

## Study plan

### Name of study plan: Kybernetika a robotika - Systémy a řízení

Faculty/Institute/Others: Faculty of Electrical Engineering  
 Department: Department of Control Engineering  
 Branch of study guaranteed by the department: Systems and Control  
 Garant of the study branch: prof. Ing. Michael Šebek, DrSc.  
 Program of study: Cybernetics and Robotics  
 Type of study: Bachelor full-time  
 Required credits: 168  
 Elective courses credits: 12  
 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: 146  
 The role of the block: P

Code of the group: BBAP  
 Name of the group: Bachelor Thesis  
 Requirement credits in the group: In this group you have to gain at least 20 credits (at most 340)  
 Requirement courses in the group: In this group you have to complete at least 1 course  
 Credits in the group: 20  
 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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
A0B13BAP	<b>Bachelor thesis</b>	Z	20	28S	L	P
A0B02BAP	<b>Bachelor thesis</b>	Z	20	28s	L	P
A0B14BAP	<b>Bachelor thesis</b>	Z	20		L	P
A0B15BAP	<b>Bachelor thesis</b>	Z	20	28s	L	P
A0B16BAP	<b>Bachelor thesis</b>	Z	20	28s	Z,L	P
A0B17BAP	<b>Bachelor thesis</b>	Z	20	28s	L	P
A0B31BAP	<b>Bachelor thesis</b>	Z	20		L	P
A0B32BAP	<b>Bachelor thesis</b> <i>Ivan Pravda</i>	Z	20	0P + 28S	L	P
A0B33BAP	<b>Bachelor thesis</b>	Z	20	28S	L	P
A0B34BAP	<b>Bachelor thesis</b> <i>Miroslav Husák</i>	Z	20	28L	L	P
A0B35BAP	<b>Bachelor thesis</b>	Z	20	28S	L	P
A0B36BAP	<b>Bachelor thesis</b>	Z	20	9s	L,Z	P
A0B37BAP	<b>Bachelor thesis</b>	Z	20	28s	L	P
A0B38BAP	<b>Bachelor thesis</b>	Z	20	0P+28C	L	P
A0B39BAP	<b>Bachelor thesis</b>	Z	20	9S	L	P
A0B01BAP	<b>Bachelor thesis</b>	Z	20	0+5	Z,L	P
ABAP20	<b>Bachelor thesis</b>	Z	20	28s	L,Z	P

#### Characteristics of the courses of this group of Study Plan: Code=BBAP Name=Bachelor Thesis

A0B13BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor's degree study program. 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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B02BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B14BAP	Bachelor thesis	Z	20
A0B15BAP	Bachelor thesis	Z	20

A0B16BAP	Bachelor thesis	Z	20
A0B17BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination. Bachelor, s projects are oriented into microwave technique, antennas, propagation, optoelectronics, EMC, medical applications.			
A0B31BAP	Bachelor thesis	Z	20
A0B32BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B33BAP	Bachelor thesis	Z	20
A0B34BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B35BAP	Bachelor thesis	Z	20
A0B36BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor's degree study program. Student will choose a topic from a range of topics related to his or her branch of study that will be specified by branch department or branch departments. The Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B37BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B38BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor's degree study program. 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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B39BAP	Bachelor thesis	Z	20
A0B01BAP	Bachelor thesis	Z	20
ABAP20	Bachelor thesis	Z	20

Code of the group: BKYRBBE

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) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
A3B14BP1	Safety in Electrical Engineering 1	Z	0	4+8j	Z,L	P
A3B14BPZS	Basic health and occupational safety regulations	Z	0	2+2j	Z	P

Characteristics of the courses of this group of Study Plan: Code=BKYRBBE Name=Safety of the bachelor's studies

A3B14BP1	Safety in Electrical Engineering 1	Z	0
The purpose of the course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from operation of it. In this way the students receive qualification of instructed person that enables them to work on electrical equipment according to the Directive of the Dean No. 1/2007			
A3B14BPZS	Basic health and occupational safety regulations	Z	0
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. Directive of the Dean No. 1/2007. This program is obligatory.			

Code of the group: BKYRPKPD

Name of the group: Komunikační a presentační dovednosti

Requirement credits in the group: In this group you have to gain 2 credits

Requirement courses in the group: In this group you have to complete at least 1 course

Credits in the group: 2

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
A0B16PRS	Presentation skills Vladimíra Nováková, Dana Lisá, František Macholda, Václava Jarská, Jiří Beranovský Jaroslav Knápek (Gar.)	Z	2	2s	Z,L	P
A0B04RET	Rhetoric Jitka Pinková Dana Saláková (Gar.)	Z	2	2C	Z,L	P

Characteristics of the courses of this group of Study Plan: Code=BKYRPKPD Name=Komunikační a presentační dovednosti

A0B16PRS	Presentation skills	Z	2
Students will learn to prepare and to do presentation. They will obtain skills how to prepare written documents using typographic principles and proper way of citation and referencing. They will prove gained theoretical knowledge on self prepared interactive presentation that is recorded on video and discussed.			
A0B04RET	Rhetoric	Z	2
The objective of the subject is to master and improve skills necessary for successful presentation as well as enhancing the communicative ability of the prospective engineers and bachelors. This subject will enable the students to develop both spoken and written presentations, non verbal communication and remove the psychological barriers for public speaking so that the students can create a good image. The course "Retorika" provides an introduction to this subject.			

Code of the group: BKYRP

Name of the group: Compulsory subjects of the program

Requirement credits in the group: In this group you have to gain 117 credits

Requirement courses in the group: In this group you have to complete at least 19 courses

Credits in the group: 117

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
A3B35ARI	<b>Automatic Control</b>	Z,ZK	7	4P+2L	L	P
A3B38DSY	<b>Distributed Systems and Computer Networks</b> Jan Holub, Jiří Novák <b>Jan Holub Jiří Novák (Gar.)</b>	Z,ZK	7	4P+2L	Z	P
A0B16EPD	<b>Business economics</b> Oldřich Starý, Jiří Vašíček, Josef Čermohous <b>Oldřich Starý (Gar.)</b>	KZ	4	2+2s	Z,L	P
A3B02FY2	<b>Physics 2 for KyR</b> Michal Bednařík, Jan Koller, Petr Koniček, Petr Kulhánek <b>Michal Bednařík Petr Kulhánek (Gar.)</b>	Z,ZK	6	3+2L	Z	P
A3B33KUI	<b>Cybernetics and Artificial Intelligence</b>	Z,ZK	5	2P+2C	L	P
A3B33OSD	<b>Operating Systems and Databases</b>	Z,ZK	6	3P+2C	L	P
A0B01PSI	<b>Probability, Statistics, and Theory of Information</b>	Z,ZK	6	4+2	Z	P
A0B36PR1	<b>Programming 1</b>	Z,ZK	6	2P+2C	Z	P
A0B36PR2	<b>Programming 2</b>	Z,ZK	6	2P+2C	L	P
A0B35SPS	<b>Computer System Structures</b>	Z,ZK	6	3P+2L	Z	P

Characteristics of the courses of this group of Study Plan: Code=BKYRP Name=Compulsory subjects of the program

A3B35ARI	Automatic Control	Z,ZK	7
Foundation course of automatic control. Introduction to basic concepts and properties of dynamic systems of physical, engineering, biological, economics, robotics and informatics nature. Basic principles of feedback and its use as a tool for altering the behavior of systems and managing uncertainty. Classical and modern methods for analysis and design of automatic control systems. Students specialized in systems and control will build on these ideas and knowledge in the advanced courses to follow. Students of other branches and programs will find out that control is a inspiring, ubiquitous and entertaining field worth of a future cooperation.			
A3B38DSY	Distributed Systems and Computer Networks	Z,ZK	7
Subject is devoted to principles and technologies of distributed systems (DS) and to their employment in typical applications. Physical layer media, analog and digital modulations, DS topologies, MAC methods, coding and cryptography basics are introduced. Widely used standard systems are then presented together with their features. Internet protocols are explained and internetworking approaches presented. Finally the typical industrial applications of distributed systems are introduced.			
A0B16EPD	Business economics	KZ	4
Basic course of Business Economics deals with the subject from wide angle of view, discussing all particular aspects of Business Economics, and relationships between them.			
A3B02FY2	Physics 2 for KyR	Z,ZK	6
The course Physics II is closely linked with the course Physics I. Within the framework of this course the students will first of all learn foundations of thermodynamics. Following topic - the theory of waves - will give to the students basic insight into the properties of waves and will help to the students to understand that the presented description of the waves has a universal character in spite of the waves character. Particular types of waves, such as acoustic or optical waves are the subjects of the following section. Quantum mechanics and nuclear physics will complete the student's general education in physics. The knowledge gained in this course will help to the students in study of such modern areas as robotics, computer vision, measuring technique and will allow them to understand the principles of novel technologies and functioning of new electronic devices. In the seminars, students will solve complex physics problems based on the use of the mathematical software Maple.			
A3B33KUI	Cybernetics and Artificial Intelligence	Z,ZK	5
The course will enable students to understand the basic concepts, goals and methods of cybernetics and artificial intelligence, and align some individual topics studied in the bachelor stage into the more profound context of the study program. The syllabus contains topics concerned with general aspects of systems and information theory, problem solving and state space search principles, elements of game theory, knowledge and expert systems, elements of decision theory, recognition and machine learning. The most important feature of the course is its unifying conceptual approach to many, at first sight diverse, components of cybernetics and artificial intelligence.			
A3B33OSD	Operating Systems and Databases	Z,ZK	6
The goal of this course is to introduce basic concepts and principles of operating systems (OS), like processes and threads, their scheduling, mutual communication and synchronization, time-dependent errors and deadlocks. Attention is also paid to memory management, virtual memory, management of secondary storages, file-systems and data security. The second part of the course is focused at databases, their types and structures, concurrent data access and transactions.			
A0B01PSI	Probability, Statistics, and Theory of Information	Z,ZK	6
Basics of probability theory, mathematical statistics, information theory, and coding. Includes descriptions of probability, random variables and their distributions, characteristics and operations with random variables. Basics of mathematical statistics: Point and interval estimates, methods of parameters estimation and hypotheses testing, least squares method. Basic notions and results of the theory of Markov chains. Shannon entropy, mutual and conditional information.			
A0B36PR1	Programming 1	Z,ZK	6
The aim of the course is to teach the students: basic interactions with user interface and to program development system, introduction to JAVA, basic control flow structures and data structures, functions, arrays, object-oriented programming concepts, streams and files. The students are able to construct and debug a simple program in Java.			

A0B36PR2	Programming 2	Z,ZK	6
The course moves along the understanding of programming skills from Programming 1, the aim is to design an interactive application with a graphic user interface (GUI), with knowledge of polymorphism abstract classes, interfaces, events handling, applets, user libraries, library practical application. Further students continue by the comparative way in getting acquainted in C language on the base of Java language, dynamic memory management, students are able to analyze the simple programs in C language.			
A0B35SPS	Computer System Structures	Z,ZK	6
The subject introduces into basic hardware structures of computer systems, into their design and architecture. It explains technical background of classic computer systems and special computer for digital and logic control. It gives greater insight into parallel processing of data in computers. Students obtain credits from practical exercises according to results of individual projects. The projects are solved on FPGA development boards Altera DE2 that are utilized in similar courses by many world's top universities.			

Code of the group: BKYRPRO

Name of the group: Project

Requirement credits in the group: In this group you have to gain 7 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 7

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
A3B33IND	Individual project	KZ	7	3+8s	Z	P
A3B38IND	Individual Project Martin Šipoš Martin Šipoš Martin Šipoš (Gar.)	KZ	7	0P+3C	Z	P
A3B35IND	Project Individual	KZ	7	3S	Z	P

Characteristics of the courses of this group of Study Plan: Code=BKYRPRO Name=Project

A3B33IND	Individual project	KZ	7
A3B38IND	Individual Project <a href="https://moodle.fel.cvut.cz/course/view.php?id=753">https://moodle.fel.cvut.cz/course/view.php?id=753</a>	KZ	7
A3B35IND	Project Individual	KZ	7

Code of the group: BKYRZAJ

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 at least 1 course

Credits in the group: 0

Note on the group:

Name of the block: Compulsory courses of the specialization

Minimal number of credits of the block: 18

The role of the block: PO

Code of the group: BKYRPO3

Name of the group: Compulsory subjects of the branch

Requirement credits in the group: In this group you have to gain 18 credits

Requirement courses in the group: In this group you have to complete at least 3 courses

Credits in the group: 18

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
A3B35APE	Applied electronics	Z,ZK	6	2P+2L	L	PO
A0B36APO	Computer Architectures	Z,ZK	6	2P+2L	L	PO
A3B35MSD	Modeling and simulation of dynamic systems	Z,ZK	6	2P+2L	Z	PO

Characteristics of the courses of this group of Study Plan: Code=BKYRPO3 Name=Compulsory subjects of the branch

A3B35APE	Applied electronics	Z,ZK	6
The main goal of this subject is acquirement of the knowledge for design of the real electronics equipments especially in area of the control systems and robotic. In comparison with analogical specialized theoretical subjects emphasis is placed on the practical application. Here the design of the schematic, choice of the suitable components, design of the printed circuit board and mechanical aspects will be explained.			

A0B36APO	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.			
A3B35MSD	Modeling and simulation of dynamic systems	Z,ZK	6
The goal of the course is to teach you how to build control-oriented mathematical models of complex dynamic systems. The focus will be on modeling techniques that can glue together subsystems from diverse physical domains. We will show that the concept of energy (or power), which is universally valid across physical domains, is the right tool for combining electrical, mechanical, hydraulic, pneumatic, thermal and thermodynamic systems. Some of the methods presented in this course will be at least partially useful in the domains where the concept of energy is not so useful such as socio-economic systems. In total we will introduce three groups of modeling techniques, which are based on the concept of energy. Analytical methods based on the Lagrangean and Hamiltonian functions well known from the studies in theoretical physics and/or mechanics, object-oriented modeling as an alternative to the more widespread block-oriented modeling, and last but not least an intuitive graphical techniques known as bond graph modeling. Whichever methodology is followed to create the mathematical model, of the ways to analyze it is a numerical simulation, that is, numerical solution of the corresponding differential or differential-algebraic equations. In this course we will be exposed to the basics of numerical techniques for differential and differential-algebraic equations with the objective to understand the basic issues such as approximation errors, numerical stability and suitability of the common methods for different classes of models.			

Name of the block: Elective courses

Minimal number of credits of the block: 4

The role of the block: V

Code of the group: BKYRH

Name of the group: Humanities subjects

Requirement credits in the group: In this group you have to gain at least 4 credits (at most 32)

Requirement courses in the group: In this group you have to complete at least 1 course

Credits in the group: 4

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
A0B16ET1	<b>Ethic</b> Vladimír Slámečka <b>Vladimír Slámečka</b> Vladimír Slámečka (Gar.)	KZ	4	2+2s	Z,L	v
A0B16FIL	<b>Philosophy</b> Peter Zamarovský <b>Peter Zamarovský</b> Peter Zamarovský (Gar.)	ZK	2	2+0s	Z,L	v
A0B16F11	<b>Philosophy I</b> Peter Zamarovský <b>Peter Zamarovský</b> Peter Zamarovský (Gar.)	KZ	4	2+2s	Z,L	v
A0B16HI1	<b>History I</b> Roman Elner, Milena Josefovičová <b>Milena Josefovičová</b> Roman Elner (Gar.)	KZ	4	2+2s	Z,L	v
A0B16HTE	<b>History of technology and economic</b> Marcela Efmertová, Jan Mikeš <b>Marcela Efmertová</b> Marcela Efmertová (Gar.)	ZK	2	2+0s	Z,L	v
A0B16HT1	<b>History of science and technology 1</b> Marcela Efmertová, Jan Mikeš <b>Jan Mikeš</b> Marcela Efmertová (Gar.)	KZ	4	2+2s	Z,L	v
A0B16MPS	<b>Psychology</b> Jan Fiala	Z,ZK	4	2+2s	Z,L	v
A0B16MPL	<b>Management psychology</b> Jan Fiala <b>Jan Fiala</b> Jan Fiala (Gar.)	ZK	2	2+0s	Z,L	v
A003TV	<b>Physical Education</b>	Z	2	0+2	L,Z	v

#### Characteristics of the courses of this group of Study Plan: Code=BKYRH Name=Humanities subjects

A0B16ET1	Ethic	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.			
A0B16FIL	Philosophy	ZK	2
A0B16F11	Philosophy I	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.			
A0B16HI1	History I	KZ	4
The main purpose of this subject is to provide a historical overview and explanation of rises and developments of mass movements and totalitarian states in 20th century. The course is based on political and econom-social history with attention to philosophic and psychologic connections.			
A0B16HTE	History of technology and economic	ZK	2
A0B16HT1	History of science and technology 1	KZ	4
This subject provides basic information on the development of science and technology in the world and at home from the earliest times to the present. The course is aimed primarily at explaining the significance of key levels of technology development, industrial revolutions and their impact on society.			
A0B16MPS	Psychology	Z,ZK	4
A0B16MPL	Management psychology	ZK	2
Psychology of personality, psychology of work and organization. Psychology in human resources management. The manager, his role and competencies. Motivation and engagement. Skills development. Communication and conflict resolution. Work group and team, conducting meetings. Time management and delegation. Dealing with stress and emotions. Company culture and organizational change.			

Code of the group: BJK

Name of the group: 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 (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
A0B04GA	<i>Petra Jennings Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04KA	<b>English Conversation 2</b> <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04OA	<b>Technical English Course</b> <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
AE0B04C0	<b>Czech Language 0</b> <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04KF1	<b>French conversation 1</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04KF2	<b>French conversation 1</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04F1	<b>French language 1</b> <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04F2	<b>French language 2</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04F3	<b>French Language 3</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04JAP	<b>Japanese</b> <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04JAP2	<b>Japanese 2</b> <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04GN	<b>German Grammar</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04KN	<b>German Conversation</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04KN2	<b>German conversation 2</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04N1	<b>German language 1</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04N2	<b>German language 2</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04N3	<b>German language 3</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04ON	<b>Professional German</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04CAE1	<b>Certificate of Advanced English CAE 1</b> <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04CAE2	<b>Certificate of Advanced English CAE 2</b> <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04CAE3	<b>Certificate of Advanced English CAE 3</b> <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04CAE4	<b>Certificate of Advanced English 4</b> <i>Pavla Péterová</i>	Z		2C	Z,L	v
A0B04FCE1	<b>FCE 1</b> <i>Petra Jennings Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04FCE2	<b>FCE 2</b> <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04FCE4	<b>FCE4</b> <i>Pavla Péterová</i>	Z	2	2C	Z,L	v
A0B04FCE3	<b>FCE 3</b> <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04PZP	<b>Preparation for stay in Germany</b> <i>Dana Lisá</i>	Z	2	2C	*	v
A0B04KR	<b>Russian conversation</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04KR2	<b>Russian conversation 2</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04R1	<b>Russian language 1</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v

A0B04R2	<b>Russian language 2</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04R3	<b>Russian language 3</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04R4	<b>Russian language 3</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04RET	<b>Rhetoric</b> <i>Jitka Pinková Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04TOEFL	<b>TOEFL</b> <i>Pavla Péterová</i>	Z	4	4C	L	v
A0B04CA	<b>Technical English for Pre-Intermediate</b> <i>Markéta Havlíčková</i>	Z	2	2C	L	v
A0B04C2Z	<b>Czech language 2</b> <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2C	Z	v
A0B04C2L	<b>Czech language 2</b> <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2C	L	v
A0B04CIN	<b>Markéta Havlíčková Dana Saláková (Gar.)</b>	Z	2	2C	*	v
A0B04CIN2	<b>Chinese Language 2</b> <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2C	Z,L	v
A0B04KS1	<b>Spanish conversation 1</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04KS2	<b>Spanish conversation 2</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04S1	<b>Spanish language 1</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04S2	<b>Spanish language 2</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04S3	<b>Spanish language 3</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v
A0B04S4	<b>Spanish Language 4</b> <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2C	*	v

#### Characteristics of the courses of this group of Study Plan: Code=BJK Name=Language courses

A0B04RET	Rhetoric	Z	2
The objective of the subject is to master and improve skills necessary for successful presentation as well as enhancing the communicative ability of the prospective engineers and bachelors. This subject will enable the students to develop both spoken and written presentations, non verbal communication and remove the psychological barriers for public speaking so that the students can create a good image. The course "Retorika" provides an introduction to this subject.			
A0B04GA		Z	2
The aim of this course is to extend and complement grammatical patterns covered in other English courses that are intended for full-time students. The course is meant mainly as a supplement for students who have not yet passed the B2 examination and are interested in further study and additional practice.			
A0B04KA	English Conversation 2	Z	2
The course is designed for students who want to develop their communication skills. Students will be given the opportunity to use the vocabulary they already know, as well as learn new words and phrases, to communicate on a variety of topics and themes. This course is not designed for beginners.			
A0B04OA	Technical English Course	Z	2
The course is designed for students who have completed the B2 English course. Its main objective is to prepare students for the study of selected specialized courses in English by covering a broader range of topics in engineering. In addition to teaching materials aimed at expanding technical vocabulary and consolidating current language skills, the focus is on authentic articles adapted from professional journals and accompanying videos. The syllabus also leaves space for students' presentations covering various fields of science.			
AE0B04C0	Czech Language 0	Z	2
The course is aimed towards ERASMUS students - especially beginners. The course is taught on the basis of English language support. The goal of the course is to give the students first hand information about pronunciation, vocabulary and grammar structure of the Czech language, and also provide them with basic useful phrases needed for everyday communication during their stay in the Czech Republic.			
A0B04KF1	French conversation 1	Z	2
A0B04KF2	French conversation 1	Z	2
A0B04F1	French language 1	Z	2
A0B04F2	French language 2	Z	2
A0B04F3	French Language 3	Z	2
A0B04JAP	Japanese	Z	2
A0B04JAP2	Japanese 2	Z	2
A0B04GN	German Grammar	Z	2
A0B04KN	German Conversation	Z	2
A0B04KN2	German conversation 2	Z	2
A0B04N1	German language 1	Z	2
A0B04N2	German language 2	Z	2
A0B04N3	German language 3	Z	2
A0B04ON	Professional German	Z	2
A0B04CAE1	Certificate of Advanced English CAE 1	Z	2
The aim of the course is to prepare for Certificate of Advanced English - the second highest level Cambridge ESOL exam. The course CAE1 covers units 1-4. Studying for CAE helps you to improve your language skills (reading, writing, English in use, listening and speaking) and use them in a wide range of contexts. The exam is based on realistic tasks and indicates the ability to use the language in practical situations. You will be able to participate in meetings and discussions, expressing opinions clearly and be able to understand and produce texts of various types. CAE is recognised by the majority of universities in English speaking countries as proof of adequate language skills for courses taught and assessed in English as well as by employers who require knowledge of a foreign language. CAE is taken by more than 60 000 people each year in more than 60 countries. It is possible but not necessary for obtaining credit to take CAE at British Council.			

A0B04CAE2	Certificate of Advanced English CAE 2	Z	2
The aim of the course is to prepare for Certificate of Advanced English - the second highest level Cambridge ESOL exam. The course CAE2 covers units 5-8. Studying for CAE helps you to improve your language skills (reading, writing, English in use, listening and speaking) and use them in a wide range of contexts. The exam is based on realistic tasks and indicates the ability to use the language in practical situations. You will be able to participate in meetings and discussions, expressing opinions clearly and be able to understand and produce texts of various types. CAE is recognised by the majority of universities in English speaking countries as proof of adequate language skills for courses taught and assessed in English as well as by employers who require knowledge of a foreign language. CAE is taken by more than 60 000 people each year in more than 60 countries. It is possible but not necessary for obtaining credit to take CAE at British Council. Student is allowed to enrol only into one CAE course during one semester.			
A0B04CAE3	Certificate of Advanced English CAE 3	Z	2
The aim of the course is to prepare for Certificate of Advanced English - the second highest level Cambridge ESOL exam. The course CAE3 covers unit 9 - 12. Studying for CAE helps you to improve your language skills (reading, writing English in use, listening and speaking) and use them in a wide range of contexts.			
A0B04CAE4	Certificate of Advanced English 4	Z	
A0B04FCE1	FCE 1	Z	2
The course is aimed for students, employees of the Faculty and the public whose knowledge of English corresponds to B1 level according to the European Language Frame. The course focuses on improving all language skills - writing, speaking, reading, listening, grammar and phonetics - and is submitted to the goal of obtaining the required skills needed for B2 ELF.			
A0B04FCE2	FCE 2	Z	2
The course is aimed for students, employees of the Faculty and the public whose knowledge of English corresponds to B1 level according to the European Language Frame. The course focuses on improving all language skills - writing, speaking, reading, listening, grammar and phonetics - and is submitted to the goal of obtaining the required skills needed for B2 ELF.			
A0B04FCE4	FCE4	Z	2
The course is aimed for students, employees of the Faculty and the public whose knowledge of English corresponds to B1 level according to the European Language Frame. The course focuses on improving all language skills - writing, speaking, reading, listening, grammar and phonetics - and is submitted to the goal of obtaining the required skills needed for B2 ELF.			
A0B04FCE3	FCE 3	Z	2
The course is aimed for students, employees of the Faculty and the public whose knowledge of English corresponds to B1 level according to the Common European Framework of Reference for Languages (CEFR). The course focuses on improving all language skills - writing, speaking, reading, listening, grammar and phonetics - and is submitted to the goal of obtaining the required skills needed for B2 CEFR.			
A0B04PZP	Preparation for stay in Germany	Z	2
A0B04KR	Russian conversation	Z	2
A0B04KR2	Russian conversation 2	Z	2
A0B04R1	Russian language 1	Z	2
A0B04R2	Russian language 2	Z	2
A0B04R3	Russian language 3	Z	2
A0B04R4	Russian language 3	Z	2
A0B04TOEFL	TOEFL	Z	4
The test of English as a Foreign Language TOEFL is an internationally accepted, standardized language exam, which allows students to show their language skills when applying for studying abroad. The course can improve the language skills taking into account the character of the exam; it will introduce the formal aspects of the exam and give strategies for taking the test. This subject is evaluated by 4 credits, which expects 3 hours of homework. Passing the TOEFL exam with minimum 100 points (the B level) by the end of the summer exam period is the requirement for getting the credit. The exam is not a part of the course and it costs 240USD. It is possible to take it in testing centers in Prague and Ostrava. The dates of the exams are published on <a href="http://www.ets.org/toefl">http://www.ets.org/toefl</a> . The validity of the exam is 2 years.			
A0B04CA	Technical English for Pre-Intermediate	Z	2
A0B04C2Z	Czech language 2	Z	2
The course is aimed at foreign students studying in Czech, it further develops their language knowledge and skills to meet the needs of technical university students			
A0B04C2L	Czech language 2	Z	2
The course is aimed at foreign students studying in Czech, it further develops their language knowledge and skills to meet the needs of technical university students.			
A0B04CIN		Z	2
A0B04CIN2	Chinese Language 2	Z	2
A0B04KS1	Spanish conversation 1	Z	2
A0B04KS2	Spanish conversation 2	Z	2
A0B04S1	Spanish language 1	Z	2
A0B04S2	Spanish language 2	Z	2
A0B04S3	Spanish language 3	Z	2
A0B04S4	Spanish Language 4	Z	2

Code of the group: BKYRJKA

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 (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
A0B04A21	English language A2-1 <i>Pavla Péterová</i>	Z	0	2s	Z	v
A0B04A22	English language A2-2 <i>Pavla Péterová</i>	Z	0	2s	L	v



A0B04B11	<b>English language B1-1</b> <i>Markéta Havlíčková</i>	Z	0	2s	Z	v
A0B04B12	<b>English language B1-2</b> <i>Markéta Havlíčková</i>	Z	0	2C	L	v
A0B04B21	<b>English language B2-1</b> <i>Markéta Havlíčková</i>	Z	3	2C	Z	v
A0B04B22	<b>English language B2-2</b> <i>Petra Jennings</i>	Z	3	2C	Z,L	v

**Characteristics of the courses of this group of Study Plan: Code=BKYRJKA Name=English language courses**

A0B04A21	English language A2-1	Z	0
A0B04A22	English language A2-2	Z	0
A0B04B11	English language B1-1	Z	0
A0B04B12	English language B1-2	Z	0
A0B04B21	English language B2-1	Z	3
A0B04B22	English language B2-2	Z	3

Code of the group: BTV

Name of the group: Tělesná výchova

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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
TVV	<b>Physical education</b>	Z	0	0+2	Z,L	v
A003TV	<b>Physical Education</b>	Z	2	0+2	L,Z	v
TVV0	<b>Physical education</b>	Z	0	0+2	Z,L	v
TV-V1	<b>Physical education</b>	Z	1	0+2	Z,L	v

**Characteristics of the courses of this group of Study Plan: Code=BTV Name=Tělesná výchova**

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

Code of the group: BTVK

Name of the group: Tělovýchovné kurzy

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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
TVKLV	<b>Physical Education Course</b>	Z	0	7dní	L	v
TVKZV	<b>Physical Education Course</b>	Z	0	7dní	Z	v

**Characteristics of the courses of this group of Study Plan: Code=BTVK Name=Tělovýchovné kurzy**

TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0

Code of the group: BKYRVOLPRE

Name of the group: Volitelné odborné předměty

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

~Nabídku volitelných předmětů uspořádaných podle kateder najdete na webových stránkách  
<http://www.fel.cvut.cz/cz/education/volitelne-predmety.html>

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
A4B36ACM1	<b>ACM Advanced Algorithmic and Programming Techniques I.</b> <i>Marko Genyk-Berezovskij, Jakub Černý, Tomáš Tunys Marko Genyk-Berezovskij Božena Mannová (Gar.)</i>	KZ	4	0P+3C	*	v
A4B36ACM2	<b>ACM Advanced Algorithmic and Programming Techniques II.</b> <i>Marko Genyk-Berezovskij, Jakub Černý Marko Genyk-Berezovskij Božena Mannová (Gar.)</i>	KZ	4	0P+3C	*	v
A4B36ACM3	<b>ACM Advanced Algorithmic and Programming Techniques III.</b> <i>Marko Genyk-Berezovskij, Jakub Černý Marko Genyk-Berezovskij Božena Mannová (Gar.)</i>	KZ	4	0P+3C	*	v
A4B36ACM4	<b>ACM Advanced Algorithmic and Programming Techniques III.</b> <i>Marko Genyk-Berezovskij, Jakub Černý Marko Genyk-Berezovskij Božena Mannová (Gar.)</i>	KZ	4	0P+3C	*	v
A4B36ACM5	<b>ACM Advanced Algorithmic and Programming Techniques V.</b> <i>Marko Genyk-Berezovskij Marko Genyk-Berezovskij Božena Mannová (Gar.)</i>	KZ	4	0P+3C	*	v
A0B02AKA	<b>Acoustic Applications</b> <i>Ondřej Jiříček</i>	KZ	4	2+2L	Z	v
A4B33ALG	<b>Algorithms</b>	Z,ZK	6	2P+2C	L	v
A2B31ANO	<b>Analog Circuits</b>	Z,ZK	5	2P+2C	Z	v
A0B38APH	<b>FPGA Applications</b> <i>Radek Sedláček Radek Sedláček Radek Sedláček (Gar.)</i>	KZ	5	1P+3L	Z	v
A3B35APE	<b>Applied electronics</b>	Z,ZK	6	2P+2L	L	v
A0B36APO	<b>Computer Architectures</b>	Z,ZK	6	2P+2L	L	v
A4B77ASS	<b>Architectures of Software Systems</b>	Z,ZK	6	2P+2C	L	v
A0B14AEE	<b>Automotive Electrical and Electronic Engineering</b>	Z,ZK	4	2+2L	L	v
A4B33DS	<b>Database Systems</b>	Z,ZK	6	2P+2C	L	v
A3B33DRR	<b>Dynamics and control of robots</b>	Z,ZK	6	2P+2L	Z	v
A2B38EMB	<b>Electrical Measurements and Instrumentation</b> <i>Vladimír Haasz Vladimír Haasz (Gar.)</i>	Z,ZK	5	2P+2L	Z	v
A0B15EIN	<b>Electrical Installations</b>	Z,ZK	4	2+2L	L	v
A1B31EOS	<b>Electrical circuits</b>	Z,ZK	6	3P+2S	L	v
A1B14PO1	<b>Electric Drives and Traction 1</b> <i>Pavel Kobrle Pavel Kobrle Pavel Kobrle (Gar.)</i>	Z,ZK	6	2P+2L	Z	v
A3B14EPR	<b>Electric drive for automation and robotics</b>	Z,ZK	6	2+2s	L	v
A1B14SP1	<b>Electric Machinery and Apparatus 1</b>	Z,ZK	6	3+2L	Z	v
A1B15EN1	<b>Power Engineering 1</b> <i>Radek Procházka</i>	Z,ZK	5	2+2L	Z	v
A1B15EN2	<b>Power Engineering 2</b>	Z,ZK	6	2+2s	L	v
A1B15EN3	<b>Power Engineering 3</b>	Z,ZK	5	2+2s	L	v
A4B34EM	<b>Electronics and Microelectronics</b> <i>Vladimír Janíček, Jiří Jakovenko, Vít Záhlava Jiří Jakovenko Jiří Jakovenko (Gar.)</i>	Z,ZK	6	2P+2L	Z	v
A1B14SEM	<b>Seminar on Electrical Engineering</b> <i>Pavel Pivoňka</i>	Z	2	2s	Z	v
A4B33FLP	<b>Functional and Logic Programming</b>	Z,ZK	6	2P+2C	L	v
A1B02FY2	<b>Physics 2 for EEM</b> <i>Michal Bednařík</i>	Z,ZK	5	2+2L	Z	v
A0B02FPL	<b>Solid State Physics</b>	Z,ZK	5	2+2s	Z	v
A4B02FYZ	<b>Physics for Informatics</b> <i>Martin Žáček, Stanislav Pekárek Jan Koller Martin Žáček (Gar.)</i>	Z,ZK	6	2+2L	L	v
A0B02FEN	<b>Physics for Electroenergetics</b> <i>Jakub Cikhardt, Pavel Kubeš Pavel Kubeš Pavel Kubeš (Gar.)</i>	Z,ZK	4	2+2s	Z	v
A0B38GRP	<b>Graphical Programming</b> <i>Pavel Mlejnek Pavel Mlejnek Pavel Mlejnek (Gar.)</i>	Z,ZK	5	1P+3C	Z	v
A2B31HPM	<b>Hardware for Multimedia</b>	Z,ZK	6	2P+2L	Z	v
A2B34IAE	<b>Smart Electronics</b> <i>Vladimír Janíček, Jan Novák Jan Novák Jan Novák (Gar.)</i>	Z,ZK	6	2P+2L	Z	v
A1B37KEL	<b>Communication and Electronics</b> <i>Josef Dobeš, Karel Ulovec Karel Ulovec Josef Dobeš (Gar.)</i>	KZ	4	2P+2L	Z	v

A2B37KMM	<b>Communication and Measurement in Multimedia</b> <i>Josef Dobeš, Karel Ulovec, Jan Bednář, Martin Bernas Jan Bednář Josef Dobeš (Gar.)</i>	Z,ZK	6	2P+2L	L	v
A0B32KTE	<b>Construction of Telecommunication Devices</b> <i>Lukáš Vojtěch, Marek Neruda, Tomáš Zitta Lukáš Vojtěch Lukáš Vojtěch (Gar.)</i>	KZ	4	2P + 2L	L	v
A2B99LES	<b>Laboratory of Electronic Systems</b> <i>Josef Dobeš</i>	Z,ZK	6	2P+2C	L	v
A0B38LPT	<b>Aircraft Instrumentation</b>	Z,ZK	5	2+2L	L	v
A1B16MME	<b>Macro and Microeconomics</b> <i>Alena Ambrožová, Helena Fialová, Miroslav Vitek Alena Ambrožová Alena Ambrožová (Gar.)</i>	Z,ZK	5	2+2s	Z	v
A0X36MOOC	<b>Massive Open Online Course</b> <i>David Šišlák David Šišlák David Šišlák (Gar.)</i>	Z	2	1P	Z,L	v
A1B15MAA	<b>Mathematic Applications</b>	Z,ZK	6	3+2c	L	v
A0B17MTB	<b>Matlab</b> <i>Viktor Adler, Pavel Valtr, Miloslav Čapek Viktor Adler Miloslav Čapek (Gar.)</i>	KZ	4	0P+3C	Z,L	v
A3B38MMP	<b>Microprocessors and Microcontrollers in Instrumentation</b> <i>Jan Fischer Jan Fischer Jan Fischer (Gar.)</i>	Z,ZK	6	2P+2L	L	v
A1B14MIS	<b>Microprocessors for Power Systems</b>	Z,ZK	5	2+2L	Z	v
A3B35MSD	<b>Modeling and simulation of dynamic systems</b>	Z,ZK	6	2P+2L	Z	v
A2B37MMT	<b>Multimedia Technology</b>	Z,ZK	6	2+2L	L	v
A0B38OCP	<b>Circuits of Digital Instruments</b> <i>Jan Holub</i>	Z,ZK	5	2+2L	L	v
A4B33OSS	<b>Operating systems and networks</b>	Z,ZK	6	2P+2C	Z	v
A4B33OPT	<b>Optimization</b>	Z,ZK	7	4P+2C	Z	v
A0B01PAN	<b>Advanced Analysis</b> <i>Jan Hamhalter, Veronika Sobotíková Veronika Sobotíková Jan Hamhalter (Gar.)</i>	Z,ZK	6	2P+2S	L	v
A0B34PPN	<b>Principles and Rules of Electronic Design.</b> <i>Vít Záhlava, Jan Novák Vít Záhlava Vít Záhlava (Gar.)</i>	Z,ZK	4	2P+2C	L	v
AE0B99PP6	<b>Professional Practice</b> <i>Jiří Jakovenko, Ivan Jelínek Jiří Jakovenko Jiří Jakovenko (Gar.)</i>	Z	6	0+2	Z,L	v
AE0B99PP4	<b>Professional Practice</b> <i>Jiří Jakovenko, Ivan Jelínek Jiří Jakovenko Jiří Jakovenko (Gar.)</i>	Z	4	0+2	Z,L	v
AE0B99PP2	<b>Professional Practice</b> <i>Jiří Jakovenko, Ivan Jelínek Jiří Jakovenko Jiří Jakovenko (Gar.)</i>	Z	2	0+2	Z,L	v
A2B37CPP	<b>C/C++ Programming Language</b> <i>Josef Dobeš, Petr Skalický, Stanislav Vitek, Václav Navrátil Petr Skalický Josef Dobeš (Gar.)</i>	Z	4	2P+2C	L	v
A0B36PRI	<b>Programming</b> <i>Ivan Jelínek Ivan Jelínek Ivan Jelínek (Gar.)</i>	Z,ZK	5	2P+2C	Z,L	v
A4B35PSR	<b>Real-Time Systems Programming</b>	Z,ZK	6	2P+2C	Z	v
A0B15PES	<b>Power Systems Operation</b>	Z,ZK	5	2+2s	Z	v
A1B16PAP	<b>Business Law</b> <i>Monika Kolrosová Monika Kolrosová (Gar.)</i>	Z,ZK	5	2+2s	Z	v
A2B13PEL	<b>Industrial Electrical Engineering</b> <i>Pavel Mach, Pavel Pivoňka, Zdeněk Müller Zdeněk Müller Pavel Mach (Gar.)</i>	Z,ZK	5	2P+2L	Z	v
A3B33ROB	<b>Robotics</b>	Z,ZK	6	2P+2L	L	v
A4B33RPZ	<b>Pattern Recognition and Machine Learning</b>	Z,ZK	6	2P+2C	Z	v
A2B37ROZ	<b>Radio Circuits and Devices</b> <i>Karel Ulovec</i>	Z,ZK	6	2+2s	Z	v
A0B14SPP	<b>Drive Sensors</b> <i>Pavel Pivoňka</i>	Z,ZK	4	2+2L	Z	v
A2B34SEI	<b>Sensors in Electronics and Informatics</b> <i>Miroslav Husák, Pavel Kulha, Adam Bouřa, Tomáš Teplý Miroslav Husák Miroslav Husák (Gar.)</i>	Z,ZK	6	2P+2L	L	v
A2B99SAS	<b>Signals and systems</b>	Z,ZK	5	2+2c	L	v
A4B33SI	<b>Software Engineering</b>	Z,ZK	6	2P+2C	Z	v
A2B31SMS	<b>Multimedia signal synthesis</b> <i>Roman Čmejla</i>	Z,ZK	6	2P+2C	Z	v
A1B13SVS	<b>Solar Energy Application Systems</b> <i>Vítězslav Benda, Pavel Hrzina Vítězslav Benda Vítězslav Benda (Gar.)</i>	Z,ZK	5	2P+2L	L	v
A2B32SOS	<b>Network Operating Systems</b> <i>Pavel Troller Ján Kučerák</i>	Z,ZK	6	2P + 2C	Z	v
A0B14TDO	<b>Technical Documentation</b>	KZ	3	1+2L	Z	v
A0B14TME	<b>Engineering mechanics</b>	Z,ZK	4	2+2s	L	v
A2B32TSI	<b>Telecommunication Systems and Networks</b> <i>Ivan Pravda Ivan Pravda (Gar.)</i>	Z,ZK	6	2P + 2L	Z	v

A0B01TIK	<b>Information Theory and Coding</b> <i>Jan Hamhalter, Alena Gollová Jan Hamhalter (Gar.)</i>	Z,ZK	8	4P+2S	L	v
A0B15VNZ	<b>High-voltage Testing</b>	Z,ZK	4	2+2L	Z	v
A1B14VE1	<b>Power Electronics 1</b>	Z,ZK	5	2+2L	L	v
A1B13VVZ	<b>Manufacturing of Power Devices</b>	Z,ZK	6	2P+2L	Z	v
A7B39WA1	<b>Web Applications Development</b> <i>Martin Klíma Martin Klíma Martin Klíma (Gar.)</i>	Z,ZK	6	2P+2C	Z	v
A2B31ZEO	<b>Fundamentals of Electrical Circuits</b>	Z,ZK	5	2P+2S	L	v
A2B37ZST	<b>Principles of Studio Technology</b> <i>Martin Bernas, František Rund František Rund Martin Bernas (Gar.)</i>	Z,ZK	6	2P+2L	Z	v
A7B36TS1	<b>Introduction to Software Testing</b>	KZ	5	2P+2C	Z	v
A4B33ZUI	<b>Introduction to Artificial Intelligence</b>	Z,ZK	6	2P+2C	L	v
A0B31ZZS	<b>Multimedia signal synthesis</b> <i>Radek Janča Roman Čmejla Roman Čmejla (Gar.)</i>	Z,ZK	4	2P+2C	Z	v
A0B33BMI	<b>Introduction to Biomedical Engineering and Informatics</b>	KZ	4	2P+2C	Z	v
A1B16UFI	<b>Corporate Finance</b> <i>Jiří Vašíček</i>	Z,ZK	5	2+2c	L	v
A0B02ZIP	<b>Environmental Science</b>	ZK	2	2+0s	Z	v

### Characteristics of the courses of this group of Study Plan: Code=BKYRVOLPRE Name=Volitelné odborné předměty

A3B35APE	Applied electronics	Z,ZK	6
The main goal of this subject is acquirement of the knowledge for design of the real electronics equipments especially in area of the control systems and robotic. In comparison with analogical specialized theoretical subjects emphasis is placed on the practical application. Here the design of the schematic, choice of the suitable components, design of the printed circuit board and mechanical aspects will be explained.			
A0B36APO	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.			
A3B35MSD	Modeling and simulation of dynamic systems	Z,ZK	6
The goal of the course is to teach you how to build control-oriented mathematical models of complex dynamic systems. The focus will be on modeling techniques that can glue together subsystems from diverse physical domains. We will show that the concept of energy (or power), which is universally valid across physical domains, is the right tool for combining electrical, mechanical, hydraulic, pneumatic, thermal and thermodynamic systems. Some of the methods presented in this course will be at least partially useful in the domains where the concept of energy is not so useful such as socio-economic systems. In total we will introduce three groups of modeling techniques, which are based on the concept of energy. Analytical methods based on the Lagrangean and Hamiltonian functions well known from the studies in theoretical physics and/or mechanics, object-oriented modeling as an alternative to the more widespread block-oriented modeling, and last but not least an intuitive graphical techniques known as bond graph modeling. Whichever methodology is followed to create the mathematical model, of of the ways to analyze it is a numerical simulation, that is, numerical solution of the corresponding differential or differential-algebraic equations. In this course we will be exposed to the basics of numerical techniques for differential and differential-algebraic equations with the objective to understand the basic issues such as approximation errors, numerical stability and suitability of the common methods for different classes of models.			
A4B36ACM1	ACM Advanced Algorithmic and Programming Techniques I.	KZ	4
A4B36ACM2	ACM Advanced Algorithmic and Programming Techniques II.	KZ	4
A4B36ACM3	ACM Advanced Algorithmic and Programming Techniques III.	KZ	4
A4B36ACM4	ACM Advanced Algorithmic and Programming Techniques III.	KZ	4
A4B36ACM5	ACM Advanced Algorithmic and Programming Techniques V.	KZ	4
A0B02AKA	Acoustic Applications	KZ	4
Lecture summarize applications in physical acoustics, room and building acoustics, environmental acoustics, noise and vibration control, physiological acoustics, diagnostics, and ultrasound.			
A4B33ALG	Algorithms	Z,ZK	6
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 affectivity.			
A2B31ANO	Analog Circuits	Z,ZK	5
The course is designed to acquaint students with the basics of analog electronic circuits. The first part is devoted to fundamental transistor amplifiers and elemental structures of analog integrated circuits. Then the typical applications of operational amplifiers are introduced, including non-linear networks and basic frequency filter design and implementation. Problems of oscillators are discussed at the conclusion.			
A0B38APH	FPGA Applications	KZ	5
A4B77ASS	Architectures of Software Systems	Z,ZK	6
The objective of the course is to introduce the basic techniques of information system design and architecture. We will emphasize the use of standard design patterns in the distributed environments and concentrate on the general aspects of software systems, rather than on specific technologies or implementations.			
A0B14AEE	Automotive Electrical and Electronic Engineering	Z,ZK	4
Operational conditions for vehicle electronic equipment. Vehicle power sources. Laboratory training is oriented on practical measurement of basic assemblies and elements in vehicle equipment. Visit to the ŠKODA AUTO factory in Mladá Boleslav is included.			
A4B33DS	Database Systems	Z,ZK	6
Database Systems and their architecture, query languages, transactions, object-relational mapping			
A3B33DRR	Dynamics and control of robots	Z,ZK	6
The subject undrestands the robot as a dynamical system. Its design, identification, control and programming will be introduced. The methods can be used for other electromechanic systems, e.g., production machines and manipulation devices.			

<b>A2B38EMB</b>	<b>Electrical Measurements and Instrumentation</b>	Z,ZK	5
Methods of measurement of electrical physical quantities (voltage, current, power, frequency, resistance, capacitance and inductance) are explained together with principles of their correct application and accuracy estimation. The course is closed by presenting information of several basic electronic measuring instruments and explaining fundamentals of magnetic measurements and basic information concerning measurement systems.			
<b>A0B15EIN</b>	<b>Electrical Installations</b>	Z,ZK	4
Basic design of electrical power circuit-wiring in housing and industrial building, wires dimension, introduction to protection and wire grounding in distribution point - low voltage and high voltage.			
<b>A1B31EOS</b>	<b>Electrical circuits</b>	Z,ZK	6
The subject describes fundamental methods of electrical circuit analysis. The aim is to unify different level of knowledge of students coming from schools of different categories and form the basis of knowledge necessary for next subjects. It presents the difference among physical circuit and its models, and then it presents the behavior of basic ideal circuit elements in DC circuits and in sinusoidal steady state as well as transients, caused by changes in the circuit. Finally, it presents the brief description of more sophisticated methods of analysis (Laplace transform, pulse excitation ?).			
<b>A1B14PO1</b>	<b>Electric Drives and Traction 1</b>	Z,ZK	6
Application of motion equation in drives, the motor torque, the load torque, the dynamical torque. Operating modes, electromechanical transient effects. Drives with DC motors, induction motors, synchronous motors, SRM, EC motors, linear motors. For each type its properties, speed control strategy and block scheme of a controller, range of application. Drive control computer structure, shared resources organization, special hardware blocks for signal measurement and signal generation in drives, programming techniques and languages for software development and debugging, migration from analog signal processing to the digital signal processing, time sampling and amplitude quantization, aliasing, difference equations and digital control algorithms. Drive commissioning			
<b>A3B14EPR</b>	<b>Electric drive for automation and robotics</b>	Z,ZK	6
Principle, philosophy and characteristics sources seat power control energy, changers for power supply small el. drive. Industrial automat used for drive el. drive. Small machinery and special electrical machine used in automatization and robots. Proposal electrical drive for automation application. Practical exhibits and check feature el. drive			
<b>A1B14SP1</b>	<b>Electric Machinery and Apparatus 1</b>	Z,ZK	6
Electric drive and its components. Electromechanical energy conversion. Rotational converters - DC machines, induction motors, synchronous generators and motors. Special electric machines, actuators. Static converters - transformers. There are presented operational principles, main constructional scheme and characteristics, applications. Switching theory. Interaction between turn-off switch and switched circuit. Basic theory and characteristic of electric arc. Transient recovery voltage. Switching overvoltage. Low voltage protection apparatuses			
<b>A1B15EN1</b>	<b>Power Engineering 1</b>	Z,ZK	5
The subject provides basic knowledge about the CR power system structure and operational characteristics and electrical power systems. Then it informs about the electric strength of insulators, machines and other power system devices. It presents knowledge about damaging phenomena of insulation systems and procedures for their elimination. It enables to meet insulation systems testing and diagnostics problems.			
<b>A1B15EN2</b>	<b>Power Engineering 2</b>	Z,ZK	6
The subject is focused on the task of electrical energy transmission and distribution. It introduces particular components of electrical systems and their electrical parameters. It explains steady and failure states in ES and other transient events. It explains principles of electrical devices protections, dimensioning principles and electrical stations realization in the transmission and distribution system.			
<b>A1B15EN3</b>	<b>Power Engineering 3</b>	Z,ZK	5
The aim of the course is to become students acquainted with heat transfer laws, the design and use of resistive, dielectric, induction and arc electro-heat devices, thermal comfort of human being, heating of interiors and examples of particular problems of electro-heat devices design and calculations. The next part of the course acquaints students with basics of photometry, light measurement, light sources, luminaires and fundamentals of indoor and outdoor lighting.			
<b>A4B34EM</b>	<b>Electronics and Microelectronics</b>	Z,ZK	6
Semiconductors fundamentals, PN junction. Bipolar transistor, MOSFET structure. Fundamentals of Integrated systems processing technologies. CMOS technology, layout design, design rules. Analogue CMOS integrated circuits blocks, AD and DA convertors. Memory structures. Micro-electro-mechanical systems. Optoelectronics devices.			
<b>A1B14SEM</b>	<b>Seminar on Electrical Engineering</b>	Z	2
The course summarizes the knowledge and shows practical use of electric energy from its production to its consumption. On the seminars, there are the basic fields of activity and related applications of following departments shown: Production and distribution of electric energy on the Department of Electroenergetics K13115, electric drives and actuators on the department of Electric Drives and Traction K13114, and the technology of production materials and equipment on the Department of Electrotechnology K13113.			
<b>A4B33FLP</b>	<b>Functional and Logic Programming</b>	Z,ZK	6
This course introduces students into the techniques of functional programming in the LISP (or more precisely SCHEME) and HASKELL language and logic programming in the PROLOG language. Both languages are declarative in that the programmer symbolically describes the problem to be solved, rather than enumerating the exact sequence of actions to be taken. In PROLOG, one describes the problem by specifying properties of objects and relations thereamong through logic formulas. In LISP, the problem description takes the form of function definitions. Both languages have found significant applications in artificial intelligence fields, such as agent systems or symbolic machine learning.			
<b>A1B02FY2</b>	<b>Physics 2 for EEM</b>	Z,ZK	5
The course Physics II is closely linked with the course Physics I. Within the framework of this course the students will first of all learn foundations of thermodynamics. Following topic - the theory of waves - will give to the students basic insight into the properties of waves and will help to the students to understand that the presented description of the waves has a universal character in spite of the waves character. Particular types of waves, such as acoustic or optical waves are the subjects of the following section. Relativistic mechanics, quantum mechanics and nuclear physics will complete the student's general education in physics. The knowledge gained in this course will help to students in the study of such modern disciplines as measuring technique, propagation of electromagnetic waves, electroacoustic or optical communications and will allow them to understand the principles of novel technologies and functioning of new electronic devices.			
<b>A0B02FPL</b>	<b>Solid State Physics</b>	Z,ZK	5
Elementary physics of solids for students of electrotechnology. Dwescription and classification of solids. Thermal properties of solids. Types of bonds in solids. Real crystals, their defects and surfaces. Electrons in solids, the band structure, electrons and holes. Metals, semiconductors, insulators. Transport phenomena, generation and recombination of minority carriers. Magnetism, magnetic properties of solids. Optical phenomena in solids, luminiscence, stimulated emission.			
<b>A4B02FYZ</b>	<b>Physics for Informatics</b>	Z,ZK	6
Within the framework of this course students gain the knowledge of selected parts of classical physics and dynamics of the physical systems. The introductory part of the course deals with the mass particle kinematics; dynamics, with the system of mass particles and rigid bodies. The students should be able to solve basic problems dealing with the description of mechanical systems. The introduction to the dynamics of the systems will allow to the students deeper understanding as well as analysis of these systems. The attention will be devoted namely to the application of the mathematical apparatus to the solution of real physical problems. Apart of this, the knowledge gained in this course will help to the students in the study of other disciplines, which they will meet during their further studies.			
<b>A0B02FEN</b>	<b>Physics for Electroenergetics</b>	Z,ZK	4
Lessons contain selected parts of physics for students of electric power engineering: Physical principles of gas discharges - glow, arc, spark and corona discharges and their applications. The students become acquainted with methods for nuclear fission and fusion energy generation. The introduction to structural properties of matter and its thermal, electrical and magnetic properties. A part of the course is two excursions in Laboratories of Czech Academy of Sciences.			

<b>A0B38GRP</b>	<b>Graphical Programming</b>	Z,ZK	5
The course is devoted to the development of application programs based on LabVIEW programming environment. The structure and conception of lectures offers unifying outlook on the area of automatic measurement and control systems. From this reason the attention will be devoted also to the principles of communication with measuring instruments and control modules equipped by standardized interface (GPIB, RS-232, RS-485, USB, Ethernet, PXI, PCI). The aim of laboratory exercises is practical programming in LabVIEW. They will be composed from the presentations, demonstrations and examples of solution of simple tasks. Exercises finish with one individual task to verify students skills. The aim of the course is to teach how to make good application focused on modularity, scalability and maintainability. Course covers the topic of the LabVIEW Core 1 and LabVIEW Core 2 courses.			
<b>A2B31HPM</b>	<b>Hardware for Multimedia</b>	Z,ZK	6
Subject provides concise basic overview of hardware used in multimedia (MM). It however does not try to achieve an encyclopedic completeness - instead of it, detailed analysis is carried out for selected blocks containing interesting technical solutions and more general principles. The main focus is specialization of digital function blocks for processing of MM data. Analog circuits are described mainly as a complement to digital core. Frequent examples of MM data are used to illustrate functions of individual HW blocks.			
<b>A2B34IAE</b>	<b>Smart Electronics</b>	Z,ZK	6
The aim of the course is to show and present to the students the modern trends used in electronics design. It will practically show the usage of electronic devices, circuits and functional blocks. Typical methods, errors and mistakes during the design process flow will be shown. During the exercises students will design a concept and select appropriate electronic components for circuit realization. Simulation software will help to compare the designed circuit with the realized one. Evaluation boards with complete software support from STMicroelectronics will help the students to understand the basic function of presented integrated circuits.			
<b>A1B37KEL</b>	<b>Communication and Electronics</b>	KZ	4
The purpose of the subject is acquiring fundamental knowledge of related themes of communication and electronics. First, the students are introduced to fundamentals of communication, the most important analog and digital modulations, and basic conception of radio systems. Second, students give information about basic elements, connections, and function blocks of electronics. The last part of the subject is devoted to explication of fundamental circuits of radio engineering.			
<b>A2B37KMM</b>	<b>Communication and Measurement in Multimedia</b>	Z,ZK	6
The aim of the subject is to give basic overview of present and perspective communication systems, mainly in relation to signal transmission and measurement. Lectures and practices make students familiar with technical principles of systems, basic conception of transmitter and receiver and measurement of these systems. Subject is focused on multimedia systems; it means systems for voice, audio, video and generally data transmission. Practices are based on laboratory measurements.			
<b>A0B32KTE</b>	<b>Construction of Telecommunication Devices</b>	KZ	4
The aim of this course is to familiarize students with the practical design of communication systems. Subject further continues with explanation of system design procedures and requirements on its parts. It all with respecting of theirs EMC (Electromagnetic Compatibility). The key part of lessons is laboratory measurements and work on projects, where the students will be dealing with design, construction, configuration and measurement of communication system blocks.			
<b>A2B99LES</b>	<b>Laboratory of Electronic Systems</b>	Z,ZK	6
The objective of the subject is to inform students about potential of electronic circuit simulations. The course is based on concrete applications. Themes of the first part of the lectures are put to a test on basic circuits. Specific circuit applications follow with a detailed explanation and a simulation in exercises afterwards. Selected circuits will be checked by laboratory measurements.			
<b>A0B38LPT</b>	<b>Aircraft Instrumentation</b>	Z,ZK	5
The course deals with theory and description of function of aircraft's low frequency instruments and systems. Students test them and measure their parameters in laboratory courses.			
<b>A1B16MME</b>	<b>Macro and Microeconomics</b>	Z,ZK	5
Basic economic terms, market, law of demand, law of supply, market equilibrium, price regulation, price and income elasticities, consumer's behavior, producer's behavior, cost, revenue, profit, market failure, monopoly, government macroeconomic policy, gross domestic product, multipliers, money, inflation, banking system, monetary policy, labor market, business cycle, fiscal policy, foreign trade policy, comparative advantage, CR and EU, Euro.			
<b>A0X36MOOC</b>	<b>Massive Open Online Course</b>	Z	2
See <a href="https://cw.fel.cvut.cz/b172/courses/a0x36mooc/start">https://cw.fel.cvut.cz/b172/courses/a0x36mooc/start</a> for additional details.			
<b>A1B15MAA</b>	<b>Mathematic Applications</b>	Z,ZK	6
The aim of the course is to obtain knowledge about mathematic programs used in power engineering. Student becomes acquainted with technical methods for gathering and data analysis, SW and HW hierarchy of resources and applications examples. Student will acquire basic knowledge about MATLAB, MATHEMATICA and mathematical model assessment. Student becomes also acquainted with the fields of complex variable function and numerical methods for solving algebraic and differential equations.			
<b>A0B17MTB</b>	<b>Matlab</b>	KZ	4
<b>A3B38MMP</b>	<b>Microprocessors and Microcontrollers in Instrumentation</b>	Z,ZK	6
Applications of microprocessors and single chip microcontrollers in instrumentation techniques are presented in this course. The course is focused on describing function and programming in embedded applications.			
<b>A1B14MIS</b>	<b>Microprocessors for Power Systems</b>	Z,ZK	5
Power electronics control computer structure, digital signal processor and ALU added features for fast real time calculations. Interrupt system and DMA system, analog signal measurement, fast impulse signal measurement, fast impulse generation support, inter-computer communication, system and power management, programming languages for power systems software development, programming techniques, software development tools (simulators, emulators, monitors), input signal conditioning circuitry, conversion from analog signals to digital processing, time sampling, amplitude quantization, power electronics control block design and implementation, difference equations and control algorithms, fixed and floating point calculations, debugging methods, program parametrization, guides and rules for implementation and application of power system control computers. Real time operating system, scheduler, dispatcher and another features and guides for application			
<b>A2B37MMT</b>	<b>Multimedia Technology</b>	Z,ZK	6
This course is the introduction to multimedia technology (audio and video). It overviews sound and picture acquisition, signal processing, transmission and distribution, recording and reproduction including physiology of hearing and vision. It provides fundamental information for understanding the main principles for system solutions in the field.			
<b>A0B38OCP</b>	<b>Circuits of Digital Instruments</b>	Z,ZK	5
Basic types of circuits and blocks of digital measuring instruments are described and analysed. Range and linearity for analogue circuits and interfaces for digital circuits are analysed in detail. Finally, individual projects including block design, model realisation and parameters verification are solved.			
<b>A4B33OSS</b>	<b>Operating systems and networks</b>	Z,ZK	6
The goal of this course is to introduce basic concepts and principles of operating systems (OS), like processes and threads, their scheduling, mutual communication and synchronization, time-dependent errors and deadlocks. Attention is also paid to memory management, virtual memory, management of secondary storages, file-systems and data security. The second part of the course is focused at distributed systems (DS) principles and technologies. DS communication media and topologies are explained and the basics of Internet including specific protocols are treated as typical DS applications.			
<b>A4B33OPT</b>	<b>Optimization</b>	Z,ZK	7
The course provides the basics of mathematical optimization: using linear algebra for optimization (least squares, SVD), Lagrange multipliers, selected numerical algorithms (gradient, Newton, Gauss-Newton, Levenberg-Marquardt methods), linear programming, convex sets and functions, intro to convex optimization, duality.			
<b>A0B01PAN</b>	<b>Advanced Analysis</b>	Z,ZK	6
Subject serves as an introduction to measure and integration theory and functional analysis. The first part deals with Lebesgue integration theory. Next parts are devoted to basic concepts of the theory of Banach and Hilbert spaces and their connection to harmonic analysis. Last part deals with spectral theory of operators and their application to matrix analysis.			

A0B34PPN	Principles and Rules of Electronic Design.	Z,ZK	4
Introduction to principles of electronic design. Reliability, compatibility, testability, safety. General design rules for professional electronic design with superior ratings in terms of high frequency and high current, immunity to a disturbance, low-level electromagnetic emission, etc. Miniaturization and cost minimization. Education of electronic design methodology in favour of creativity instead of specialization on specific devices and systems. Hands-on approach with aid of modern computer design tools.			
AE0B99PP6	Professional Practice	Z	6
AE0B99PP4	Professional Practice	Z	4
AE0B99PP2	Professional Practice	Z	2
A2B37CPP	C/C++ Programming Language	Z	4
The goal of the subject is to ensure necessary knowledge of the C language and main features of C++ as one of the dominant programming languages in many areas of research and technique (programming microprocessors, numerical mathematics, etc.). The skills on the language C/C++ are hence necessary for the work of students in various forms of projects, and for fulfillment of their final theses. The subject is based on the fundamental course of programming and algorithms in the first phase of study, which is mainly realized by means of Java programming language. The knowledge of syntax of Java (which have been derived from the C language) is hence an advantage for the study of this subject. The syllabus, therefore, contains an explanation of the differences of Java and C in the first stage. In this way, a guide of syntax of the fundamental features of the C language is naturally performed. The next lectures are devoted to the specific features of the C language as pointers, address arithmetic, etc. An explanation of structures and arrays of them follows. A review of the standard libraries of the C language is also performed. The subject is finished by the explanation of new features of the standards C99 and C++. At the beginning of this part of the subject, new data types are defined, novel types of input/output, and dynamic allocation of arrays are explained. An explanation of fundamental features of object programming in C++ follows, and an operation with the constructors and destructors is described. The explanation ends with class hierarchy and derived classes. A practical usage of operator overloading is demonstrated on the complex arithmetic. The exercises are organized in computer laboratories using the free environments as OpenWatcom, for example.			
A0B36PRI	Programming	Z,ZK	5
The course is an introduction into basics programming using using the Java language. Its core are data types, expressions, functions (exemplified by those at Java programming language), algorithms complexity evaluation, basics of programming techniques. In a comparative way the basic properties of language C are presented.			
A4B35PSR	Real-Time Systems Programming	Z,ZK	6
The goal of this subject is to give students basic knowledge in the area of software design for embedded systems with real-time operating systems (RTOS) with emphasis to practical experience. Students will solve several simple tasks to get basic knowledge about RTOS VxWorks and to measure timing parameters of the RTOS and hardware, which are necessary when choosing a platform for a given application. Then a more complicated task (motor control) will be solved, which will fully utilize means of RTOS VxWorks. During lectures, students will become familiar with real-time systems theory, which can be used to formally prove the timing correctness of the applications. Moreover, some software engineering techniques, which help with increasing of quality of safety-critical systems will be discussed.			
A0B15PES	Power Systems Operation	Z,ZK	5
The subject deals with legislative and technical conditions of electrical power systems operation. It covers systems operation at all voltage levels, basic system quantities control at both supply and consumption side, system dispatching control. It also informs about systems interconnection and extraordinary states.			
A1B16PAP	Business Law	Z,ZK	5
Introduction to Legal Terminology. Legal Regulation of Business in the Czech Republic. Legal Regulation of Business in European Union and legally binding Regulation for business subjects in the Czech Republic. Basic legal Regulations concerning Business Activities. Introduction to Commercial Law, commercial law obligation relationships, business entities, co-operatives, public control. Introduction to Civil Law, civil law obligation relationships, personal entities and legal entities, analogy of law, public control. Introduction to Trade Law, rights and duties of businessmen, business trade operation, commencement and types of trade authorization, public control. Introduction to Labour Law, labour law relationships, types of contractual relationships, public control. Protection of the competition. Enforcement of Law and executive proceedings.			
A2B13PEL	Industrial Electrical Engineering	Z,ZK	5
A student will, at first, meet with information about basic types of materials for electrical engineering, their properties, technologies and applications. The next task is focused on the fundamentals, function and service characteristics of transformers, power electronic converters, generators, DC and AC motors and contact electric apparatus. The problems are tested on the mains supply real units. The third part of the course deals with power electrical engineering, with the basic characteristic of a power system in the Czech Rep. and with types, operational modes and environmental impact of different types of power sources.			
A3B33ROB	Robotics	Z,ZK	6
Robotics is an integrating discipline designing and exploring machines with high degree of flexibility and autonomy. The subject introduces the discipline. It will briefly present broader context of robotics first and after that will teach students kinematics and statics of robots.			
A4B33RPZ	Pattern 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.			
A2B37ROZ	Radio Circuits and Devices	Z,ZK	6
The goal of the subject is to inform the students about properties, parameters, and design methodology of radio circuits, radio function blocks, and more complex blocks of radio transmitters and receivers. The lectures are devoted sequentially to elements, circuits, function blocks, and systems which are used at radio frequencies. The exercises are both seminar and laboratory; the seminars are devoted the basic calculations from the area of the radio function blocks, and the measurements are devoted to both basic function blocks and more complex problems from the area of radio transmitters and receivers.			
A0B14SPP	Drive Sensors	Z,ZK	4
Electric and non-electric quantity sensors for drives, Basic sensors types - physical principles. Theoretical fundamentals, practical choice of suitable sensor, sensor output electrical circuit, sensor output signal processing, digital signal processing and noise suppression. Sensor output signal time characteristics and frequency characteristics. Practical lab verification of theoretical principles			
A2B34SEI	Sensors in Electronics and Informatics	Z,ZK	6
The subject describes basic physical, electronic as well as optoelectronic behaviours using in sensors and microsensors, static and dynamic parameters, improvement of parameters, sensor data processing, intelligent sensors, applications of basic principles in sensors (temperature, pressure, optoelectronic and fibre optic, radiation, chemical, mechanical, level, flow, ultrasound, etc.). There are showed principles and applications of MEMS and microsystems in the subject. Principles are demonstrated on actual sensor datasheets and applications.			
A2B99SAS	Signals and systems	Z,ZK	5
Course explains basic terms and methods for continuous-time and discrete-time signal and system analysis.			
A4B33SI	Software Engineering	Z,ZK	6
The aim of this course is to provide the basic orientation in the software development process in order to be able to act effectively as a developmnet team members. The students will become knowledgeable in the core techniques of software design, support tools for the software development and selected project management and risk control procedures.			
A2B31SMS	Multimedia signal synthesis	Z,ZK	6
This course introduces the fundamentals of sound synthesis algorithms (everyday, music and speech), digital audio effects and sonification. Multimedia synthetic signals are used in modern digital systems, virtual reality systems, computer animations, games and film. Understanding of theoretical concepts will be consolidated through practical programming assignments in Matlab.			
A1B13SVS	Solar Energy Application Systems	Z,ZK	5
Solar energy. Photovoltaic phenomena. Photovoltaic cells and modules and their characteristics. Photovoltaic systems and their applications. Photo-thermal phenomena. Photo-thermal power stations. Significance, economic and environmental aspects of solar energy exploitation.			

A2B32SOS	Network Operating Systems	Z,ZK	6
Network operating systems, Linux, Unix. Administration and network tools, managing and administration of documentation. The graduates will be informed about basic conception and procedures in operating systems administration (UNIX) and gain the basic facility in operating systems configuration based on the x 86 platforms.			
A0B14TDO	Technical Documentation	KZ	3
In the subject TECHNICAL DOCUMENTATION students are acquainted with creation and defending of graphical and text technical documentation and with professional presentation in electro technical projects and design. Students are taught to fundamentals of technical drawing (projection methods, representation, sectional views, dimensioning, qualitative parameters etc.), to technical standards, to creation of graphical documentation in electro-technical branches, to creation of technical text documentation. In one half of seminars are students acquainted with basics of the graphic editor AutoCAD			
A0B14TME	Engineering mechanics	Z,ZK	4
This subject provides knowledge of applied mechanics for the industry practice. Analysis of constructional elements and their dimensioning. Kinematics of simple mechanisms. Dynamic behaviour of mechanical systems, mechanic vibrations. Thermodynamics of real gases and vapours, their processes an cycles, basic comparative cycles of heat machines. Fundamentals of hydrodynamics, transport losses in hydraulic systems.			
A2B32TSI	Telecommunication Systems and Networks	Z,ZK	6
The subject discusses principles of the telecommunication systems both digital transmission systems and digital switching systems. The subject will allow students to gain overview in broad telecommunication domain and they will be able to solve partial problems related with network traffic. Furthermore, students will also obtain knowledge in VoIP technology, QoS and signaling systems that are used in modern wired and wireless networks.			
A0B01TIK	Information Theory and Coding	Z,ZK	8
Fundamentals of information theory with a view towards efficient data compression and reliable transmission of information.			
A0B15VNZ	High-voltage Testing	Z,ZK	4
The aim of the subject is the introduction of metrological system and testing procedures in the field of high voltage techniques. It brings overview of modern diagnostic methods that are applied in electrical power systems. The subject opens questions in evaluation and interpretation of test results from the application of diagnostic methods and high-voltage tests.			
A1B14VE1	Power Electronics 1	Z,ZK	5
Power semiconductor devices, their serial and parallel connection, voltage and current dimensioning, point-to-point and bridge rectifiers, reversible rectifiers, control pulse generators, AC/AC and DC/DC converters, voltage source inverters, current source inverters, resonance inverters, frequency converters, matrix converters, principles of electromagnetic compatibility, cooperation of power semiconductor converters with DC and AC motors, survey of power semiconductor converters application in engineering practice			
A1B13VVZ	Manufacturing of Power Devices	Z,ZK	6
The topic of the subject is focused on manufacturing of power electrical machines and devices from construction and technological point of view. Main part of the subject is devoted to transformers and rotating machines, namely their magnetic circuits and windings. Second half of the subject is dedicated to manufacturing of power semiconductive devices and converters including diagnostics, reliable operation. Last part of lectures deals with layouts of manufacturing, lean management and planning of manufacturing.			
A7B39WA1	Web Applications Development	Z,ZK	6
Development of web applications. Designing web presentations using HTML/XHTML and CSS, scripting on the client side, creation of dynamic web applications on the server side. Main languages used: XHTML, CSS, JavaScript, PHP.			
A2B31ZEO	Fundamentals of Electrical Circuits	Z,ZK	5
The subject describes fundamental methods of electrical circuit analysis. After a brief introductory part where the difference between an electrical device and its models is introduced, the basic ideal passive and active circuit elements are then defined. Next, basic circuit quantities are defined; lectures are then focused on important laws and methods of analysis of electrical circuits. Circuit theorems, an analysis of DC circuits, AC circuits, first-order and second-order circuits are described. Finally, a brief description of more sophisticated methods of analysis (Laplace transform, pulse excitation) is done. The seminars are focused on getting a theoretical experience in analysis of electrical circuits, supplemented with simulations and simple measurement.			
A2B37ZST	Principles of Studio Technology	Z,ZK	6
The course gives basic knowledge of elements and systems used in television and radio professional and semiprofessional studio technology and of technology of radio and television production and broadcasting. Laboratory exercises are situated in a small school studio and are completed with professional excursions.			
A7B36TS1	Introduction to Software Testing	KZ	5
A4B33ZUI	Introduction to Artificial Intelligence	Z,ZK	6
This course provides introduction to symbolic artificial intelligence. It presents the algorithms for informed and non-informed state space search, nontraditional methods of problem solving, knowledge representation by means of formal logic, methods of automated reasoning and introduction to markovian decision making.			
A0B31ZZS	Multimedia signal synthesis	Z,ZK	4
The introductory subject to the study of Digital Signal Processing. The main emphasis is focused on the interpretation and acquirement of the basic principals. Practical approaches and real examples from different areas (music, biomedical engineering, speech processing communication systems) are used. The program system MATLAB is used for the tasks solution, which offers comfortable and user friendly environment with graphical and sound outputs and allows digital signal processing in different formats.			
A0B33BMI	Introduction to Biomedical Engineering and Informatics	KZ	4
Aim of the course is to introduce students into the area of biomedical engineering and informatics. It is focused on various issues starting from basic cybernetic approaches to research and modelling of living organisms, over measurement and processing of biological signals, up to medical devices and health care information systems. During laboratory exercises the students acquire basic experience and skills with application of medical devices, imaging systems, biomedical informatics and processing of biomedical data and signals.			
A1B16UFI	Corporate Finance	Z,ZK	5
Financial ratios.Principles of accounting. Assets and liabilities valuation appreciation). Costs, revenues and profit. Analysis of balance sheet and income statement. Financial analysis of firm, methods and objectives. Budgets and controlling. Present value, opportunity cost. Long term finance. Investment efficiency evaluation techniques. IRR, NPV. The comparing period (the comparison period), an equivalent annual value NPV. Inflation and tax influence to investment decision. Capital Asset Pricing Model, WACC.			
A0B02ZIP	Environmental Science	ZK	2
Attention is devoted to the basis of ecology, to the growth of human population, to the capitalization of energy and to other resources of the biosphere. The pollution of water, soil, and air together with a waste treatment is evaluated. The impact of mechanic, electric, magnetic fields and chemical components to environment is also discussed. Economy, law and morality in relation to environment are dealt with.			

### List of courses of this pass:

Code	Name of the course	Completion	Credits
A003TV	Physical Education	Z	2



A0B01BAP	Bachelor thesis	Z	20
A0B01PAN	Advanced Analysis Subject serves as an introduction to measure and integration theory and functional analysis. The first part deals with Lebesgue integration theory. Next parts are devoted to basic concepts of the theory of Banach and Hilbert spaces and their connection to harmonic analysis. Last part deals with spectral theory of operators and their application to matrix analysis.	Z,ZK	6
A0B01PSI	Probability, Statistics, and Theory of Information Basics of probability theory, mathematical statistics, information theory, and coding. Includes descriptions of probability, random variables and their distributions, characteristics and operations with random variables. Basics of mathematical statistics: Point and interval estimates, methods of parameters estimation and hypotheses testing, least squares method. Basic notions and results of the theory of Markov chains. Shannon entropy, mutual and conditional information.	Z,ZK	6
A0B01TIK	Information Theory and Coding Fundamentals of information theory with a view towards efficient data compression and reliable transmission of information.	Z,ZK	8
A0B02AKA	Acoustic Applications Lecture summarize applications in physical acoustics, room and building acoustics, environmental acoustics, noise and vibration control, physiological acoustics, diagnostics, and ultrasound.	KZ	4
A0B02BAP	Bachelor thesis Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.	Z	20
A0B02FEN	Physics for Electroenergetics Lessons contain selected parts of physics for students of electric power engineering: Physical principles of gas discharges - glow, arc, spark and corona discharges and their applications. The students become acquainted with methods for nuclear fission and fusion energy generation. The introduction to structural properties of matter and its thermal, electrical and magnetic properties. A part of the course is two excursions in Laboratories of Czech Academy of Sciences.	Z,ZK	4
A0B02FPL	Solid State Physics Elementary physics of solids for students of electrotechnology. Description and classification of solids. Thermal properties of solids. Types of bonds in solids. Real crystals, their defects and surfaces. Electrons in solids, the band structure, electrons and holes. Metals, semiconductors, insulators. Transport phenomena, generation and recombination of minority carriers. Magnetism, magnetic properties of solids. Optical phenomena in solids, luminescence, stimulated emission.	Z,ZK	5
A0B02ZIP	Environmental Science Attention is devoted to the basis of ecology, to the growth of human population, to the capitalization of energy and to other resources of the biosphere. The pollution of water, soil, and air together with a waste treatment is evaluated. The impact of mechanic, electric, magnetic fields and chemical components to environment is also discussed. Economy, law and morality in relation to environment are dealt with.	ZK	2
A0B04A21	English language A2-1	Z	0
A0B04A22	English language A2-2	Z	0
A0B04B11	English language B1-1	Z	0
A0B04B12	English language B1-2	Z	0
A0B04B21	English language B2-1	Z	3
A0B04B22	English language B2-2	Z	3
A0B04C2L	Czech language 2 The course is aimed at foreign students studying in Czech, it further develops their language knowledge and skills to meet the needs of technical university students.	Z	2
A0B04C2Z	Czech language 2 The course is aimed at foreign students studying in Czech, it further develops their language knowledge and skills to meet the needs of technical university students	Z	2
A0B04CA	Technical English for Pre-Intermediate	Z	2
A0B04CAE1	Certificate of Advanced English CAE 1 The aim of the course is to prepare for Certificate of Advanced English - the second highest level Cambridge ESOL exam. The course CAE1 covers units 1-4. Studying for CAE helps you to improve your language skills (reading, writing, English in use, listening and speaking) and use them in a wide range of contexts. The exam is based on realistic tasks and indicates the ability to use the language in practical situations. You will be able to participate in meetings and discussions, expressing opinions clearly and be able to understand and produce texts of various types. CAE is recognised by the majority of universities in English speaking countries as proof of adequate language skills for courses taught and assessed in English as well as by employers who require knowledge of a foreign language. CAE is taken by more than 60 000 people each year in more than 60 countries. It is possible but not necessary for obtaining credit to take CAE at British Council.	Z	2
A0B04CAE2	Certificate of Advanced English CAE 2 The aim of the course is to prepare for Certificate of Advanced English - the second highest level Cambridge ESOL exam. The course CAE2 covers units 5-8. Studying for CAE helps you to improve your language skills (reading, writing, English in use, listening and speaking) and use them in a wide range of contexts. The exam is based on realistic tasks and indicates the ability to use the language in practical situations. You will be able to participate in meetings and discussions, expressing opinions clearly and be able to understand and produce texts of various types. CAE is recognised by the majority of universities in English speaking countries as proof of adequate language skills for courses taught and assessed in English as well as by employers who require knowledge of a foreign language. CAE is taken by more than 60 000 people each year in more than 60 countries. It is possible but not necessary for obtaining credit to take CAE at British Council. Student is allowed to enrol only into one CAE course during one semester.	Z	2
A0B04CAE3	Certificate of Advanced English CAE 3 The aim of the course is to prepare for Certificate of Advanced English - the second highest level Cambridge ESOL exam. The course CAE3 covers unit 9 - 12. Studying for CAE helps you to improve your language skills (reading, writing English in use, listening and speaking) and use them in a wide range of contexts.	Z	2
A0B04CAE4	Certificate of Advanced English 4	Z	
A0B04CIN		Z	2
A0B04CIN2	Chinese Language 2	Z	2
A0B04F1	French language 1	Z	2
A0B04F2	French language 2	Z	2
A0B04F3	French Language 3	Z	2
A0B04FCE1	FCE 1 The course is aimed for students, employees of the Faculty and the public whose knowledge of English corresponds to B1 level according to the European Language Frame. The course focuses on improving all language skills - writing, speaking, reading, listening, grammar and phonetics - and is submitted to the goal of obtaining the required skills needed for B2 ELF.	Z	2
A0B04FCE2	FCE 2 The course is aimed for students, employees of the Faculty and the public whose knowledge of English corresponds to B1 level according to the European Language Frame. The course focuses on improving all language skills - writing, speaking, reading, listening, grammar and phonetics - and is submitted to the goal of obtaining the required skills needed for B2 ELF.	Z	2

A0B04FCE3	FCE 3	Z	2
The course is aimed for students, employees of the Faculty and the public whose knowledge of English corresponds to B1 level according to the Common European Framework of Reference for Languages (CEFR). The course focuses on improving all language skills - writing, speaking, reading, listening, grammar and phonetics - and is submitted to the goal of obtaining the required skills needed for B2 CEFR.			
A0B04FCE4	FCE4	Z	2
The course is aimed for students, employees of the Faculty and the public whose knowledge of English corresponds to B1 level according to the European Language Frame. The course focuses on improving all language skills - writing, speaking, reading, listening, grammar and phonetics - and is submitted to the goal of obtaining the required skills needed for B2 ELF.			
A0B04GA		Z	2
The aim of this course is to extend and complement grammatical patterns covered in other English courses that are intended for full-time students. The course is meant mainly as a supplement for students who have not yet passed the B2 examination and are interested in further study and additional practice.			
A0B04GN	German Grammar	Z	2
A0B04JAP	Japanese	Z	2
A0B04JAP2	Japanese 2	Z	2
A0B04KA	English Conversation 2	Z	2
The course is designed for students who want to develop their communication skills. Students will be given the opportunity to use the vocabulary they already know, as well as learn new words and phrases, to communicate on a variety of topics and themes. This course is not designed for beginners.			
A0B04KF1	French conversation 1	Z	2
A0B04KF2	French conversation 1	Z	2
A0B04KN	German Conversation	Z	2
A0B04KN2	German conversation 2	Z	2
A0B04KR	Russian conversation	Z	2
A0B04KR2	Russian conversation 2	Z	2
A0B04KS1	Spanish conversation 1	Z	2
A0B04KS2	Spanish conversation 2	Z	2
A0B04N1	German language 1	Z	2
A0B04N2	German language 2	Z	2
A0B04N3	German language 3	Z	2
A0B04OA	Technical English Course	Z	2
The course is designed for students who have completed the B2 English course. Its main objective is to prepare students for the study of selected specialized courses in English by covering a broader range of topics in engineering. In addition to teaching materials aimed at expanding technical vocabulary and consolidating current language skills, the focus is on authentic articles adapted from professional journals and accompanying videos. The syllabus also leaves space for students' presentations covering various fields of science.			
A0B04ON	Professional German	Z	2
A0B04PZP	Preparation for stay in Germany	Z	2
A0B04R1	Russian language 1	Z	2
A0B04R2	Russian language 2	Z	2
A0B04R3	Russian language 3	Z	2
A0B04R4	Russian language 3	Z	2
A0B04RET	Rhetoric	Z	2
The objective of the subject is to master and improve skills necessary for successful presentation as well as enhancing the communicative ability of the prospective engineers and bachelors. This subject will enable the students to develop both spoken and written presentations, non verbal communication and remove the psychological barriers for public speaking so that the students can create a good image. The course "Retorika" provides an introduction to this subject.			
A0B04S1	Spanish language 1	Z	2
A0B04S2	Spanish language 2	Z	2
A0B04S3	Spanish language 3	Z	2
A0B04S4	Spanish Language 4	Z	2
A0B04TOEFL	TOEFL	Z	4
The test of English as a Foreign Language TOEFL is an internationally accepted, standardized language exam, which allows students to show their language skills when applying for studying abroad. The course can improve the language skills taking into account the character of the exam; it will introduce the formal aspects of the exam and give strategies for taking the test. This subject is evaluated by 4 credits, which expects 3 hours of homework. Passing the TOEFL exam with minimum 100 points (the B level) by the end of the summer exam period is the requirement for getting the credit. The exam is not a part of the course and it costs 240USD. It is possible to take it in testing centers in Prague and Ostrava. The dates of the exams are published on <a href="http://www.ets.org/toefl">http://www.ets.org/toefl</a> . The validity of the exam is 2 years.			
A0B13BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor's degree study program. 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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B14AEE	Automotive Electrical and Electronic Engineering	Z,ZK	4
Operational conditions for vehicle electronic equipment. Vehicle power sources. Laboratory training is oriented on practical measurement of basic assemblies and elements in vehicle equipment. Visit to the ŠKODA AUTO factory in Mladá Boleslav is included.			
A0B14BAP	Bachelor thesis	Z	20
A0B14SPP	Drive Sensors	Z,ZK	4
Electric and non-electric quantity sensors for drives, Basic sensors types - physical principles. Theoretical fundamentals, practical choice of suitable sensor, sensor output electrical circuit, sensor output signal processing, digital signal processing and noise suppression. Sensor output signal time characteristics and frequency characteristics. Practical lab verification of theoretical principles			
A0B14TDO	Technical Documentation	KZ	3
In the subject TECHNICAL DOCUMENTATION students are acquainted with creation and defending of graphical and text technical documentation and with professional presentation in electro technical projects and design. Students are taught to fundamentals of technical drawing (projection methods, representation, sectional views, dimensioning, qualitative parameters etc.), to technical standards, to creation of graphical documentation in electro-technical branches, to creation of technical text documentation. In one half of seminars are students acquainted with basics of the graphic editor AutoCAD			

A0B14TME	Engineering mechanics	Z,ZK	4
This subject provides knowledge of applied mechanics for the industry practice. Analysis of constructional elements and their dimensioning. Kinematics of simple mechanisms. Dynamic behaviour of mechanical systems, mechanic vibrations. Thermodynamics of real gases and vapours, their processes and cycles, basic comparative cycles of heat machines. Fundamentals of hydrodynamics, transport losses in hydraulic systems.			
A0B15BAP	Bachelor thesis	Z	20
A0B15EIN	Electrical Installations	Z,ZK	4
Basic design of electrical power circuit-wiring in housing and industrial building, wires dimension, introduction to protection and wire grounding in distribution point - low voltage and high voltage.			
A0B15PES	Power Systems Operation	Z,ZK	5
The subject deals with legislative and technical conditions of electrical power systems operation. It covers systems operation at all voltage levels, basic system quantities control at both supply and consumption side, system dispatching control. It also informs about systems interconnection and extraordinary states.			
A0B15VNZ	High-voltage Testing	Z,ZK	4
The aim of the subject is the introduction of metrological system and testing procedures in the field of high voltage techniques. It brings overview of modern diagnostic methods that are applied in electrical power systems. The subject opens questions in evaluation and interpretation of test results from the application of diagnostic methods and high-voltage tests.			
A0B16BAP	Bachelor thesis	Z	20
A0B16EPD	Business economics	KZ	4
Basic course of Business Economics deals with the subject from wide angle of view, discussing all particular aspects of Business Economics, and relationships between them.			
A0B16ET1	Ethic	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.			
A0B16F11	Philosophy I	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.			
A0B16FIL	Philosophy	ZK	2
A0B16HI1	History I	KZ	4
The main purpose of this subject is to provide a historical overview and explanation of rises and developments of mass movements and totalitarian states in 20th century. The course is based on political and econom-social history with attention to philosophic and psychologic connections.			
A0B16HT1	History of science and technology 1	KZ	4
This subject provides basic information on the development of science and technology in the world and at home from the earliest times to the present. The course is aimed primarily at explaining the significance of key levels of technology development, industrial revolutions and their impact on society.			
A0B16HTE	History of technology and economic	ZK	2
A0B16MPL	Management psychology	ZK	2
Psychology of personality, psychology of work and organization. Psychology in human resources management. The manager, his role and competencies. Motivation and engagement. Skills development. Communication and conflict resolution. Work group and team, conducting meetings. Time management and delegation. Dealing with stress and emotions. Company culture and organizational change.			
A0B16MPS	Psychology	Z,ZK	4
A0B16PRS	Presentation skills	Z	2
Students will learn to prepare and to do presentation. They will obtain skills how to prepare written documents using typographic principles and proper way of citation and referencing. They will prove gained theoretical knowledge on self prepared interactive presentation that is recorded on video and discussed.			
A0B17BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination. Bachelor, s projects are oriented into microwave technique, antennas, propagation, optoelectronics, EMC, medical applications.			
A0B17MTB	Matlab	KZ	4
A0B31BAP	Bachelor thesis	Z	20
A0B31ZZS	Multimedia signal synthesis	Z,ZK	4
The introductory subject to the study of Digital Signal Processing. The main emphasis is focused on the interpretation and acquirement of the basic principals. Practical approaches and real examples from different areas (music, biomedical engineering, speech processing communication systems) are used. The program system MATLAB is used for the tasks solution, which offers comfortable and user friendly environment with graphical and sound outputs and allows digital signal processing in different formats.			
A0B32BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B32KTE	Construction of Telecommunication Devices	KZ	4
The aim of this course is to familiarize students with the practical design of communication systems. Subject further continues with explanation of system design procedures and requirements on its parts. It all with respecting of theirs EMC (Electromagnetic Compatibility). The key part of lessons is laboratory measurements and work on projects, where the students will be dealing with design, construction, configuration and measurement of communication system blocks.			
A0B33BAP	Bachelor thesis	Z	20
A0B33BMI	Introduction to Biomedical Engineering and Informatics	KZ	4
Aim of the course is to introduce students into the area of biomedical engineering and informatics. It is focused on various issues starting from basic cybernetic approaches to research and modelling of living organisms, over measurement and processing of biological signals, up to medical devices and health care information systems. During laboratory exercises the students acquire basic experience and skills with application of medical devices, imaging systems, biomedical informatics and processing of biomedical data and signals.			
A0B34BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B34PPN	Principles and Rules of Electronic Design.	Z,ZK	4
Introduction to principles of electronic design. Reliability, compatibility, testability, safety. General design rules for professional electronic design with superior ratings in terms of high frequency and high current, immunity to a disturbance, low-level electromagnetic emission, etc. Miniaturization and cost minimization. Education of electronic design methodology in favour of creativity instead of specialization on specific devices and systems. Hands-on approach with aid of modern computer design tools.			
A0B35BAP	Bachelor thesis	Z	20

A0B35SPS	Computer System Structures	Z,ZK	6
The subject introduces into basic hardware structures of computer systems, into their design and architecture. It explains technical background of classic computer systems and special computer for digital and logic control. It gives greater insight into parallel processing of data in computers. Students obtain credits from practical exercises according to results of individual projects. The projects are solved on FPGA development boards Altera DE2 that are utilized in similar courses by many world's top universities.			
A0B36APO	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.			
A0B36BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor's degree study program. Student will choose a topic from a range of topics related to his or her branch of study that will be specified by branch department or branch departments. The Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B36PR1	Programming 1	Z,ZK	6
The aim of the course is to teach the students: basic interactions with user interface and to program development system, introduction to JAVA, basic control flow structures and data structures, functions, arrays, object-oriented programming concepts, streams and files. The students are able to construct and debug a simple program in Java.			
A0B36PR2	Programming 2	Z,ZK	6
The course moves along the understanding of programming skills from Programming 1, the aim is to design an interactive application with a graphic user interface (GUI), with knowledge of polymorphism abstract classes, interfaces, events handling, applets, user libraries, library practical application. Further students continue by the comparative way in getting acquainted in C language on the base of Java language, dynamic memory management, students are able to analyze the simple programs in C language.			
A0B36PRI	Programming	Z,ZK	5
The course is an introduction into basics programming using using the Java language. Its core are data types, expressions, functions (exemplified by those at Java programming language), algorithms complexity evaluation, basics of programming techniques. In a comparative way the basic properties of language C are presented.			
A0B37BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor'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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B38APH	FPGA Applications	KZ	5
A0B38BAP	Bachelor thesis	Z	20
Independent final project for the Bachelor's degree study program. 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 Bachelor's project will be defended in front of the board of examiners for the comprehensive final examination.			
A0B38GRP	Graphical Programming	Z,ZK	5
The course is devoted to the development of application programs based on LabVIEW programming environment. The structure and conception of lectures offers unifying outlook on the area of automatic measurement and control systems. From this reason the attention will be devoted also to the principles of communication with measuring instruments and control modules equipped by standardized interface (GPIB, RS-232, RS-485, USB, Ethernet, PXI, PCI). The aim of laboratory exercises is practical programming in LabVIEW. They will be composed from the presentations, demonstrations and examples of solution of simple tasks. Exercises finish with one individual task to verify students skills. The aim of the course is to teach how to make good application focused on modularity, scalability and maintainability. Course covers the topic of the LabVIEW Core 1 and LabVIEW Core 2 courses.			
A0B38LPT	Aircraft Instrumentation	Z,ZK	5
The course deals with theory and description of function of aircraft's low frequency instruments and systems. Students test them and measure their parameters in laboratory courses.			
A0B38OCP	Circuits of Digital Instruments	Z,ZK	5
Basic types of circuits and blocks of digital measuring instruments are described and analysed. Range and linearity for analogue circuits and interfaces for digital circuits are analysed in detail. Finally, individual projects including block design, model realisation and parameters verification are solved.			
A0B39BAP	Bachelor thesis	Z	20
A0X36MOOC	Massive Open Online Course	Z	2
See <a href="https://cw.fel.cvut.cz/b172/courses/a0x36mooc/start">https://cw.fel.cvut.cz/b172/courses/a0x36mooc/start</a> for additional details.			
A1B02FY2	Physics 2 for EEM	Z,ZK	5
The course Physics II is closely linked with the course Physics I. Within the framework of this course the students will first of all learn foundations of thermodynamics. Following topic - the theory of waves - will give to the students basic insight into the properties of waves and will help to the students to understand that the presented description of the waves has a universal character in spite of the waves character. Particular types of waves, such as acoustic or optical waves are the subjects of the following section. Relativistic mechanics, quantum mechanics and nuclear physics will complete the student's general education in physics. The knowledge gained in this course will help to students in the study of such modern disciplines as measuring technique, propagation of electromagnetic waves, electroacoustic or optical communications and will allow them to understand the principles of novel technologies and functioning of new electronic devices.			
A1B13SVS	Solar Energy Application Systems	Z,ZK	5
Solar energy. Photovoltaic phenomena. Photovoltaic cells and modules and their characteristics. Photovoltaic systems and their applications. Photo-thermal phenomena. Photo-thermal power stations. Significance, economic and environmental aspects of solar energy exploitation.			
A1B13VVZ	Manufacturing of Power Devices	Z,ZK	6
The topic of the subject is focused on manufacturing of power electrical machines and devices from construction and technological point of view. Main part of the subject is devoted to transformers and rotating machines, namely their magnetic circuits and windings. Second half of the subject is dedicated to manufacturing of power semiconductor devices and converters including diagnostics, reliable operation. Last part of lectures deals with layouts of manufacturing, lean management and planning of manufacturing.			
A1B14MIS	Microprocessors for Power Systems	Z,ZK	5
Power electronics control computer structure, digital signal processor and ALU added features for fast real time calculations. Interrupt system and DMA system, analog signal measurement, fast impulse signal measurement, fast impulse generation support, inter-computer communication, system and power management, programming languages for power systems software development, programming techniques, software development tools (simulators, emulators, monitors), input signal conditioning circuitry, conversion from analog signals to digital processing, time sampling, amplitude quantization, power electronics control block design and implementation, difference equations and control algorithms, fixed and floating point calculations, debugging methods, program parametrization, guides and rules for implementation and application of power system control computers. Real time operating system, scheduler, dispatcher and another features and guides for application			
A1B14PO1	Electric Drives and Traction 1	Z,ZK	6
Application of motion equation in drives, the motor torque, the load torque, the dynamical torque. Operating modes, electromechanical transient effects. Drives with DC motors, induction motors, synchronous motors, SRM, EC motors, linear motors. For each type its properties, speed control strategy and block scheme of a controller, range of application. Drive control computer structure, shared resources organization, special hardware blocks for signal measurement and signal generation in drives, programming techniques and languages for software development and debugging, migration from analog signal processing to the digital signal processing, time sampling and amplitude quantization, aliasing, difference equations and digital control algorithms. Drive commissioning			

A1B14SEM	Seminar on Electrical Engineering	Z	2
The course summarizes the knowledge and shows practical use of electric energy from its production to its consumption. On the seminars, there are the basic fields of activity and related applications of following departments shown: Production and distribution of electric energy on the Department of Electroenergetics K13115, electric drives and actuators on the department of Electric Drives and Traction K13114, and the technology of production materials and equipment on the Department of Electrotechnology K13113.			
A1B14SP1	Electric Machinery and Apparatus 1	Z,ZK	6
Electric drive and its components. Electromechanical energy conversion. Rotational converters - DC machines, induction motors, synchronous generators and motors. Special electric machines, actuators. Static converters - transformers. There are presented operational principles, main constructional scheme and characteristics, applications. Switching theory. Interaction between turn-off switch and switched circuit. Basic theory and characteristic of electric arc. Transient recovery voltage. Switching overvoltage. Low voltage protection apparatuses			
A1B14VE1	Power Electronics 1	Z,ZK	5
Power semiconductor devices, their serial and parallel connection, voltage and current dimensioning, point-to-point and bridge rectifiers, reversible rectifiers, control pulse generators, AC/AC and DC/DC converters, voltage source inverters, current source inverters, resonance inverters, frequency converters, matrix converters, principles of electromagnetic compatibility, cooperation of power semiconductor converters with DC and AC motors, survey of power semiconductor converters application in engineering practice			
A1B15EN1	Power Engineering 1	Z,ZK	5
The subject provides basic knowledge about the CR power system structure and operational characteristics and electrical power systems. Then it informs about the electric strength of insulators, machines and other power system devices. It presents knowledge about damaging phenomena of insulation systems and procedures for their elimination. It enables to meet insulation systems testing and diagnostics problems.			
A1B15EN2	Power Engineering 2	Z,ZK	6
The subject is focused on the task of electrical energy transmission and distribution. It introduces particular components of electrical systems and their electrical parameters. It explains steady and failure states in ES and other transient events. It explains principles of electrical devices protections, dimensioning principles and electrical stations realization in the transmission and distribution system.			
A1B15EN3	Power Engineering 3	Z,ZK	5
The aim of the course is to become students acquainted with heat transfer laws, the design and use of resistive, dielectric, induction and arc electro-heat devices, thermal comfort of human being, heating of interiors and examples of particular problems of electro-heat devices design and calculations. The next part of the course acquaints students with basics of photometry, light measurement, light sources, luminaires and fundamentals of indoor and outdoor lighting.			
A1B15MAA	Mathematic Applications	Z,ZK	6
The aim of the course is to obtain knowledge about mathematic programs used in power engineering. Student becomes acquainted with technical methods for gathering and data analysis, SW and HW hierarchy of resources and applications examples. Student will acquire basic knowledge about MATLAB, MATHEMATICA and mathematical model assessment. Student becomes also acquainted with the fields of complex variable function and numerical methods for solving algebraic and differential equations.			
A1B16MME	Macro and Microeconomics	Z,ZK	5
Basic economic terms, market, law of demand, law of supply, market equilibrium, price regulation, price and income elasticities, consumer's behavior, producer's behavior, cost, revenue, profit, market failure, monopoly, government macroeconomic policy, gross domestic product, multipliers, money, inflation, banking system, monetary policy, labor market, business cycle, fiscal policy, foreign trade policy, comparative advantage, CR and EU, Euro.			
A1B16PAP	Business Law	Z,ZK	5
Introduction to Legal Terminology. Legal Regulation of Business in the Czech Republic. Legal Regulation of Business in European Union and legally binding Regulation for business subjects in the Czech Republic. Basic legal Regulations concerning Business Activities. Introduction to Commercial Law, commercial law obligation relationships, business entities, co-operatives, public control. Introduction to Civil Law, civil law obligation relationships, personal entities and legal entities, analogy of law, public control. Introduction to Trade Law, rights and duties of businessmen, business trade operation, commencement and types of trade authorization, public control. Introduction to Labour Law, labour law relationships, types of contractual relationships, public control. Protection of the competition. Enforcement of Law and executive proceedings.			
A1B16UFI	Corporate Finance	Z,ZK	5
Financial ratios. Principles of accounting. Assets and liabilities valuation appreciation). Costs, revenues and profit. Analysis of balance sheet and income statement. Financial analysis of firm, methods and objectives. Budgets and controlling. Present value, opportunity cost. Long term finance. Investment efficiency evaluation techniques. IRR, NPV. The comparing period (the comparison period), an equivalent annual value NPV. Inflation and tax influence to investment decision. Capital Asset Pricing Model, WACC.			
A1B31EOS	Electrical circuits	Z,ZK	6
The subject describes fundamental methods of electrical circuit analysis. The aim is to unify different level of knowledge of students coming from schools of different categories and form the basis of knowledge necessary for next subjects. It presents the difference among physical circuit and its models, and then it presents the behavior of basic ideal circuit elements in DC circuits and in sinusoidal steady state as well as transients, caused by changes in the circuit. Finally, it presents the brief description of more sophisticated methods of analysis (Laplace transform, pulse excitation ?).			
A1B37KEL	Communication and Electronics	KZ	4
The purpose of the subject is acquiring fundamental knowledge of related themes of communication and electronics. First, the students are introduced to fundamentals of communication, the most important analog and digital modulations, and basic conception of radio systems. Second, students give information about basic elements, connections, and function blocks of electronics. The last part of the subject is devoted to explication of fundamental circuits of radio engineering.			
A2B13PEL	Industrial Electrical Engineering	Z,ZK	5
A student will, at first, meet with information about basic types of materials for electrical engineering, their properties, technologies and applications. The next task is focused on the fundamentals, function and service characteristics of transformers, power electronic converters, generators, DC and AC motors and contact electric apparatus. The problems are tested on the mains supply real units. The third part of the course deals with power electrical engineering, with the basic characteristic of a power system in the Czech Rep. and with types, operational modes and environmental impact of different types of power sources.			
A2B31ANO	Analog Circuits	Z,ZK	5
The course is designed to acquaint students with the basics of analog electronic circuits. The first part is devoted to fundamental transistor amplifiers and elemental structures of analog integrated circuits. Then the typical applications of operational amplifiers are introduced, including non-linear networks and basic frequency filter design and implementation. Problems of oscillators are discussed at the conclusion.			
A2B31HPM	Hardware for Multimedia	Z,ZK	6
Subject provides concise basic overview of hardware used in multimedia (MM). It however does not try to achieve an encyclopedic completeness - instead of it, detailed analysis is carried out for selected blocks containing interesting technical solutions and more general principles. The main focus is specialization of digital function blocks for processing of MM data. Analog circuits are described mainly as a complement to digital core. Frequent examples of MM data are used to illustrate functions of individual HW blocks.			
A2B31SMS	Multimedia signal synthesis	Z,ZK	6
This course introduces the fundamentals of sound synthesis algorithms (everyday, music and speech), digital audio effects and sonification. Multimedia synthetic signals are used in modern digital systems, virtual reality systems, computer animations, games and film. Understanding of theoretical concepts will be consolidated through practical programming assignments in Matlab.			
A2B31ZEO	Fundamentals of Electrical Circuits	Z,ZK	5
The subject describes fundamental methods of electrical circuit analysis. After a brief introductory part where the difference between an electrical device and its models is introduced, the basic ideal passive and active circuit elements are then defined. Next, basic circuit quantities are defined; lectures are then focused on important laws and methods of analysis of			

electrical circuits. Circuit theorems, an analysis of DC circuits, AC circuits, first-order and second-order circuits are described. Finally, a brief description of more sophisticated methods of analysis (Laplace transform, pulse excitation) is done. The seminars are focused on getting a theoretical experience in analysis of electrical circuits, supplemented with simulations and simple measurement.

A2B32SOS	<b>Network Operating Systems</b>	Z,ZK	6
Network operating systems, Linux, Unix. Administration and network tools, managing and administration of documentation. The graduates will be informed about basic conception and procedures in operating systems administration (UNIX) and gain the basic facility in operating systems configuration based on the x 86 platforms.			
A2B32TSI	<b>Telecommunication Systems and Networks</b>	Z,ZK	6
The subject discusses principles of the telecommunication systems both digital transmission systems and digital switching systems. The subject will allow students to gain overview in broad telecommunication domain and they will be able to solve partial problems related with network traffic. Furthermore, students will also obtain knowledge in VoIP technology, QoS and signaling systems that are used in modern wired and wireless networks.			
A2B34IAE	<b>Smart Electronics</b>	Z,ZK	6
The aim of the course is to show and present to the students the modern trends used in electronics design. It will practically show the usage of electronic devices, circuits and functional blocks. Typical methods, errors and mistakes during the design process flow will be shown. During the exercises students will design a concept and select appropriate electronic components for circuit realization. Simulation software will help to compare the designed circuit with the realized one. Evaluation boards with complete software support from STMicroelectronics will help the students to understand the basic function of presented integrated circuits.			
A2B34SEI	<b>Sensors in Electronics and Informatics</b>	Z,ZK	6
The subject describes basic physical, electronic as well as optoelectronic behaviours using in sensors and microsensors, static and dynamic parameters, improvement of parameters, sensor data processing, intelligent sensors, applications of basic principles in sensors (temperature, pressure, optoelectronic and fibre optic, radiation, chemical, mechanical, level, flow, ultrasound, etc.). There are showed principles and applications of MEMS and microsystems in the subject. Principles are demonstrated on actual sensor datasheets and applications.			
A2B37CPP	<b>C/C++ Programming Language</b>	Z	4
The goal of the subject is to ensure necessary knowledge of the C language and main features of C++ as one of the dominant programming languages in many areas of research and technique (programming microprocessors, numerical mathematics, etc.). The skills on the language C/C++ are hence necessary for the work of students in various forms of projects, and for fulfillment of their final theses. The subject is based on the fundamental course of programming and algorithms in the first phase of study, which is mainly realized by means of Java programming language. The knowledge of syntax of Java (which have been derived from the C language) is hence an advantage for the study of this subject. The syllabus, therefore, contains an explanation of the differences of Java and C in the first stage. In this way, a guide of syntax of the fundamental features of the C language is naturally performed. The next lectures are devoted to the specific features of the C language as pointers, address arithmetic, etc. An explanation of structures and arrays of them follows. A review of the standard libraries of the C language is also performed. The subject is finished by the explanation of new features of the standards C99 and C++. At the beginning of this part of the subject, new data types are defined, novel types of input/output, and dynamic allocation of arrays are explained. An explanation of fundamental features of object programming in C++ follows, and an operation with the constructors and destructors is described. The explanation ends with class hierarchy and derived classes. A practical usage of operator overloading is demonstrated on the complex arithmetic. The exercises are organized in computer laboratories using the free environments as OpenWatcom, for example.			
A2B37KMM	<b>Communication and Measurement in Multimedia</b>	Z,ZK	6
The aim of the subject is to give basic overview of present and perspective communication systems, mainly in relation to signal transmission and measurement. Lectures and practices make students familiar with technical principles of systems, basic conception of transmitter and receiver and measurement of these systems. Subject is focused on multimedia systems; it means systems for voice, audio, video and generally data transmission. Practices are based on laboratory measurements.			
A2B37MMT	<b>Multimedia Technology</b>	Z,ZK	6
This course is the introduction to multimedia technology (audio and video). It overviews sound and picture acquisition, signal processing, transmission and distribution, recording and reproduction including physiology of hearing and vision. It provides fundamental information for understanding the main principles for system solutions in the field.			
A2B37ROZ	<b>Radio Circuits and Devices</b>	Z,ZK	6
The goal of the subject is to inform the students about properties, parameters, and design methodology of radio circuits, radio function blocks, and more complex blocks of radio transmitters and receivers. The lectures are devoted sequentially to elements, circuits, function blocks, and systems which are used at radio frequencies. The exercises are both seminar and laboratory; the seminars are devoted the basic calculations from the area of the radio function blocks, and the measurements are devoted to both basic function blocks and more complex problems from the area of radio transmitters and receivers.			
A2B37ZST	<b>Principles of Studio Technology</b>	Z,ZK	6
The course gives basic knowledge of elements and systems used in television and radio professional and semiprofessional studio technology and of technology of radio and television production and broadcasting. Laboratory exercises are situated in a small school studio and are completed with professional excursions.			
A2B38EMB	<b>Electrical Measurements and Instrumentation</b>	Z,ZK	5
Methods of measurement of electrical physical quantities (voltage, current, power, frequency, resistance, capacitance and inductance) are explained together with principles of their correct application and accuracy estimation. The course is closed by presenting information of several basic electronic measuring instruments and explaining fundamentals of magnetic measurements and basic information concerning measurement systems.			
A2B99LES	<b>Laboratory of Electronic Systems</b>	Z,ZK	6
The objective of the subject is to inform students about potential of electronic circuit simulations. The course is based on concrete applications. Themes of the first part of the lectures are put to a test on basic circuits. Specific circuit applications follow with a detailed explanation and a simulation in exercises afterwards. Selected circuits will be checked by laboratory measurements.			
A2B99SAS	<b>Signals and systems</b>	Z,ZK	5
Course explains basic terms and methods for continuous-time and discrete-time signal and system analysis.			
A3B02FY2	<b>Physics 2 for KyR</b>	Z,ZK	6
The course Physics II is closely linked with the course Physics I. Within the framework of this course the students will first of all learn foundations of thermodynamics. Following topic - the theory of waves - will give to the students basic insight into the properties of waves and will help to the students to understand that the presented description of the waves has a universal character in spite of the waves character. Particular types of waves, such as acoustic or optical waves are the subjects of the following section. Quantum mechanics and nuclear physics will complete the student's general education in physics. The knowledge gained in this course will help to the students in study of such modern areas as robotics, computer vision, measuring technique and will allow them to understand the principles of novel technologies and functioning of new electronic devices. In the seminars, students will solve complex physics problems based on the use of the mathematical software Maple.			
A3B14BP1	<b>Safety in Electrical Engineering 1</b>	Z	0
The purpose of the course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from operation of it. In this way the students receive qualification of instructed person that enables them to work on electrical equipment according to the Directive of the Dean No. 1/2007			
A3B14BPZS	<b>Basic health and occupational safety regulations</b>	Z	0
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. Directive of the Dean No. 1/2007. This program is obligatory.			
A3B14EPR	<b>Electric drive for automation and robotics</b>	Z,ZK	6
Principle, philosophy and characteristics sources seat power control energy, changers for power supply small el. drive. Industrial automat used for drive el. drive. Small machinery and special electrical machine used in automatization and robots. Proposal electrical drive for automation application. Practical exhibits and check feature el. drive			

A3B33DRR	Dynamics and control of robots	Z,ZK	6
The subject understands the robot as a dynamical system. Its design, identification, control and programming will be introduced. The methods can be used for other electromechanic systems, e.g., production machines and manipulation devices.			
A3B33IND	Individual project	KZ	7
A3B33KUI	Cybernetics and Artificial Intelligence	Z,ZK	5
The course will enable students to understand the basic concepts, goals and methods of cybernetics and artificial intelligence, and align some individual topics studied in the bachelor stage into the more profound context of the study program. The syllabus contains topics concerned with general aspects of systems and information theory, problem solving and state space search principles, elements of game theory, knowledge and expert systems, elements of decision theory, recognition and machine learning. The most important feature of the course is its unifying conceptual approach to many, at first sight diverse, components of cybernetics and artificial intelligence.			
A3B33OSD	Operating Systems and Databases	Z,ZK	6
The goal of this course is to introduce basic concepts and principles of operating systems (OS), like processes and threads, their scheduling, mutual communication and synchronization, time-dependent errors and deadlocks. Attention is also paid to memory management, virtual memory, management of secondary storages, file-systems and data security. The second part of the course is focused at databases, their types and structures, concurrent data access and transactions.			
A3B33ROB	Robotics	Z,ZK	6
Robotics is an integrating discipline designing and exploring machines with high degree of flexibility and autonomy. The subject introduces the discipline. It will briefly present broader context of robotics first and after that will teach students kinematics and statics of robots.			
A3B35APE	Applied electronics	Z,ZK	6
The main goal of this subject is acquirement of the knowledge for design of the real electronics equipments especially in area of the control systems and robotic. In comparison with analogical specialized theoretical subjects emphasis is placed on the practical application. Here the design of the schematic, choice of the suitable components, design of the printed circuit board and mechanical aspects will be explained.			
A3B35ARI	Automatic Control	Z,ZK	7
Foundation course of automatic control. Introduction to basic concepts and properties of dynamic systems of physical, engineering, biological, economics, robotics and informatics nature. Basic principles of feedback and its use as a tool for altering the behavior of systems and managing uncertainty. Classical and modern methods for analysis and design of automatic control systems. Students specialized in systems and control will build on these ideas and knowledge in the advanced courses to follow. Students of other branches and programs will find out that control is an inspiring, ubiquitous and entertaining field worth of a future cooperation.			
A3B35IND	Project Individual	KZ	7
A3B35MSD	Modeling and simulation of dynamic systems	Z,ZK	6
The goal of the course is to teach you how to build control-oriented mathematical models of complex dynamic systems. The focus will be on modeling techniques that can glue together subsystems from diverse physical domains. We will show that the concept of energy (or power), which is universally valid across physical domains, is the right tool for combining electrical, mechanical, hydraulic, pneumatic, thermal and thermodynamic systems. Some of the methods presented in this course will be at least partially useful in the domains where the concept of energy is not so useful such as socio-economic systems. In total we will introduce three groups of modeling techniques, which are based on the concept of energy. Analytical methods based on the Lagrangean and Hamiltonian functions well known from the studies in theoretical physics and/or mechanics, object-oriented modeling as an alternative to the more widespread block-oriented modeling, and last but not least an intuitive graphical techniques known as bond graph modeling. Whichever methodology is followed to create the mathematical model, of the ways to analyze it is a numerical simulation, that is, numerical solution of the corresponding differential or differential-algebraic equations. In this course we will be exposed to the basics of numerical techniques for differential and differential-algebraic equations with the objective to understand the basic issues such as approximation errors, numerical stability and suitability of the common methods for different classes of models.			
A3B38DSY	Distributed Systems and Computer Networks	Z,ZK	7
Subject is devoted to principles and technologies of distributed systems (DS) and to their employment in typical applications. Physical layer media, analog and digital modulations, DS topologies, MAC methods, coding and cryptography basics are introduced. Widely used standard systems are then presented together with their features. Internet protocols are explained and internetworking approaches presented. Finally the typical industrial applications of distributed systems are introduced.			
A3B38IND	Individual Project <a href="https://moodle.fel.cvut.cz/course/view.php?id=753">https://moodle.fel.cvut.cz/course/view.php?id=753</a>	KZ	7
A3B38MMP	Microprocessors and Microcontrollers in Instrumentation	Z,ZK	6
Applications of microprocessors and single chip microcontrollers in instrumentation techniques are presented in this course. The course is focused on describing function and programming in embedded applications.			
A4B02FYZ	Physics for Informatics	Z,ZK	6
Within the framework of this course students gain the knowledge of selected parts of classical physics and dynamics of the physical systems. The introductory part of the course deals with the mass particle kinematics; dynamics, with the system of mass particles and rigid bodies. The students should be able to solve basic problems dealing with the description of mechanical systems. The introduction to the dynamics of the systems will allow to the students deeper understanding as well as analysis of these systems. The attention will be devoted namely to the application of the mathematical apparatus to the solution of real physical problems. Apart of this, the knowledge gained in this course will help to the students in the study of other disciplines, which they will meet during their further studies.			
A4B33ALG	Algorithms	Z,ZK	6
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 affectivity.			
A4B33DS	Database Systems Database Systems and their architecture, query languages, transactions, object-relational mapping	Z,ZK	6
A4B33FLP	Functional and Logic Programming	Z,ZK	6
This course introduces students into the techniques of functional programming in the LISP (or more precisely SCHEME) and HASKELL language and logic programming in the PROLOG language. Both languages are declarative in that the programmer symbolically describes the problem to be solved, rather than enumerating the exact sequence of actions to be taken. In PROLOG, one describes the problem by specifying properties of objects and relations thereamong through logic formulas. In LISP, the problem description takes the form of function definitions. Both languages have found significant applications in artificial intelligence fields, such as agent systems or symbolic machine learning.			
A4B33OPT	Optimization	Z,ZK	7
The course provides the basics of mathematical optimization: using linear algebra for optimization (least squares, SVD), Lagrange multipliers, selected numerical algorithms (gradient, Newton, Gauss-Newton, Levenberg-Marquardt methods), linear programming, convex sets and functions, intro to convex optimization, duality.			
A4B33OSS	Operating systems and networks	Z,ZK	6
The goal of this course is to introduce basic concepts and principles of operating systems (OS), like processes and threads, their scheduling, mutual communication and synchronization, time-dependent errors and deadlocks. Attention is also paid to memory management, virtual memory, management of secondary storages, file-systems and data security. The second part of the course is focused at distributed systems (DS) principles and technologies. DS communication media and topologies are explained and the basics of Internet including specific protocols are treated as typical DS applications.			

A4B33RPZ	Pattern 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.			
A4B33SI	Software Engineering	Z,ZK	6
The aim of this course is to provide the basic orientation in the software development process in order to be able to act effectively as a developmnet team members. The students will become knowledgeable in the core techniques of software design, support tools for the software development and selected project management and risk control procedures.			
A4B33ZUI	Introduction to Artificial Intelligence	Z,ZK	6
This course provides introduction to symbolic artificial intelligence. It presents the algorithms for informed and non-informed state space search, nontraditional methods of problem solving, knowledge representation by means of formal logic, methods of automated reasoning and introduction to markovian decision making.			
A4B34EM	Electronics and Microelectronics	Z,ZK	6
Semiconductors fundamentals, PN junction. Bipolar transistor, MOSFET structure. Fundamentals of Integrated systems processing technologies. CMOS technology, layout design, design rules. Analogue CMOS integrated circuits blocks, AD and DA convertors. Memory structures. Micro-electro-mechanical systems. Optoelectronics devices.			
A4B35PSR	Real-Time Systems Programming	Z,ZK	6
The goal of this subject is to give students basic knowledge in the area of software design for embedded systems with real-time operating systems (RTOS) with emphasis to practical experience. Students will solve several simple tasks to get basic knowledge about RTOS VxWorks and to measure timing parameters of the RTOS and hardware, which are necessary when choosing a platform for a given application. Then a more complicated task (motor control) will be solved, which will fully utilize means of RTOS VxWorks. During lectures, students will become familiar with real-time systems theory, which can be used to formally prove the timing correctness of the applications. Moreover, some software engineering techniques, which help with increasing of quality of safety-critical systems will be discussed.			
A4B36ACM1	ACM Advanced Algorithmic and Programming Techniques I.	KZ	4
A4B36ACM2	ACM Advanced Algorithmic and Programming Techniques II.	KZ	4
A4B36ACM3	ACM Advanced Algorithmic and Programming Techniques III.	KZ	4
A4B36ACM4	ACM Advanced Algorithmic and Programming Techniques III.	KZ	4
A4B36ACM5	ACM Advanced Algorithmic and Programming Techniques V.	KZ	4
A4B77ASS	Architectures of Software Systems	Z,ZK	6
The objective of the course is to introduce the basic techniques of information system design and architecture. We will emphasize the use of standard design patterns in the distributed environments and concentrate on the general aspects of software systems, rather than on specific technologies or implementations.			
A7B36TS1	Introduction to Software Testing	KZ	5
A7B39WA1	Web Applications Development	Z,ZK	6
Development of web applications. Designing web presentations using HTML/XHTML and CSS, scripting on the client side, creation of dynamic web applications on the server side. Main languages used: XHTML, CSS, JavaScript, PHP.			
ABAP20	Bachelor thesis	Z	20
AE0B04C0	Czech Language 0	Z	2
The course is aimed towards ERASMUS students - especially beginners. The course is taught on the basis of English language support. The goal of the course is to give the students first hand information about pronunciation, vocabulary and grammar structure of the Czech language, and also provide them with basic useful phrases needed for everyday communication during their stay in the Czech Republic.			
AE0B99PP2	Professional Practice	Z	2
AE0B99PP4	Professional Practice	Z	4
AE0B99PP6	Professional Practice	Z	6
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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