P |
| B0B36DBS | Database Systems <br> Martin Řimnáč Martin Řimnáć Martin Řimnáč (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}+4 \mathrm{D}$ | L | P |
| B4B01DMA | Discrete Mathematics <br> Petr Habala Petr Habala Petr Habala (Gar.) | Z,ZK | 5 | $2 \mathrm{P}+2 \mathrm{~S}$ | Z | P |
| B0B01LAG | Linear Algebra <br> Jirí Velebil, Natalie Žukovec, Daniel Gromada, Josef Dvořăk, Matěj Dostál Jirí Velebil Jiǐi Velebil (Gar.) | Z,ZK | 8 | 4P+2S | Z | P |
| B0B01LGR | Logic anad Graphs <br> Natalie Żukovec, Matěj Dostál, Alena Gollová Alena Gollová Marie Demlová (Gar.) | Z,ZK | 5 | $3 \mathrm{P}+2 \mathrm{~S}$ | Z,L | P |
| B0B01MA1 | Mathematical Analysis 1 <br> Josef Dvořăk, Martin Kł̌epela, Josef Tkadlec, Veronika Sobotiková Josef <br> Tkadlec Josef Tkadlec (Gar.) | Z,ZK | 7 | 4P+2S | Z,L | P |
| B0B01MA2 | Mathematical Analysis 2 <br> Karel Pospísil, Miroslav Korbelář, Petr Hájek, Martin Bohata, Jaroslav Tišer, Paola Vivi, Hana Turčinová Petr Hájek Jaroslav Tišer (Gar.) | Z,ZK | 7 | $4 \mathrm{P}+2 \mathrm{~S}$ | L,Z | P |
| B4B35OSY | Operating Systems <br> Petr Štépán, Michal Sojka Michal Sojka Michal Sojka (Gar.) | Z,ZK | 4 | $2 \mathrm{P}+2 \mathrm{C}$ | Z | P |
| B0B33OPT | Optimization <br> Tomáś Werner, Petr Olšák, Mirko Navara, Tomáś Kroupa Tomáš Werner Tomáš Werner (Gar.) | Z,ZK | 7 | $4 \mathrm{P}+2 \mathrm{C}$ | Z,L | P |
| B4B36PDV | Parallel and Distributed Computing Jakub Mareček, Michal Jakob, Daria Mikhaylovskaya Michal Jakob Michal Jakob (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | L | P |
| B4B38PSIA | Computer Networks Jiirí Novák, Jan Holub Jirír Novák Jirí Novák (Gar.) | Z,ZK | 5 | 2P+2L | L | P |
| B0B01PST | Probability and Statistics <br> Miroslav Korbelář, Veronika Sobotiková, Kateriina Helisová, Matvei Slavenko Kateřina Helisová Petr Hájek (Gar.) | Z,ZK | 7 | 4P+2S | Z | P |
| B0B36PRP | Procedural Programming Jan Faigl Jan Faigl Jan Faigl (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | Z | P |
| B0B36PJV | Programming in Java Jiiri Vokrïnek, Martin Mudroch, Ladislav Serédi Jiríl Vokřinek Jirí Vokrínek (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+3 \mathrm{C}+7 \mathrm{D}$ | L | P |
| B4B33RPH | Solving Problems and other Games Tomáš Svoboda, Petr Pošík Petr Pošik Tomáš Svoboda (Gar.) | KZ | 6 | $2 \mathrm{P}+3 \mathrm{C}$ | Z | P |
| B4BPROJ6 | Unassisted project <br> Tomáś Svoboda, Petr Pošik, Jiríl Šebek, Jaroslav Sloup, Ivan Jelínek, Katarína Żmoliková Petr Pošík | Z | 6 | 0+2 | Z,L | P |

## Characteristics of the courses of this group of Study Plan: Code=2018_BOIP Name=Compulsory subjects of the programme

| B4B33ALG <br> In the course, the algorithms development is constructed with minimum dependency to programming language; nevertheless the lectures and seminars are based on Java. Basic data <br> types a data structures, basic algorithms, recursive functions, abstract data types, stack, queues, trees, searching, sorting, special application algorithms, Dynamic programming. <br> Students are able to design and construct non-trivial algorithms and to evaluate their effectivity. |  |  |  |  |
| :--- | :--- | :---: | :---: | :---: |
| B0B35APO | Computer Architectures | Z,ZK | Z,ZK | 5 |
| B0B36DBS | Database Systems | Z,ZK | 6 |  |

The course is designed as a basic database course mainly aimed at the student ability to design a relational data model and to use the SQL language for data definition as well as for data querying and to choose the appropriate degree of transaction isolation. Students will also get acquainted with the most commonly used indexing techniques, database system architecture and their management. They will verify their knowledge during the elaboration of a continuously submitted seminar task.
B4B01DMA $\quad$ Discrete Mathematics
Z,ZK
5
In this course students meet some important topics from the field of discrete mathematics. Namely, they will explore divisibility and calculations modulo n , diophantine equations, binary relations, mappings, cardinality of sets, induction, and recurrence equations. The second aim of this course is to teach students the language of mathematics, both passively and actively, and introduce them to mathematics as science.
B0B01LAG $\quad$ Linear Algebra
Z,ZK 8
The course covers the initial parts of linear algebra. Firstly, the basic notions of a linear space and linear mappings are covered (linear dependence and independence, basis, coordinates, etc). The calculus of matrices (determinants, inverse matrices, matrices of a linear map, eigenvalues and eigenvectors, diagonalisation, etc) is covered next. The applications include solving systems of linear equations, the geometry of a 3D space (including the scalar product and the vector product) and SVD. and of the relationship between a formula and its model is stressed. Further, basic notions from graph theory are introduced.
B0B01MA1 $\quad$ Mathematical Analysis 1
Z,ZK
7
The aim of the course is to introduce students to basics of differential and integral calculus of functions of one variable.
B0B01MA2 $\quad$ Mathematical Analysis 2

| Z,ZK | 7 |
| :--- | :--- |

The subject covers an introduction to the differential and integral calculus in several variables and basic relations between curve and surface integrals. Other part contains function series and power series with application to Taylor and Fourier series.

B4B35OSY $\quad$ Operating Systems<br>Z,ZK $\quad 4$

Lecture introduces operation system's basic concepts and principles as processes, threads, communication and synchronization, virtual memory, drivers, file systems, basic security aspects. These topics are theoretically described and demonstrated on Linux and Windows OS with multi-core systems. Practical exercises from OS in C programming language will be solved on labs. Students will work with Linux OS and micro-kernel NOVA.


The course provides an introduction to mathematical optimization, specifically to optimization in real vector spaces of finite dimension. The theory is illustrated with a number of examples. You will refresh and extend many topics that you know from linear algebra and calculus courses.

| B4B36PDV | Parallel and Distributed Computing | Z,ZK | 6 |
| :--- | :--- | :---: | :---: |
| B4B38PSIA | Computer Networks | 5 |  |
| B0B01PST | Probability and Statistics | Procedural Programming | Z,ZK |
| B0B36PRP | Z,ZK | 7 |  |

The course accompanies basic programming emphasizing the data representation in computer memory. Furthermore, the concepts of linked data structures and processing user inputs are developed. Students master the practical implementation of simple individual tasks. The course emphasizes acquiring programming habits for creating readable and reusable programs. At the same time, the effort is to build students an overview of the program operation, data model, memory access, and management. Therefore, the C programming language is used that provides a direct link between the program data structures and their representation in the computer memory. Students will get acquainted not only with program compilation and linking but also with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and accuracy of implementation. Student independence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a larger program using existing implementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the selected tasks.

## B0B36PJV $\quad$ Programming in Java

| $Z, Z K$ | 6 |
| :--- | :--- |

The course builds on the basics of algorithms and programming from the first semester and introduces students to the Java environment. The course also focus on the object concept of the Java language. The topics of the course includes exceptions, event handling, and building a graphical interface. Basic library methods, working with files and using generic types will be introduced. An important topic is models of multithreaded applications and their implementation. Practical exercises of practical skills and knowledge of Java is tested in the form of solving partial tasks and semester work, which will be submitted continuously through the source code version control system. The semester work scoring consists of points for the correctness and efficiency of the code, as well as points that take into account the quality of the source codes, their readability and reusability.
B4B33RPH $\quad$ Solving Problems and other Games

| KZ | 6 |
| :--- | :--- |

The main motivation is to let students to deal with real-world problems properly. When working on real problems the student shall learn how to decompose the big problem, how to define interfaces, how to test and validate individual steps and so on. Many problems will actually be beyond the first-year-student skills. And many problem will not be solved in the optimal way. The unsolved parts should motivate the students to study difficult theoretical subjects. They should generate the important questions. Ideally, at the end of the subject, the student should be eager to study deeper about informatics. The course also explains the basis of the object oriented design, software testing, ways for writing readable and robust codes.
B4BPROJ6
Unassisted project
Z
6

## Code of the group: 2015_BZAJ

Name of the group: Exam from the english language
Requirement credits in the group:

## Requirement courses in the group: In this group you have to complete 2 courses Credits in the group: 0

Note on the group:

| Code | Name of the course / Name of the group of courses <br> (in case of groups of courses the list of codes of their <br> members) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: |
| B0B04B1K | English language B1 - classified assessment <br> Markéta Havlíckova, Pav1a Péterová, Erik Peter Stadnik, Michael Ynsua, Dana <br> Saláková, Petra Jennings Petra Jennings Petra Jennings (Gar.) | KZ | 0 | 0 C | Z,L | P |
| B0B04B2Z | English language B2 - exam <br> Michael Ynsua,, Dana Saláková, Petra Jennings Petra Jennings Petra <br> Jennings (Gar.) | Z,ZK | 0 | $0 C$ | Z,L | P |

## Characteristics of the courses of this group of Study Plan: Code=2015_BZAJ Name=Exam from the english language

| B0B04B <br> verifying o |  | KZ |  |
| :---: | :---: | :---: | :---: |
|  | English language B2-exam |  |  |
| I) The B2 English Exam is a compulsory subject for all Faculty of Electrical Engineering students at the Czech Technical University. According to the Study and Examination Rules and Regulations for Students at CTU (Part III, Article 4), a compulsory subject is one "whose completion is a necessary condition in order to successfully complete the study programme." In addition, this requires the "passing of an examination evaluated on the scale A, B, C, D, or E..." (SERR Part III, Article 6). II) According to the Common European Framework of Reference for Languages (CEFR), an international standard for describing language ability, the definition of an English language learner who has achieved the B2 (Upper-Intermediate) level is one who "...can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options." III) Students who have successfully passed an approved international exam within the past five years may present their certificate to the Department of Languages, Faculty of Electrical Engineering.Upon approval, students are then exempt from both the Written Test and the Oral Part. For a list of approved international exams go the department website: http://jazyky.fel.cvut.cz/ |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## Name of the block: Povinné předměty zaměření

## Minimal number of credits of the block: 30

## The role of the block: PZ

## Code of the group: 2018_BOIPS1

## Name of the group: Compulsory subjects of the branch

Requirement credits in the group: In this group you have to gain 30 credits
Requirement courses in the group: In this group you have to complete 5 courses
Credits in the group: 30
Note on the group: Specializace - základy umělé inteligence a počítačových věd

| Code | Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| B4B36FUP | Functional Programming <br> Rostislav Horčík, Niklas Maximilian Heim Michal Pěchouček Michal <br> Pěchouček (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | L | PZ |
| B4B01JAG | Languages, Automats and Gramatics Marie Demlová, Jiríl Demel Marie Demlová Marie Demlová (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{~S}$ | Z | PZ |
| B4B01NUM | Numerical Analysis <br> Mirko Navara, Aleš Nèmeček Mirko Navara Mirko Navara (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | Z | PZ |
| B4B33RPZ | Recognition and machine learning <br> Ondřej Drbohlav, Jiríl Matas, Jan Šochman Ondřej Drbohlav Jiǐí Matas (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | Z | PZ |
| B4B36ZUI | Introduction to Artificial Intelligence <br> Viliam Lisý, Branislav Bošansky Branislav Bošanský Michal Pěchouček (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | L | PZ |

Characteristics of the courses of this group of Study Plan: Code=2018_BOIPS1 Name=Compulsory subjects of the branch

| B4B36FUP | Functional Programming | Z,ZK | 6 |
| :--- | :--- | :--- | :--- |

This course introduces students into the techniques of functional programming, the advantages and disadvantages of this programming paradigm, and its use in practice. This approach is declarative in the sense that the programmer symbolically describes the problem to be solved, rather than specifying the exact sequence of operations required to solve it. It allows focusing on the essence of the solved problem and implementing even more complex algorithms compactly. Functional programming has notable advantages for parallelization and automated verification of algorithms, and the most useful functional programming concepts are increasingly often introduced to standard programming languages. Because of the focus of functional programming on symbols, rather than numbers, functional programming has been heavily used in in artificial intelligence fields, such as agent systems or symbolic machine learning. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.

| B4B01JAG | Languages, Automats and Gramatics | Z,ZK | 6 |
| :--- | :--- | :--- | :--- |

Basic notions of the theory of finite automata and grammars: deterministic and non deterministic finite automata, languages accepted by finite automata, regular expressions. Grammars and languages generated by grammars with emphasis to context free grammars. A very brief introduction of Turing machines.

The course introduces to basic numerical methods of interpolation and approximation of functions, numerical differentiation and integration, solution of transcendent equations and systems of linear equations. Emphasis is put on estimation of errors, practical skills with the methods and demonstration of their properties using Maple and computer graphics.

| B4B33RPZ | Recognition and machine learning | Z,ZK | 6 |
| :--- | :--- | :---: | :---: | The basic formulations of the statistical decision problem are presented. The necessary knowledge about the (statistical) relationship between observations and classes of objects is acquired by learning on the raining set. The course covers both well-established and advanced classifier learning methods, as Perceptron, AdaBoost, Support Vector Machines, and Neural Nets. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.



The aim of the course is to cover the basics of symbolic artificial intelligence. We will focus on algorithms of informed and uninformed state space search, problem representation and solving, representation of knowledge using formal logic, methods of automated reasoning, and an introduction to Markov decision making, and to two-player games. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.

Name of the block: Compulsory elective courses
Minimal number of credits of the block: 0
The role of the block: PV
Code of the group: 2018_BOIAPP
Name of the group: Subjects in english
Requirement credits in the group:
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 0
Note on the ~Studenti programu Otevřená informatika musí v bakalárském studiu projít alespoň jedním anglicky přednášeným group: povinným předmětem programu či oboru. Bližší podmínky jsou uvedeny na stránce https://oi.fel.cvut.cz/ccs/bakalarsky-program (sekce Jazyková příprava). Niže je uveden seznam doporučených předmětů, kterými můžete tuto povinnost splnit. Pokud je česká varianta součástí vašeho povinného studijního
plánu, pochopitelně vam anglická varianta nahradí tuto českou. Kromě uvedeného seznamu Ize povinnost splnit zápisem anglicky přednášeného předmětu na zahraniční stáži (Erasmus, apod.). V obou výše uvedených případech bude povinnost v KOSu splněna automaticky. Poslední možností je splnit tuto povinnost na žádost jinak (předmět mimo seznam, bakalářská práce vedená zahraničním vedoucím, apod.).II

| Code | Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| BE4B33SEA | Subject in english - abroad | Z,ZK | 0 |  | Z,L | PV |
| BE5B32PKS | Computer and Communication Networks Leoš Boháč, Tomáš Vaněk, Pavel Bezpalec Zbyněk Kocur Leoš Boháč (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | Z | PV |
| BE5B35APO | Computer Architectures <br> Pavel Píša, Richard Šusta Pavel Píša Pavel Píša (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{~L}$ | L | PV |
| BE4B38PSIA | Computer Networks Jiirí Novák, Jan Holub Jirí Novák Jirí Novák (Gar.) | Z,ZK | 5 | 2P+2L | L | PV |
| BE4B36FUP | Functional Programming Rostislav Horčik, Niklas Maximilian Heim Rostislav Horčík Michal Pěchouček (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | L | PV |
| BE4B36ZUI | Introduction to Artificial Intelligence Viliam Lisý, Branislav Bošanský Branislav Bošanský Branislav Bošanský (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | L | PV |
| BE5B35LSP | Logic Systems and Processors <br> Richard SUusta, Martin Hlinovsky Martin Hlinovský Richard Šusta (Gar.) | Z,ZK | 6 | 3P+2L | Z | PV |
| BE5B33RPZ | Pattern Recognition and Machine Learning Ondřej Drbohlav, Jiirí Matas, Jan Šochman Jiriŕ Matas Jiří Matas (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}$ | Z | PV |
| BE4B39VGO | Creating graphic content Ladislav Cmolik Ladislav Čmolík Ladislav Čmolik (Gar.) | Z,ZK | 6 | $2 \mathrm{P}+2 \mathrm{C}+8 \mathrm{D}$ | Z | PV |

Characteristics of the courses of this group of Study Plan: Code=2018_BOIAPP Name=Subjects in english


The aim of the course is to familiarize students with current trends in the switched local networks and the key functions of routing protocols in IP networks. The course is aimed rather primarily practically then theoretically.
BE5B35APO $\quad$ Computer Architectures
Z,ZK
6
Subject provides overview of basic building blocks of computer systems. Explanation starts from hardware side where it extends knowledge presented in the previous lectures of Structures of computer systems. Topics cover building blocks description, CPU structure, multiple processors interconnections, input/output subsystem and basic overview of network and buses topologies. Emphasis is placed on clarification of interconnection of hardware components with software support, mainly lower levels of operating systems, device drivers and virtualization techniques. General principles are more elaborated during presentation of examples of multiple standard CPU architectures. Exercises are more focused on the software view to the contrary. Students are lead from basic programming on CPU level to the interaction with raw hardware.
BE4B38PSIA $\quad$ Computer Networks

## Z,ZK

5
Subject is devoted to principles and technologies of Computer Networks. Physical layer media, analog and digital modulations, network topologies, MAC methods, ARQ algorithms, data communication models, coding and cryptography basics are introduced. Widely used LAN technologies are then presented together with their features. Internet protocols are explained and internetworking approaches are presented.
BE4B36FUP $\quad$ Functional Programming
Z,ZK
6

This course introduces students into the techniques of functional programming, the advantages and disadvantages of this programming paradigm, and its use in practice. This approach is declarative in the sense that the programmer symbolically describes the problem to be solved, rather than specifying the exact sequence of operations required to solve it. It allows focusing on the essence of the solved problem and implementing even more complex algorithms compactly. Functional programming has notable advantages for parallelization and automated verification of algorithms, and the most useful functional programming concepts are increasingly often introduced to standard programming languages. Because of the focus of functional programming on symbols, rather than numbers, functional programming has been heavily used in in artificial intelligence fields, such as agent systems or symbolic machine learning. This course is also part of the inter-university programme prg.ai Minor. It pools the best of Al education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.
BE4B36ZUI $\quad$ Introduction to Artificial Intelligence
Z,ZK
6
The aim of the course is to cover the basics of symbolic artificial intelligence. We will focus on algorithms of informed and uninformed state space search, problem representation and solving, representation of knowledge using formal logic, methods of automated reasoning, and an introduction to Markov decision making, and to two-player games. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.
BE5B35LSP $\quad$ Logic Systems and Processors
Z,ZK
6

The course introduces the basic hardware structures of computing resources, their design, and architecture. It provides an overview of the possibilities of performing data operations at the hardware level and the design of embedded processor systems with peripherals on modern FPGA programmable logic circuits, which are increasingly widely used today. Students will learn their description in VHDL, from logic to more complex sequential circuits to practical finite state machine (FSM) designs. They will also master the correct design procedure using circuit simulation. Practical problems are solved using development boards used at hundreds of leading universities around the world. The course ends with RISC-V processor structure, cache, and pipeline processing.
BE5B33RPZ $\quad$ Pattern Recognition and Machine Learning
Z,ZK $\quad 6$
The basic formulations of the statistical decision problem are presented. The necessary knowledge about the (statistical) relationship between observations and classes of objects is acquired by learning on the raining set. The course covers both well-established and advanced classifier learning methods, as Perceptron, AdaBoost, Support Vector Machines, and Neural Nets. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.
BE4B39VGO $\quad$ Creating graphic content
Z,ZK
6
The aim of this course is to provide theory behind geometric modeling and modeling of materials, give students an overview of methods used in the process of creating 2D and 3D graphics and how to apply those methods in praxis. At the seminars, students will learn how to design and create three-dimensional scene, create and apply textures imitating materials (e.g., wall finishes, wood, sky) and geometrical details, and position and set-up lights in the scene.

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_BOIH
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) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| B0B16ET1 | Ethic 1 <br> Vladimír Slámečka Vladimír Slámečka Vladimír Slámečka (Gar.) | KZ | 4 | $2 \mathrm{P}+2 \mathrm{C}$ | Z | V |
| B0B16FIL | Philosophy <br> Peter Zamarovsky Peter Zamarovský Peter Zamarovský (Gar.) | ZK | 2 | 2P+0S | Z,L | V |
| B0B16FI1 | Philosophy 1 <br> Peter Zamarovsky Peter Zamarovský Peter Zamarovský (Gar.) | KZ | 4 | $2 \mathrm{P}+2 \mathrm{~S}$ | Z | v |
| B0B16HTE | History of technology and economic Marcela Efmertová, Jan Mikeš Marcela Efmertová Marcela Efmertová (Gar.) | ZK | 2 | 2P+0S | Z,L | V |
| B0B16HT1 | History of science and technology 1 Marcela Efmertová, Jan Mikeš Marcela Efmertová Marcela Efmertová (Gar.) | KZ | 4 | $2 \mathrm{P}+2 \mathrm{~S}$ | Z | V |
| B0B16HI1 | History 1 <br> Milena Josefovičová Milena Josefovičová Milena Josefovičová (Gar.) | KZ | 4 | $2 \mathrm{P}+2 \mathrm{~S}$ | Z | V |
| B0B16MPS | Psychology Jan Fiala Jan Fiala Jan Fiala (Gar.) | Z,ZK | 4 | $2 \mathrm{P}+2 \mathrm{~S}$ | Z,L | V |
| B0B16MPL | Psychology for managers Jan Fiala Jan Fiala Jan Fiala (Gar.) | ZK | 2 | $2 \mathrm{P}+0 \mathrm{~S}$ | Z,L | V |

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

| B0B16ET1 | Ethic 1 | KZ | 4 |
| :---: | :---: | :---: | :---: |
| Aim of this subject is to provide the students an orientation not only in general problems of ethics but above all to offer instructions for solving various situations of human life. Essential parts of the subject are discussions in which students can react to lectures but also to actual questions coming with news and look for the communal answers. |  |  |  |
| B0B16FIL | Philosophy | ZK | 2 |
| We deal with the most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy and connection of old philosophical thoughts with recent problems of science, technology, economics and politics. |  |  |  |
| B0B16FI1 | Philosophy 1 | KZ | 4 |
| We deal with the most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy and connection of old philosophical thoughts with recent problems of science, technology, economics and politics. |  |  |  |
| B0B16HTE | History of technology and economic | ZK | 2 |
| B0B16HT1 | History of science and technology 1 | KZ | 4 |
| B0B16HI1 | History 1 | KZ | 4 |
| B0B16MPS | Psychology | Z,ZK | 4 |
| B0B16MPL | Psychology for managers | ZK | 2 |

Code of the group: 2015_BJKA
Name of the group: English language courses
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 <br> (in case of groups of courses the list of codes of their <br> members) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: |
| B0B04A21 | English Language A2-1 <br> Dana Saláková | Z |  | 2 s | Z | V |
| B0B04A22 | English Language A2-2 <br> Dana Saláková | Z | 0 | 2 s | L | V |
| B0B04B11 | English Language B1-1 <br> Petra Jennings Petra Jennings (Gar.) | Z | 0 | 2 C | Z | V |
| B0B04B12 | English Language B1-2 <br> Petra Jennings Petra Jennings (Gar.) | Z | 0 | 2 C | L | V |
| B0B04B21 | English Language B2-1 <br> Petra Jennings Petra Jennings (Gar.) | Z | 3 | 2 C | Z | V |

Characteristics of the courses of this group of Study Plan: Code=2015_BJKA Name=English language courses


## Code of the group: BTV

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 <br> (in case of groups of courses the list of codes of their <br> members) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: |
| TVV | Physical education | Z | 0 | $0+2$ | $\mathrm{Z}, \mathrm{L}$ | V |
| A003TV | Physical Education | Z | 2 | $0+2$ | $\mathrm{~L}, \mathrm{Z}$ | V |
| TV-V1 | Physical education | Z | 1 | $0+2$ | $\mathrm{Z}, \mathrm{L}$ | V |
| TVV0 | Physical education | Z | 0 | $0+2$ | $\mathrm{Z}, \mathrm{L}$ | V |

## Characteristics of the courses of this group of Study Plan: Code=BTV Name=Physical education

| TVV | Physical education | Z | 0 |
| :--- | :--- | :---: | :---: |
| A003TV | Physical Education | Z | 2 |
| TV-V1 | Physical education | Z | 1 |
| TVV0 | Physical education | Z | 0 |

## Code of the group: BTVK

Name of the group: Physical education courses
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 <br> (in case of groups of courses the list of codes of their <br> members) <br> Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: |
| TVKLV | Physical Education Course | Z | 0 | $7 d n i ́$ | L | V |
| TVKZV | Physical Education Course | Z | 0 | $7 d n i ́$ | Z | V |

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

| TVKLV | Physical Education Course | Z | 0 |
| :--- | :--- | :---: | :---: |
| TVKZV | Physical Education Course | Z | 0 |

Code of the group: 2018_BOIVOL

# Name of the group: Elective subjects <br> Requirement credits in the group: <br> Requirement courses in the group: <br> Credits in the group: 0 <br> Note on the group: <br> ~Nabídku volitelných předmětů uspořádaných podle kateder najdete na webových stránkách http://www.fel.cvut.cz/cz/education/volitelne-predmety.htm/ll 

## List of courses of this pass:

| Code | Name of the course | Completion | Credits |
| :--- | :---: | :---: | :---: |
| A003TV | Physical Education | Z | 2 |
| B0B01LAG | Linear Algebra | Z,ZK | 8 |

The course covers the initial parts of linear algebra. Firstly, the basic notions of a linear space and linear mappings are covered (linear dependence and independence, basis, coordinates, etc). The calculus of matrices (determinants, inverse matrices, matrices of a linear map, eigenvalues and eigenvectors, diagonalisation, etc) is covered next. The applications include solving systems of linear equations, the geometry of a 3D space (including the scalar product and the vector product) and SVD.

| B0B01LGR Logic anad Graphs | Z,ZK | 5 |
| :---: | :---: | :---: | :---: |

This course covers basics of mathematical logic and graph theory. Syntax and semantics of propositional and predicate logic are introduced. The importance of the notion of consequence and of the relationship between a formula and its model is stressed. Further, basic notions from graph theory are introduced.



This course is designed as a full-year, two semester preparation course for the university's compulsory B2-level English Examination (Anglický jazyk B2-zkouška - B0B04B2Z*). While the course is focused on helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher mark), it also focuses more on the academic and technical vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an appropriate level of English for Erasmus / International Study.
B0B04B22
English Language B2-2

| $Z$ | 3 |
| :--- | :--- |

This course is designed as a full-year, two semester preparation course for the university's compulsory B2-level English Examination (Anglicky jazyk B2-zkouška - B0B04B2Z *). While the course is focused on helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher mark), it also focuses more on the academic and technical vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an appropriate level of English for Erasmus / International Study.

## B0B04B2Z

English language B2 - exam

| Z,ZK | 0 |
| :--- | :--- |

I) The B2 English Exam is a compulsory subject for all Faculty of Electrical Engineering students at the Czech Technical University. According to the Study and Examination Rules and Regulations for Students at CTU (Part III, Article 4), a compulsory subject is one "whose completion is a necessary condition in order to successfully complete the study programme." In addition, this requires the "passing of an examination evaluated on the scale A, B, C, D, or E..." (SERR Part III, Article 6). II) According to the Common European Framework of Reference for Languages (CEFR), an international standard for describing language ability, the definition of an English language learner who has achieved the B2 (Upper-Intermediate) level is one who "...can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options." III) Students who have successfully passed an approved international exam within the past five years may present their certificate to the Department of Languages, Faculty of Electrical Engineering.Upon approval, students are then exempt from both the Written Test and the Oral Part. For a list of approved international exams go the department website: http://jazyky.fel.cvut.cz/

```
B0B16ET1
Ethic \(1 \quad\) KZ
```

4
Aim of this subject is to provide the students an orientation not only in general problems of ethics but above all to offer instructions for solving various situations of human life. Essential parts of the subject are discussions in which students can react to lectures but also to actual questions coming with news and look for the communal answers.

We deal with the most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy and connection of old philosophical thoughts with recent problems of science, technology, economics and politics.

| B0B16H11 | History 1 | KZ | 4 |
| :---: | :---: | :---: | :---: |
| BOB16HT1 | History of science and technology 1 | KZ | 4 |
| B0B16HTE | History of technology and economic | ZK | 2 |
| BOB16MPL | Psychology for managers | ZK | 2 |
| BOB16MPS | Psychology | Z,ZK | 4 |
| BOB33OPT | Optimization | Z,ZK | 7 |

The course provides an introduction to mathematical optimization, specifically to optimization in real vector spaces of finite dimension. The theory is illustrated with a number of examples. You will refresh and extend many topics that you know from linear algebra and calculus courses.

| B0B35APO | Computer Architectures | Database Systems | Z,ZK |
| :---: | :---: | :---: | :---: |
| B0B36DBS | ZK | 5 |  |
| The course is designed as a basic database course mainly aimed at the student ability to design a relational data model and to use the sol language for data definition as well as for |  |  |  |

The course is designed as a basic database course mainly aimed at the student ability to design a relational data model and to use the SQL language for data definition as well as for data querying and to choose the appropriate degree of transaction isolation. Students will also get acquainted with the most commonly used indexing techniques, database system architecture and their management. They will verify their knowledge during the elaboration of a continuously submitted seminar task.
B0B36PJV
Programming in Java

| Z,ZK | 6 |
| :--- | :--- |

The course builds on the basics of algorithms and programming from the first semester and introduces students to the Java environment. The course also focus on the object concept of the Java language. The topics of the course includes exceptions, event handling, and building a graphical interface. Basic library methods, working with files and using generic types will be introduced. An important topic is models of multithreaded applications and their implementation. Practical exercises of practical skills and knowledge of Java is tested in the form of solving partial tasks and semester work, which will be submitted continuously through the source code version control system. The semester work scoring consists of points for the correctness and efficiency of the code, as well as points that take into account the quality of the source codes, their readability and reusability.
B0B36PRP $\quad$ Procedural Programming $\quad$ Z,ZK
The course accompanies basic programming emphasizing the data representation in computer memory. Furthermore, the concepts of linked data structures and processing user inputs are developed. Students master the practical implementation of simple individual tasks. The course emphasizes acquiring programming habits for creating readable and reusable programs. At the same time, the effort is to build students an overview of the program operation, data model, memory access, and management. Therefore, the C programming language is used that provides a direct link between the program data structures and their representation in the computer memory. Students will get acquainted not only with program compilation and linking but also with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and accuracy of implementation.
Student independence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a larger program using existing implementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the selected tasks.

## B4B01DMA <br> Discrete Mathematics $\quad$ Z,ZK

In this course students meet some important topics from the field of discrete mathematics. Namely, they will explore divisibility and calculations modulo n , diophantine equations, binary relations, mappings, cardinality of sets, induction, and recurrence equations. The second aim of this course is to teach students the language of mathematics, both passively and actively, and introduce them to mathematics as science.

## B4B01JAG

Languages, Automats and Gramatics
Z,ZK 6
Basic notions of the theory of finite automata and grammars: deterministic and non deterministic finite automata, languages accepted by finite automata, regular expressions. Grammars and languages generated by grammars with emphasis to context free grammars. A very brief introduction of Turing machines.

## B4B01NUM

## Numerical Analysis

| Z,ZK | 6 |
| :--- | :--- |

The course introduces to basic numerical methods of interpolation and approximation of functions, numerical differentiation and integration, solution of transcendent equations and systems of linear equations. Emphasis is put on estimation of errors, practical skills with the methods and demonstration of their properties using Maple and computer graphics. $\begin{array}{ll}\text { B4B33ALG } & \text { Algorithms }\end{array}$
In the course, the algorithms development is constructed with minimum dependency to programming language; nevertheless the lectures and seminars are based on Java. Basic data types a data structures, basic algorithms, recursive functions, abstract data types, stack, queues, trees, searching, sorting, special application algorithms, Dynamic programming. Students are able to design and construct non-trivial algorithms and to evaluate their effectivity.
B4B33RPH
Solving Problems and other Games

| KZ | 6 |
| :--- | :--- |

The main motivation is to let students to deal with real-world problems properly. When working on real problems the student shall learn how to decompose the big problem, how to define interfaces, how to test and validate individual steps and so on. Many problems will actually be beyond the first-year-student skills. And many problem will not be solved in the optimal way. The unsolved parts should motivate the students to study difficult theoretical subjects. They should generate the important questions. Ideally, at the end of the subject, the student should be eager to study deeper about informatics. The course also explains the basis of the object oriented design, software testing, ways for writing readable and robust codes.
B4B33RPZ

## Recognition and machine learning

Z,ZK
6
The basic formulations of the statistical decision problem are presented. The necessary knowledge about the (statistical) relationship between observations and classes of objects is acquired by learning on the raining set. The course covers both well-established and advanced classifier learning methods, as Perceptron, AdaBoost, Support Vector Machines, and Neural Nets. This course is also part of the inter-university programme prg.ai Minor. It pools the best of Al education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.
B4B35OSY Operating Systems $\quad$ Z,ZK
Lecture introduces operation system's basic concepts and principles as processes, threads, communication and synchronization, virtual memory, drivers, file systems, basic security aspects. These topics are theoretically described and demonstrated on Linux and Windows OS with multi-core systems. Practical exercises from OS in C programming language will be solved on labs. Students will work with Linux OS and micro-kernel NOVA.

## B4B36FUP Functional Programming

## Z,ZK

6
This course introduces students into the techniques of functional programming, the advantages and disadvantages of this programming paradigm, and its use in practice. This approach is declarative in the sense that the programmer symbolically describes the problem to be solved, rather than specifying the exact sequence of operations required to solve it. It allows focusing on the essence of the solved problem and implementing even more complex algorithms compactly. Functional programming has notable advantages for parallelization and automated verification of algorithms, and the most useful functional programming concepts are increasingly often introduced to standard programming languages. Because of the focus of functional programming on symbols, rather than numbers, functional programming has been heavily used in in artificial intelligence fields, such as agent systems or symbolic machine learning. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.

| B4B36PDV | Parallel and Distributed Computing | Z,ZK | 6 |
| :---: | :---: | :---: | :---: |
| B4B36ZUI | Introduction to Artificial Intelligence | Z,ZK | 6 |

The aim of the course is to cover the basics of symbolic artificial intelligence. We will focus on algorithms of informed and uninformed state space search, problem representation and solving, representation of knowledge using formal logic, methods of automated reasoning, and an introduction to Markov decision making, and to two-player games. This course is
also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.

| B4B38PSIA | Computer Networks | Z,ZK | 5 |
| :---: | :---: | :---: | :---: |
| B4BPROJ6 | Unassisted project | Z | 6 |
| BBAP20 | Bachelor thesis | Z | 20 |
| BE4B33SEA | Subject in english - abroad <br> The subject serves for validation of the duty to complete at least one compulsory course of the program in English. | Z,ZK | 0 |
| BE4B36FUP | Functional Programming | Z,ZK | 6 |

This course introduces students into the techniques of functional programming, the advantages and disadvantages of this programming paradigm, and its use in practice. This approach is declarative in the sense that the programmer symbolically describes the problem to be solved, rather than specifying the exact sequence of operations required to solve it. It allows focusing on the essence of the solved problem and implementing even more complex algorithms compactly. Functional programming has notable advantages for parallelization and automated verification of algorithms, and the most useful functional programming concepts are increasingly often introduced to standard programming languages. Because of the focus of functional programming on symbols, rather than numbers, functional programming has been heavily used in in artificial intelligence fields, such as agent systems or symbolic machine learning. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.

The aim of the course is to cover the basics of symbolic artificial intelligence. We will focus on algorithms of informed and uninformed state space search, problem representation and solving, representation of knowledge using formal logic, methods of automated reasoning, and an introduction to Markov decision making, and to two-player games. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.


Subject is devoted to principles and technologies of Computer Networks. Physical layer media, analog and digital modulations, network topologies, MAC methods, ARQ algorithms, data communication models, coding and cryptography basics are introduced. Widely used LAN technologies are then presented together with their features. Internet protocols are explained and internetworking approaches are presented.


The aim of this course is to provide theory behind geometric modeling and modeling of materials, give students an overview of methods used in the process of creating 2D and 3D
graphics and how to apply those methods in praxis. At the seminars, students will learn how to design and create three-dimensional scene, create and apply textures imitating materials (e.g., wall finishes, wood, sky) and geometrical details, and position and set-up lights in the scene.

BE5B32PKS

> Computer and Communication Networks

| Z,ZK | 6 |
| :--- | :--- |

The aim of the course is to familiarize students with current trends in the switched local networks and the key functions of routing protocols in IP networks. The course is aimed rather primarily practically then theoretically.

\section*{BE5B33RPZ Pattern Recognition and Machine Learning <br> | Z,ZK | 6 |
| :--- | :--- |}

The basic formulations of the statistical decision problem are presented. The necessary knowledge about the (statistical) relationship between observations and classes of objects is acquired by learning on the raining set. The course covers both well-established and advanced classifier learning methods, as Perceptron, AdaBoost, Support Vector Machines, and Neural Nets. This course is also part of the inter-university programme prg.ai Minor. It pools the best of Al education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.

## BE5B35APO <br> Computer Architectures <br> Z,ZK <br> 6 <br> Subject provides overview of basic building blocks of computer systems. Explanation starts from hardware side where it extends knowledge presented in the previous lectures of

 Structures of computer systems. Topics cover building blocks description, CPU structure, multiple processors interconnections, input/output subsystem and basic overview of network and buses topologies. Emphasis is placed on clarification of interconnection of hardware components with software support, mainly lower levels of operating systems, device drivers and virtualization techniques. General principles are more elaborated during presentation of examples of multiple standard CPU architectures. Exercises are more focused on the software view to the contrary. Students are lead from basic programming on CPU level to the interaction with raw hardware.BE5B35LSP
Logic Systems and Processors

| Z,ZK | 6 |
| :--- | :--- |

The course introduces the basic hardware structures of computing resources, their design, and architecture. It provides an overview of the possibilities of performing data operations at the hardware level and the design of embedded processor systems with peripherals on modern FPGA programmable logic circuits, which are increasingly widely used today. Students will learn their description in VHDL, from logic to more complex sequential circuits to practical finite state machine (FSM) designs. They will also master the correct design procedure using circuit simulation. Practical problems are solved using development boards used at hundreds of leading universities around the world. The course ends with RISC-V processor structure, cache, and pipeline processing.
BEZB $\quad$ Safety in Electrical Engineering for a bachelor's degree

| $Z$ | 0 |
| :--- | :--- |

The purpose of the safety course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from operation of it. This introductory course contains fundamentals of Safety Electrical Engineering. In this way the students receive qualification of instructed person that enables them to work on electrical equipment.
BEZZ $\quad$ Basic health and occupational safety regulations $\quad$ Z

The guidelines were worked out based on The Training Scheme for Health and Occupational Safety designed for employees and students of the Czech Technical University in Prague, which was provided by the Rector's Office of the CTU. Safety is considered one of the basic duties of all employees and students. The knowledge of Health and Occupational Safety regulations forms an integral and permanent part of qualification requirements. This program is obligatory.

| 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//3.html Generated: day 2024-05-21, time 10:39.

