

Study plan

Name of study plan: Biomedicínské inženýrství a informatika - Biomedicínské inženýrství

Faculty/Institute/Others: Faculty of Electrical Engineering

Department: Department of Cybernetics

Branch of study guaranteed by the department: Biomedical Engineering

Garantor of the study branch: doc. Ing. Lenka Lhotská, CSc.

Program of study: Biomedical Engineering and Informatics

Type of study: Follow-up master full-time

Required credits: 106

Elective courses credits: 14

Sum of credits in the plan: 120

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 63

The role of the block: P

Code of the group: MBIOBME

Name of the group: Safety of the master's studies

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:

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
BEZM	Safety in Electrical Engineering for a master's degree Vladimír Kůla, Radek Havlíček, Ivana Nová, Josef Černohous, Petr Novák, Zdeněk Burián, Adam Bouřa, Pavel Mlejnek Vladimír Kůla Vladimír Kůla (Gar.)	Z	0	2j+2j	Z	P

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

BEZM	Safety in Electrical Engineering for a master's degree	Z	0			
The course provides for students of all programs periodic training guidelines for health and occupational safety and gives knowledge of electrical hazard of given branch of study. Students receive indispensable qualification according to the current Directive of the Dean.						

Code of the group: MBIODIP

Name of the group: Diploma thesis

Requirement credits in the group: In this group you have to gain 25 credits

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

Credits in the group: 25

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
A0M02DIP	Diploma Thesis	Z	25	36s	L	P
A0M17DIP	Diploma Thesis Miloš Mazánek	Z	25	36s	L	P
A0M31DIP	Diploma Thesis	Z	25		L	P
A0M33DIP	Diploma Thesis	Z	25	36s	L	P
A0M34DIP	Diploma Thesis	Z	25	36C	L	P
A0M37DIP	Diploma Thesis	Z	25	36s	L	P
A0M38DIP	Diploma Thesis	Z	25	0P+36C	L	P
ADIP25	Diploma Thesis	Z	25	36s	L	P

Characteristics of the courses of this group of Study Plan: Code=MBIODIP Name=Diploma thesis

A0M02DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			
A0M17DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination. Diploma projects deals with microwave technique, antennas, propagation, optical communications, EMC, and medical applications.			
A0M31DIP	Diploma Thesis	Z	25
A0M33DIP	Diploma Thesis	Z	25
A0M34DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			
A0M37DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			
A0M38DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			
ADIP25	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			

Code of the group: MBIOHUMEKO

Name of the group: Compulsory subjects - humanities and economics

Requirement credits in the group: In this group you have to gain 9 credits

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

Credits in the group: 9

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
A6M33LEE	Medical Ethics <i>David Macků David Macků (Gar.)</i>	Z,ZK	3	2+0c	Z	P
A6M33LTE	Medical Terminology <i>David Macků</i>	Z	2	2s	Z	P
A6M33OZL	Organization of the Health Care System and Legislation <i>Lenka Lhotská Lenka Lhotská Lenka Lhotská (Gar.)</i>	Z,ZK	4	2+2s	L	P

Characteristics of the courses of this group of Study Plan: Code=MBIOHUMEKO Name=Compulsory subjects - humanities and economics

A6M33LEE	Medical Ethics	Z,ZK	3
The aim of the course is to provide orientation in the general issues of ethics and in medical ethics specially. The course is divided into three blocks. The first block is connected with issues of General Ethics, while the second and third blocks are devoted to the ethical issues related to the health, disease, death and problems with medical interventions. The course is read by teachers, who are or have been active for many years in medical and nursing care. Open discussions are an integral part of the course, which forces the students to consider ethical questions and respond to them. In this way, the students learn to argue, to advocate, to search for answers, and to find common solutions. At the end of the semester students present their reports related to selected ethical issues. After passing all lectures, students are able to discuss and solve not only the general ethical problems, but also medical ethical issues.			
A6M33LTE	Medical Terminology	Z	2
In the course of medical terminology students learn to understand medical texts containing technical terms. Students read medical text based on clinical practice and are conducted towards understanding the medical text as a whole, not only its parts. Medical texts are medical reports, medical protocols, and other medical documents. Part of the course covers special issues related to clinical medicine, namely to Cardiology, Cardiosurgery, Neurology. The course also includes basics of pharmacologic terminology. The most commonly used medical shortcuts are explained. In the beginning of the course there are given selected themes for the home self-study.			
A6M33OZL	Organization of the Health Care System and Legislation	Z,ZK	4
The course explains the problems of health care structure, its financial and legal context in Czech Republic and European Union. Further there are discussed legal aspects of development, implementation and utilization of information systems and development, production and distribution of medical technology.			

Code of the group: MBIOP

Name of the group: Compulsory subjects of the program

Requirement credits in the group: In this group you have to gain 29 credits

Requirement courses in the group: In this group you have to complete at least 6 courses

Credits in the group: 29

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
A6M31ANS	Signal analysis Pavel Sovka, Petr Pollák Pavel Sovka (Gar.)	Z,ZK	6	3+2c	Z	P
A6M33FZG	Physiology and Anatomy Jaromír Mysliveček Jaromír Mysliveček Jaromír Mysliveček (Gar.)	Z,ZK	3	2+1L	Z	P
A6M33LI	Medical Informatics Michal Huptych Michal Huptych Lenka Lhotská (Gar.)	Z,ZK	5	2+2c	Z	P
A6M33MOS	Modeling and Simulation Jiří Kofránek, Filip Ježek Jiří Kofránek (Gar.)	Z,ZK	5	2+2c	Z	P
A6M33SSL	Statistics and Reliability in Medicine Petr Pošík, Vojtěch Vonásek Vojtěch Vonásek Petr Pošík (Gar.)	Z,ZK	5	2+2c	L	P
A6M33ZMO	Medical Image Processing Václav Hlaváč, Radoslav Škoviera Jan Kybic Jan Kybic (Gar.)	Z,ZK	5	2+2c	Z	P

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

A6M31ANS	Signal analysis Selected methods of biological signal processing and analysis	Z,ZK	6			
A6M33FZG	Physiology and Anatomy The subject is focused on physiology of specific organ systems in human physiology, it reviews the physiological functions on the level of cell and organ systems. There are described basic principles of physiological functions: attention is given to the connection between structure and function as well as to the role of biological membranes and their importance for body functions. Moreover, the subject studies specific systems, such as homeostasis and internal environment regulation, blood, basic principles of immunology. In addition to that, there are explained also some other systems, such as respiration, blood circulation, digestion (gastrointestinal tract), metabolism, renal functions, reproduction and development, aging, humoral regulation, neurophysiology and physiology of senses. From the view of anatomy there are emphasized basic morphological structures as cell, muscle composition and neuronal structures. There are reviewed in a systematic way the structures of respiratory tract, circulation system, gastrointestinal tract, renal, reproductive system and central and autonomous nervous system.	Z,ZK	3			
A6M33LI	Medical Informatics The course explains specific problems of information systems in health care, protection of medical data, processing of medical data, and intelligent monitoring systems. Possibilities of application of telemedicine in different fields of health care are discussed. The computer labs are focused on practical tasks in medical informatics, as for example database technology, data protection and security, examples of health care information systems, applications of mobile technologies, resources of medical information.	Z,ZK	5			
A6M33MOS	Modeling and Simulation The modelling techniques being frequently used in biomedical engineering and corresponding software tools: Matlab-Simulink, Modelica. Techniques of modelling and processes associated with them. Types of models, continuous and discrete time models, linear and nonlinear models with lumped parameters, models and their implementation in program environment. Formalization and model creation for a selected system, its identification, verification and interpretation. Equilibrium states (homeostasis) and their inquiry by simulation. Models of open and feedback systems. Use of fuzzy-neuronal models in biomedicine. Models of separate systems and whole constellations being defined in biomedical engineering. Models of cellular and physiological control, population models. Application of models for artificial organs production.	Z,ZK	5			
A6M33SSL	Statistics and Reliability in Medicine The course extends previous course EA0B01PSI (Probability, Statistics, and Theory of Information) by specific statistical methods used in biology and medicine. Planning and evaluation of statistical studies is given particular attention. Moreover, the course deals with description, analysis and modeling of reliability issues in the context of technical systems, as well as elaborates reliability estimation for complex systems. Methods and tools for systems backup are introduced.	Z,ZK	5			
A6M33ZMO	Medical Image Processing This subject describes algorithms for digital image processing of 2D and 3D images, with emphasis on biomedical applications. We shall therefore concentrate on the most often used techniques in medical image processing: segmentation, registration, and classification. The methods will be illustrated by a range of examples on medical data. The students will implement some of the algorithms during the practice sessions. Because of the very large overlap between courses A6M33ZMO and A4M33ZMO, the courses will be taught together this year.	Z,ZK	5			

Name of the block: Compulsory courses of the specialization

Minimal number of credits of the block: 43

The role of the block: PO

Code of the group: MBIOP01

Name of the group: Compulsory subjects of the branch

Requirement credits in the group: In this group you have to gain 43 credits

Requirement courses in the group: In this group you have to complete at least 11 courses

Credits in the group: 43

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
A6M33BEZ	Safety of Electric and Non-electric Devices and Management of Medical Technology Antonín Grošpic	Z,ZK	4	2s	Z	PO
A6M02BFY	Biophysics Vratislav Fabián, Jaroslav Jíra Vratislav Fabián Vratislav Fabián (Gar.)	Z,ZK	4	2+2L	Z	PO
A6M31BSG	Biological signals	Z,ZK	5	2+2L	L	PO
A6M34BMS	Biomedical sensors Adam Bouřa, Miroslav Husák Miroslav Husák Miroslav Husák (Gar.)	Z,ZK	4	2P+2L	Z	PO

A6M33DVZ	Mining and Visualisation of Knowledge <i>Tomáš Sieger, Olga Štěpánková Olga Štěpánková Olga Štěpánková (Gar.)</i>	Z,ZK	4	2+2c	Z	PO
A6M02FPT	Physics for Therapy <i>Vratislav Fabián, Jaroslav Jíra Vratislav Fabián Vratislav Fabián (Gar.)</i>	Z,ZK	3	2+1L	L	PO
A6M38KLS	Construction of Medical Systems <i>Jan Holub Jan Holub Jan Holub (Gar.)</i>	Z,ZK	5	2P+2L	Z	PO
A6M31LET	Medical Instrumentation and Devices <i>Jan Havlík</i>	Z,ZK	6	3+3L	L	PO
A6M33PFR	Disorders of Physiological Regulations <i>Jiří Kofránek</i>	KZ	2	2+0c	L	PO
A6M33ZPP	First Aid Training Course <i>David Macků David Macků David Macků (Gar.)</i>	Z	1	2s	Z	PO
A6M33ZSL	Medical Imaging Systems <i>Jan Kybic Jan Kybic Jan Kybic (Gar.)</i>	Z,ZK	5	2+2c	L	PO

Characteristics of the courses of this group of Study Plan: Code=MBIOP01 Name=Compulsory subjects of the branch

A6M33BEZ	Safety of Electric and Non-electric Devices and Management of Medical Technology	Z,ZK	4
The aim of the course is to introduce to students specific safety risks and measures for their elimination or their reduction during installation and utilization of technical equipment determined for health care provision - medical devices and some other devices and equipment of general character. In the first place safety against electric current accident. The students will be informed about safety against influence of gas pressure, medical gases and ionizing radiation. Important topics are not only organizational and technical measures concerning safety but also verifiable records about them. Therefore the course also focuses on the databases of medical technology in the health care institution. Further important topics linked to previous ones are management of health care technology (HCT), expert management of HCT, analysis of HCT failures, proposals of measures and solutions, safety and security technological checks- principles and application.			
A6M02BFY	Biophysics	Z,ZK	4
Physical processes related to blood flow, measurement of haemodynamic parameters in vivo, properties of blood vessels. Special attention will be given to artificial capillary systems and their application in treatment of renal or lung insufficiency. The students will learn how to measure blood pressure under various degrees of load and they will observe their own ventilation parameters. Theoretical knowledge will be complemented by practical experience from excursions.			
A6M31BSG	Biological signals	Z,ZK	5
A6M34BMS	Biomedical sensors	Z,ZK	4
Sensors and microsensors for use in biomedicine. The physical principles of semicond. sensors and microsensors, classification, parameters, design, integration, construction, processing of sensor signals, linearisation, calibration, intelligent sensors, application of sensor (temperature, pressure, optoelectronic, fibre optic, radiation, chemical and biochemical, mechanical, level and flow, ...), microactuators and microsystems in medicine, nanotechnology.			
A6M33DVZ	Mining and Visualisation of Knowledge	Z,ZK	4
The subject reviews current tools for data mining and illustrates their properties using real-life tasks. Specific attention is devoted to descriptive presentation of the obtained results along the data-mining process - an approach that significantly improves and facilitates communication with the domain expert or data owner (e.g. medical professional) who can thus take active part in the process by focussing to the most promising direction.			
A6M02FPT	Physics for Therapy	Z,ZK	3
Lectures will be focused to Over Using Syndrome problems. Besides that, there will be discussed pain treatment for patients with cancer. A significant room will be dedicated to electrotherapy, physiotherapy and phototherapy. Also healing processes, organ conservation methods and progressive surgery methods will be spoken about. Students will also gain many practical knowledge via labs.			
A6M38KLS	Construction of Medical Systems	Z,ZK	5
A6M31LET	Medical Instrumentation and Devices	Z,ZK	6
Students will study fundamental principles applied within the modern medical devices and systems, esp. from the point of view of functional blocks and electronic circuits of diagnostic and therapeutical medical equipments including electrocardiographs, electroencephalographs, bedside and central monitors, equipments for anesthesiology, intensive and critical healthcare, equipments for clinical laboratory, electrostimulators, cardiostimulators and defibrillators, blood pressure and flow measurement (including dilution) and pulse oxymetry.			
A6M33PFR	Disorders of Physiological Regulations	KZ	2
The course builds on knowledge gained in the subject devoted to physiology and anatomy. It acquaints with selected disorders of physiological function of organ systems, adaptive body's response to the disorder and the course of pathogenesis of organ failure. Emphasis is placed on understanding the interdependence of physiological systems and understanding of the regulatory response for each organ disorders. For clearer explanation computer models, e-learning resources and wiki pages will be widely used.			
A6M33ZPP	First Aid Training Course	Z	1
The course provides the essential training for everyone seeking to learn proper CPR and first aid technique.			
A6M33ZSL	Medical Imaging Systems	Z,ZK	5
The course covers the principles, design and properties of currently used medical imaging devices. We shall deal with 2D microscopic, X-ray and ultrasound imaging systems, including advanced topics such as Doppler ultrasound. We will also study tomographic (3D) imaging systems: computed tomography (CT), magnetic resonance imaging (MRI) including functional MRI (fMRI) and nuclear imaging methods (PET,SPECT). For more information see https://cw.fel.cvut.cz/wiki/courses/zsl			

Name of the block: Elective courses

Minimal number of credits of the block: 0

The role of the block: V

Code of the group: MJK

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) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
A0B04GA	<i>Petra Jennings Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04KA	English Conversation 2 <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04OA	Technical English Course <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
AE0B04C0	Czech language 0 <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04CIN	<i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	0+2	*	v
A0B04KF1	French conversation 1 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04KF2	French conversation 1 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04F1	French language 1 <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04F2	French language 2 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04F3	French Language 3 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04JAP	Japanese <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	0+2	*	v
A0B04GN	German Grammar <i>Dana Saláková Dana Lisá (Gar.)</i>	Z	2	2s	Z,L	v
A0B04KN	German Conversation <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04KN2	German conversation 2 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04N1	German language 1 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04N2	German language 2 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04N3	German language 3 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04ON	Professional German <i>Dana Saláková Dana Lisá (Gar.)</i>	Z	2	2s	Z,L	v
A0B04PPR	Professional Presentation <i>Dana Lisá</i>	Z	2	2s	Z,L	v
A0B04CAE1	Certificate of Advanced English CAE 1 <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04CAE2	Certificate of Advanced English CAE 2 <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04CAE3	Certificate of Advanced English CAE 3 <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04CAE4	Certificate of Advanced English 4 <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04FCE1	FCE 1 <i>Petra Jennings Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04FCE2	FCE 2 <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04FCE4	FCE4 <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04FCE3	FCE 3 <i>Pavla Péterová Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04PZP	Preparation for stay in Germany <i>Dana Lisá</i>	Z	2	2s	*	v
A0B04RET	Rhetoric <i>Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04KR	Russian conversation <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	Z,L	v
A0B04KR2	Russian conversation 2 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04R1	Russian language 1 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04R2	Russian language 2 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04R3	Russian language 3 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04R4	Russian language 3 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04KS1	Spanish conversation 1 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v

A0B04KS2	Spanish conversation 2 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04S1	Spanish language 1 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04S2	Spanish language 2 <i>Dana Saláková Dana Lisá (Gar.)</i>	Z	2	2s	*	v
A0B04S3	Spanish language 3 <i>Dana Saláková Dana Lisá (Gar.)</i>	Z	2	2s	*	v
A0B04S4	Spanish Language 4 <i>Dana Saláková Dana Saláková (Gar.)</i>	Z	2	2s	*	v
A0B04CA	Technical English for Pre-Intermediate <i>Markéta Havlíčková Dana Saláková (Gar.)</i>	Z	2	2s	L	v

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

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.						
A0B04CIN		Z	2			
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			
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			
A0B04PPR	Professional Presentation	Z	2			
The objective of the subject is to master and improve skills necessary for successful professional 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 in public speeches so that the students can create a good image. The course "Profesni prezentace" is a follow up course which further develops the themes comprised in "Retorika". It is a synthesis of rhetoric, stylistics, psychology and semantics. The course focuses on students own presentations. It is supposed that the students already have certain rhetorical skills.						
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
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.			
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
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
A0B04CA	Technical English for Pre-Intermediate	Z	2

Code of the group: MBIOPRO

Name of the group: Project

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
A6M17IP	Individual Project <i>Miloš Mazánek</i>	KZ	4	4c	3	v
A6M33IP	Individual Project <i>Vratislav Fabián, Olga Štěpánková, Jan Vrba Olga Štěpánková</i>	KZ	4	4c	Z	v
A6M31IP	Individual Project <i>Jan Havlík, Patrik Kutílek, Radek Janča, Petr Ježdík Pavel Sovka</i>	KZ	4		Z	v
A6M02IND	Individual project	Z	4	4L	Z	v

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

A6M17IP	Individual Project	KZ	4
Independent work in the form of a project. 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 project will be defended within the framework of a subject. Projects deals with microwave technique, antennas, propagation, optical communications, EMC, and medical applications.			
A6M33IP	Individual Project	KZ	4
Independent work in the form of a project. 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 project will be defended within the framework of a subject. List of topics: http://cyber.felk.cvut.cz/study/student-projects/			
A6M31IP	Individual Project	KZ	4
A6M02IND	Individual project	Z	4
Independent work in the form of a project. 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 project will be defended within the framework of a subject.			

Code of the group: MTV

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	Physical education	Z	0	0+2	Z,L	v
TV-V1	Physical education	Z	1	0+2	Z,L	v
TVV0	Physical education	Z	0	0+2	Z,L	v
TVKLV	Physical Education Course	Z	0	7dní	L	v
TVKZV	Physical Education Course	Z	0	7dní	Z	v

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

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

Code of the group: MBIOVOL

Name of the group: Elective subjects

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

~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
A0M14AML	Aerodynamics and Mechanics of Flight	Z,ZK	4	2+2s	Z	v
A0M02AKA	Acoustic Applications <i>Marek Brothánek, Ondřej Jiříček Ondřej Jiříček Ondřej Jiříček (Gar.)</i>	KZ	4	2+2L	Z	v
A0M31ASN	Algorithms and Structures of Neurocomputers <i>Jana Tučková Jana Tučková Jana Tučková (Gar.)</i>	Z,ZK	5	2+2c	Z	v
A0M31ACS	Architectures of Digital Systems	Z,ZK	4	2+2c	L	v
A6M33AST	Assistive Technologies and Patient Supervision Systems	Z,ZK	5	2+2L	L	v
A0M02ASF	Astrophysics	KZ	4	2+2c	L	v
A5M17BUP	Biological Effects of Electromagnetic Field <i>Jan Vrba, Ladislav Oppl Jan Vrba Jan Vrba (Gar.)</i>	KZ	4	2P+2L	L	v
A6M33BIO	Biophysics <i>Petr Pollák, Daniel Novák, Eduard Bakštein, Vojtěch Franc, Jakub Schneider Daniel Novák Daniel Novák (Gar.)</i>	KZ	4	2+2c	Z	v
AE6M02BFY	Biophysics <i>Vratislav Fabián</i>	Z,ZK	4	2+2L	Z	v
A0M37CIR	Implementation of the digital circuits in Radio <i>Petr Skalický Petr Skalický Petr Skalický (Gar.)</i>	Z,ZK	5	2+2L	L	v
A4B33DS	Database Systems	Z,ZK	6	2+2c	L	v
A0M02DCE	Determinism, chaos, evolution	KZ	2	2+0s	L	v
A0M14DGP	Electric Drive Diagnostics	Z,ZK	5	2+2L	L	v
A6M33DVZ	Mining and Visualisation of Knowledge <i>Tomáš Sieger, Olga Štěpánková Olga Štěpánková Olga Štěpánková (Gar.)</i>	Z,ZK	4	2+2c	Z	v
A0M37DUP	Satellite navigation systems	Z,ZK	4	2+2L	Z	v
A0M14DMP	Dynamics of mechanical parts of drives	Z,ZK	4	2+2s	Z	v
A0M02EKE	Environmental Engineering <i>Rudolf Bálek</i>	KZ	3	2+1L	L	v
A0M15Ezs	Electrical Sources and Systems	Z,ZK	5	2+2s	Z	v
A0M31EOF	Electronic Circuits and Filters	Z,ZK	5	2+2c	L	v
A0M34Ezs	Electronic Security Systems <i>Miroslav Husák, Jan Novák, Tomáš Teplý Miroslav Husák (Gar.)</i>	Z,ZK	5	2P+2L	Z	v
A0M33EOA	Evolutionary Optimization Algorithms <i>Petr Pošík, Jiří Kubalík Petr Pošík Petr Pošík (Gar.)</i>	Z,ZK	6	2+2c	Z	v

A0M02FPL	Solid State Physics <i>Vítězslav Kříha, Martin Žáček, Jan Píchal Vítězslav Kříha Vítězslav Kříha (Gar.)</i>	Z,ZK	5	2+2s	Z	v
A0M02FEN	Physics for Electroenergetics <i>Jakub Cíhhardt, Pavel Kubeš Pavel Kubeš Pavel Kubeš (Gar.)</i>	Z,ZK	4	2+2s	Z	v
A0M14FZP	Fundamentals of Electrical Devices	Z,ZK	5	2+2L	Z	v
A0M32IBE	Informační bezpečnost	KZ	5	2+2c	Z	v
A6M33KSY	Cognitive Systems <i>Michal Vavrečka, Karla Štěpánová Michal Vavrečka Michal Vavrečka (Gar.)</i>	KZ	4	2+1c	Z	v
A2B37KMM	Communication and Measurement in Multimedia <i>Martin Bernas, Karel Ulovec, Josef Dobeš Karel Ulovec Josef Dobeš (Gar.)</i>	Z,ZK	6	2+2L	L	v
A0M14KSP	Drive Communication Systems	Z,ZK	5	2+2c	L	v
A0M13KTM	Construction and Technology of Microcomputers	Z,ZK	5	2+2L	Z	v
A0M38MAP	Magnetic Elements and Magnetic Measurements	Z,ZK	5	2+2L	Z	v
A0M16MPS	Psychology <i>Jan Fiala Jan Fiala Jan Fiala (Gar.)</i>	Z,ZK	4	2+2s	Z,L	v
A0M17MVK	Measurement of Fiber Optical Communications <i>Stanislav Zvánovec</i>	KZ	4	2+2L	Z	v
A0M38MET	Metrology	Z,ZK	5	2+2L	Z	v
A0M17MMS	Microwave Measurement Systems	KZ	4	2+2L	L	v
A0M12MDS	Simulation of dynamic systems	Z,ZK	4	2+2s	L	v
A0M14MDS	Simulation of dynamic systems	Z,ZK	4	2+2c	L	v
A0M02MFK	Modern Physics for Cybernetics	Z,ZK	3	2+1s	L	v
A0M13MKV	Advanced Components of Power Electronic	Z,ZK	5	2+2L	L	v
A0M37MOT	Advanced areas in image and video technology	KZ	5	2+2L	L	v
A6M33MBG	Molecular Biology and Genetics	Z,ZK	4	3+1c	L	v
A0M17NKA	Antenna Design and Technology <i>Milan Polívka, Miloš Mazánek, Pavel Hazdra, Milan Švanda Milan Švanda Milan Polívka (Gar.)</i>	Z,ZK	5	2+2L	Z	v
A0M34NFO	Design of Photonic Circuits <i>Zdeněk Burian, Vítězslav Jeřábek, Václav Prajzler Vítězslav Jeřábek Vítězslav Jeřábek (Gar.)</i>	Z,ZK	4	2P+2L	L	v
A0M14KOP	Electric Drive Component Design	Z,ZK	5	2+2L	Z	v
A0M34NNZ	Design of Power Supplies for Electronics <i>Lubor Jirásek, Jan Novák Jan Novák Lubor Jirásek (Gar.)</i>	Z,ZK	5	2P+2L	L	v
A0M34NSV	VLSI System Design <i>Pavel Hazdra Pavel Hazdra Pavel Hazdra (Gar.)</i>	Z,ZK	4	2P+2L	Z	v
A0M38OSE	Image Sensors	Z,ZK	5	2P+2L	Z	v
A0M33OSW	Ontologies and Semantic Web	KZ	4	2+2c	Z	v
AE0M33OSW	Ontologies and Semantic Web	KZ	4	2+2c	Z	v
A3B33OSD	Operating Systems and Databases	Z,ZK	6	3+2c	L	v
A0M38PPT	Advanced Instrumentation <i>Jan Holub</i>	Z,ZK	5	2+2L	Z	v
A0M38PMZ	Advanced Signal Processing	Z,ZK	5	2+2L	Z	v
A0M32PST	Advanced Network Technologies	Z,ZK	5	2+2L	L	v
A0M32PRD	Data Communication Means <i>Tomáš Zeman Tomáš Zeman (Gar.)</i>	Z,ZK	5	2+2L	Z	v
A0M13PRE	Industrial electronics	Z,ZK	5	2+2L	Z	v
A0M02POS	Scientific View of the World	Z	2	2s	Z	v
A4B33RPZ	Pattern Recognition and Machine Learning <i>Ondřej Drbohlav, Jiří Matas Jiří Matas</i>	Z,ZK	6	2+2c	Z	v
A0M38SPP	Signal Processors in Practice	Z,ZK	5	2+2L	Z,L	v
A0M15SZS	Reliability and Security of Power Systems	Z,ZK	5	2+2s	L	v
A0M37SEK	Synchronization and equalization in digital communications <i>Jan Sýkora Jan Sýkora Jan Sýkora (Gar.)</i>	Z,ZK	4	3+1s	Z	v
A0M37TAV	Technology of Audiovisual Production	Z,ZK	4	2+2L	L	v
A0M13TKS	Technology of Cables and Optical waveguides	Z,ZK	5	2+2L	L	v
A0M14TDT	Thermomechanics and fluid dynamics	Z,ZK	4	2+2s	Z	v
A0M17TMS	Perspectives in Millimetre and Submillimetre Technology <i>Stanislav Zvánovec</i>	Z,ZK	5	2+2L	Z	v
A0M02UFL	Introduction to Laser Physics <i>Jan Píchal</i>	KZ	4	2+2L	L	v
A0M38VIP	Virtual Instruments	Z,ZK	5	2+2c	Z	v

A0M17VOD	Fiber Optic Detection <i>Matěj Komanec, Stanislav Zvánovec Stanislav Zvánovec Stanislav Zvánovec (Gar.)</i>	KZ	5	2+2L	L	v
A0M17EMC	Introduction to Electromagnetic Compatibility	KZ	4	2+2L	Z	v
A0M32ZST	Fundamentals of Network Technologies	Z,ZK	5	2+2L	Z	v
A0M37ZV2	Audio Technology 2	Z,ZK	4	2+2L	Z	v
A0M02ZIP	Environmental Science <i>Rudolf Bálek Rudolf Bálek Rudolf Bálek (Gar.)</i>	ZK	2	2+0s	Z	v

Characteristics of the courses of this group of Study Plan: Code=MBIOVOL Name=Elective subjects

A6M33DVZ	Mining and Visualisation of Knowledge The subject reviews current tools for data mining and illustrates their properties using real-life tasks. Specific attention is devoted to descriptive presentation of the obtained results along the data-mining process - an approach that significantly improves and facilitates communication with the domain expert or data owner (e.g. medical professional) who can thus take active part in the process by focussing to the most promising direction.	Z,ZK	4
A0M14AML	Aerodynamics and Mechanics of Flight Subject clarifies substantial relations and effects of force influence of flowing fluid on surface of airfoil, wing or complete airplane at subsonic or supersonic airspeeds. Further, subject deals with basic tasks of airplane performance and necessary conditions for airplane stability and control.	Z,ZK	4
A0M02AKA	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
A0M31ASN	Algorithms and Structures of Neurocomputers Information about the basic principles and possibility of the application of the neural informative technology for the signal processing are the main topic. The lectures are devoted to the introduction into the artificial neural networks (NN) theory and applications, to the choice and the optimisation of the structures, the choice of the data, and to the solutions of the classification. The neural network applications at the speech and image processing are investigated in detail. Some neural network applications in the biomedical engineering and hardware realization of the SOM are described. The applications are o focused to EEG and ECG processing, also to possibilities of applications ANN at physiotherapy,	Z,ZK	5
A0M31ACS	Architectures of Digital Systems Types of processor architectures, singlechip and multichip computers. Processor structures for real-time digital signal processing. Data flow driven computers. Artificial neural nets. Structures designed in accordance with procedures of data processing, architectonical considerations. Design of circuits for digital signal processing and arithmetic operations, design of processors and peripherals, low-power design techniques. Data synchronization and communication between asynchronous clock-domains	Z,ZK	4
A6M33AST	Assistive Technologies and Patient Supervision Systems The course offers a concise review of current ICT based approaches to development of assistive technologies and monitoring systems for persons with specific requirements and constraints (e.g. limited mobility, impairment of perception or cognition). Special attention is devoted to technical aspects related to construction of the corresponding tools and to the future trends in this domain incorporating results obtained in various modern disciplines (e.g. robotics, artificial intelligence) as well as necessary knowledge of medical background relevant for the most frequent impairments. Student will gain personal experience in using some selected assistive tools during the laboratories complementing the course.	Z,ZK	5
A0M02ASF	Astrophysics Astrophysics follows up freely the standard lectures from physics. In relatively attractive area then student recapitulates the knowledge of some parts of the physics (mechanics, optics, relativity, quantum mechanics, radiation, differential and integral calculations).	KZ	4
A5M17BUP	Biological Effects of Electromagnetic Field Biophysical Aspects of Electromagnetic Fields (EF) coupling of Various Biological Systems (BS). Interaction of EF with BS - overview. Mechanism of Interaction and Biological Effects. Experimental Results and Hypotheses of Biological Effects of Static and Stationary Electrical, Magnetic and Nonstationary Fields. Mathematical Solution of Interaction. EF generated by living Organism. Applications of EF in Medicine. Hygienic Standards.	KZ	4
A6M33BIO	Biometrics The course focuses on introduction of basic principles of methods mostly used in biometry. It discuss security issues of biometrical systems. For every biometrical system, the evaluation of speed, price and accuracy is given. The course covers also the field of securing the biometrical systems, including the mostly used cryptographical methods.	KZ	4
AE6M02BFY	Biophysics The course focuses on the physical processes related to blood flow, measuring hemodynamic parameters in vivo and properties of blood vessels. Special attention will be given to artificial capillary systems and their application in treatment of renal or lung insufficiency. Further properties of human tissue and body fluids will be discussed, including methods of measurement. Students will also learn about the measurement of fundamental physiological variables. This knowledge will be complemented with the basics of electrochemistry, optics and acoustics, always in relation to the human body and in biological systems. Theoretical knowledge will be complemented by practical experience in laboratories.	Z,ZK	4
A0M37CIR	Implementation of the digital circuits in Radio The course is base for student, which want practically designed circuits of the digital signal processing with the signal processors and specialised circuits. Attention is concentration to realisation of the modulators and circuit of the numerical conversion of the signal, algorithms coding/decoding, which contains in the communication chain. Dominantly is concentration to effective realization with minimal computing power.	Z,ZK	5
A4B33DS	Database Systems Database Systems and their architecture, query languages, transactions, object-relational mapping	Z,ZK	6
A0M02DCE	Determinism, chaos, evolution The subject deals with broader philosophical connections of these concepts. Necessity and chance in natural processes. Determinism in classical physics and in the theory of relativity. Statistical physics and thermodynamics. Determinism and probability in quantum physics, quantum information. Information and entropy, irreversibility of natural events. Formation of structures, evolution, life, evolution of man.	KZ	2
A0M14DGP	Electric Drive Diagnostics 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	Z,ZK	5
A0M37DUP	Satellite navigation systems Existing, future and past radio satellite navigation systems. Course is addressed to students without knowledge of radio engineering. Attention is paid to measurements and practical tasks in laboratory and to experimental receiver programming.	Z,ZK	4

A0M14DMP	Dynamics of mechanical parts of drives	Z,ZK	4
Subject is oriented to mathematical description and solving of dynamic processes in mechanic parts of machines and drives. Dynamics of rotational and general plane motion, effects of inertial forces on body, balancing of rotors. Vector and analytic methods of composing equations of motion of systems and their solving. Vibration in machine set and vibration effects reducing. Stress and deformation in rotating parts, critical speed of rotors. Drives characteristics and transient events in systems with driving aggregates .			
A0M02EKE	Environmental Engineering	KZ	3
Environmental natural and physical components e.g. mechanic, electric, magnetic fields, excited and ionising particles and waste are treated in this course. Measuring systems, methods of measurement and sensors of environmental quantities are dealt with. Many of these methods are practically exercised in laboratories.			
A0M15Ezs	Electrical Sources and Systems	Z,ZK	5
The subject is focused on the task of power quality, its operational criteria and improvement possibilities. There are also discussed specific tasks of dispersed generation and electrical systems. The student is then informed about basic electrical energy renewable sources and their connection possibilities to the system.			
A0M31EOF	Electronic Circuits and Filters	Z,ZK	5
Subject deepens and consolidates knowledge in the field of analog electronic circuits and frequency-selection filters. Analytical procedures are the gist that lead from complete models of analog integrated circuit structures, through the simplification, to a deeper understanding of their characteristic. Design fundamental is obtained by the analysis of the dominant influences to the circuit activities. Design and realizations of analog filters is introduced in the next part.			
A0M34Ezs	Electronic Security Systems	Z,ZK	5
The subject describes the system design, electronic solutions, conception characteristics, reliability and its increasing of electronic security and safety systems. It reports solutions of electronic sensor systems and methods of security system design, usage of modern electronic components and microprocessors. It offers practical applications suitable for safety systems of houses, cars, industry companies.			
A0M33EOA	Evolutionary Optimization Algorithms	Z,ZK	6
The course aims at issues related to the application of evolutionary algorithms in practice and at the methods used to solve them. Evolutionary algorithms are optimization metaheuristics that use analogies with natural evolution to solve complex optimization tasks. The course builds on and extends knowledge from the course Bio-inspired algorithms. In the seminar and lab lectures, the students will get hands-on tutorials and will be obliged to implement their own evolutionary algorithm to solve an optimization task as part of their project.			
A0M02FPL	Solid State Physics	Z,ZK	5
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.			
A0M02FEN	Physics for Electroenergetics	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.			
A0M14FZP	Fundamentals of Electrical Devices	Z,ZK	5
Switching arc in contact switching apparatus, environmental influence on arc property. Switching ability of switching devices. Electrical contacts. Protecting of electric circuits. Breaking of electric circuits under current limiting. Breaking of special electric circuits. Switching over voltage. Surge arresters, its properties, characteristics and application			
A0M32IBE	Informační bezpečnost	KZ	5
The Information Security course provides a complete source of information on the field of security of information systems and information technologies. The most of information in today society is created, transferred, stored in electronic form so information security is very important part of it. Technical background for information security is provided by cryptology.			
A6M33KSY	Cognitive Systems	KZ	4
This subject is conceived as the introduction to the cognitive psychology for the students of technical schools. The mind is considered as the information processing system in this approach so the students should find some similarities with the computational and mathematical theories. The lectures are divided to the several sections copying the way of informational processing in the human brain. There are lectures focused attention, perception, reasoning, mental imagery, knowledge representation and language acquisition. In the practical lessons student undergo experiments that demonstrates theories from the lectures.			
A2B37KMM	Communication and Measurement in Multimedia	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.			
A0M14KSP	Drive Communication Systems	Z,ZK	5
Electric drive distributed control system - system view, serial communication primer, computer network topology, point-to-point, bus, loop, bus access methods, master-slave, peer-to-peer, CSMA/CD, CSMA/CR, addressed transmission, broadcasting, baud-rate, synchronous and asynchronous transmission, channel bandwidth, transmission synchronization, bit and character stuffing/destuffing, modulation, bit encoding, frame, transfer protocol, protocol overhead, error detection, acknowledged and unacknowledged communication, transmission media and environment , OSI model and other layered models, overview of industrial communication technologies utilized in drives and their features, UART, USART, ProfiBus, HDLC, SDLC, Bitbus, LIN bus, CAN bus, CANOpen, LonWorks, EIB/KNX, Ethernet, TCN-MVB/WTB, Microwire, SPI, I2C, USB. Communication services programming and their implementation inside overall control computer software architecture. Communication development tools, communication services debugging, monitoring and logging. Noise resistance, cabling, connectors			
A0M13KTM	Construction and Technology of Microcomputers	Z,ZK	5
Microcomputers for control of technological systems, architecture, timing, instructions, basic parts, embedded microprocessors, input/output. Supplementary circuits. Control of technological systems. Microprocessor development system, design of microcomputer and application. Industrial standards. Design of microcomputers - modular and built-in systems, industrial PC. SCADA systems.			
A0M38MAP	Magnetic Elements and Magnetic Measurements	Z,ZK	5
Measurement of magnetic field, NMR. Typical soft and hard magnetic materials. Measurement of properties of soft and hard magnetic materials. DC and AC magnetised circuits, circuits with permanent magnet. Current and voltage instrument transformers, current comparators. Sources of magnetic field. Magnetic shielding.			
A0M16MPS	Psychology	Z,ZK	4
A0M17MVK	Measurement of Fiber Optical Communications	KZ	4
The main aim of this subject is to introduce with measurement techniques and measurement methods for optical fibers. The subject includes methodologies for measurement of constructive and transition parameters of optical communication systems such as numerical aperture, attenuation, dispersion etc. The measurements of principal characteristics of active and passive elements of optical systems are involved as well.			
A0M38MET	Metrology	Z,ZK	5
After a brief description of the role of the most important domestic and foreign metrological organizations and institutions, explanation is focused on units of measurable quantities and possibilities of their definition, realization, conservation and reproduction by means of measurement standards. After that, attention is paid to measurement methods and techniques for evaluating and increasing measurement accuracy. Facilities and methods applicable to precision measurements of both active and passive electrical quantities are described.			

A0M17MMS	Microwave Measurement Systems	KZ	4
The subject dwells on problems of rf. and microwave measurement in frequency band from 10 MHz to 100 GHz. Students are informed about principles and constructions of basic microwave instruments and complex processor controlled measurement systems including applied methods. Generators, synthesizers, power meters, frequency counters, noise figure meters, spectrum, scalar and vector network analyzers, oscilloscopes are browsed on. Sources of measurement errors and correction methods are analyzed. The subject leads to gain professional skills in the field of radiofrequency and microwave measurement including correct choice of measurement instruments, measurement method and measurement results evaluation.			
A0M12MDS	Simulation of dynamic systems	Z,ZK	4
A0M14MDS	Simulation of dynamic systems	Z,ZK	4
Aim of subject is simulation of nonlinear problems from fields of dynamics of rigid bodies, fluid mechanics, aerodynamics, thermodynamics and their mutual combinations. In scope of subject is given overview of substantial derivations, relations, formulas and numeric methods. Seminars are focused on assembling of numeric models in program Matlab-Simulink			
A0M02MFK	Modern Physics for Cybernetics	Z,ZK	3
Concepts and problems in the frontiers of physics, computer science, informatics and cybernetics. Information as a physical concept. Connection of space and time, relativistic paradoxes. Evolution of the Universe and its structure. Deterministic chaos, fractals. Quantum phenomena, quantum information, quantum measurement, quantum computation, teleportation, cryptography. Entropy in physics and in information theory. Dissipation of energy. Synergetics and selforganization.			
A0M13MKV	Advanced Components of Power Electronic	Z,ZK	5
Power semiconductor device (diodes, BJTs, thyristors, MOSFETs and IGBTs) and integraed structures (modules). Structures, function, characteristics and parameters, conditions for reliable operation. Connection of devices in parallel and in series. Operating reliability of power components and equipments.			
A0M37MOT	Advanced areas in image and video technology	KZ	5
This course presents the state-of-the-art techniques for digital image and video technology. These techniques and their applications cover almost all areas of technical professions dealing with human interaction. The content of lectures is being updated rapidly and continuously according to a remarkable progress in this field. The course deals with the principal functional blocks of mentioned systems both hardware and software implemented.			
A6M33MBG	Molecular Biology and Genetics	Z,ZK	4
The goal of the subject is to broaden the knowledge in the fields of molecular biology and genetics, to give a more detailed overview of principles of the methods used, and to demonstrate the overlap of these fields into the modern biomedicine. Emphasis will be placed on understanding the thought of modern molecular biology and genetics, on the questions asked and problems solved, and on the increasing challenges to find new ways of processing of the large volumes of data generated by the current experiments. The course will also present a number of real cases analyzed in the laboratory of medical molecular genetics, including the bioinformatic approaches used.			
A0M17NKA	Antenna Design and Technology	Z,ZK	5
Basics of practical design of antennas for specific frequency bands, modeling, design and construction of antenna and antenna systems. Antenna measurement methods, practical measurements in antenna laboratory. Modeling on professional software tools for antenna design.			
A0M34NFO	Design of Photonic Circuits	Z,ZK	4
Students obtain practical skills with design of photonics devices and their applications in photonics systems. Students acquaint with BMP, FULL WAVE and TCAD programs. These software allowed design optics structures and devices using for controlling and distribution optical signals. Software TCAD is used for design of injection optical sources. Optoelectronic integrated circuits will be design by WINMIDE and ORCAD programes.			
A0M14KOP	Electric Drive Component Design	Z,ZK	5
Theoretical principles and pragmatic procedures in main types electric drives for transtort, automatisaton and manipulating technics design. Selection, dimensionning and realisation of drives components: power supply, switching devices, protection, semiconductor converter, electric motor. Project, verification of dimensionning and testing of drive components, realisation of selected part on model drive, experimental parameters examination. Semestrial project optionally fixed on theoterical design, realisation or experimental parameters verification			
A0M34NNZ	Design of Power Supplies for Electronics	Z,ZK	5
The subject describes the basic principles and concepts of power supplies. The subject explains the behavior of linear stabilizers, basic switching regulators, supplies protections, electrochemical supply cells and trends in power supply designs. The subject is meant for diploma project students designing the switching power supplies. It treats the switching power supply design programs and switching regulators component using PC. A special attention is devoted to EMC requirements in switch-mode power supplies as well as to the cost versus operational efficiency ratio. Design of a switch-mode power supply.			
A0M34NSV	VLSI System Design	Z,ZK	4
Introduction to basic building blocks, architecture and design methodologies of advanced VLSI systems. Structure and design of digital and analogue integrated circuit subsystems. Integrated system description and synthesis using cell libraries and IP cores. Synchronization, power consumption and parasitics reduction issues. Testing and reliability of integrated systems. In seminars and labs, the hardware description language VHDL will be explained and used for practical design, synthesis and testing of a system on chip.			
A0M38OSE	Image Sensors	Z,ZK	5
This course explains the topics of optoelectronic image sensors, especially CCD and CMOS sensors, optical system, illuminators and their application in the computer vision.			
A0M33OSW	Ontologies and Semantic Web	KZ	4
The course "Ontologies and Semantic Web" will guide students through current trends and technologies in the semantic web field. Students will learn designing complex ontologies, thesauri, formalizing them in a suitable formal language, querying them and creating semantic web applications on their top. The second part of the course will be devoted to the efficient management of ontological data and other selected topics.			
AE0M33OSW	Ontologies and Semantic Web	KZ	4
The course "Ontologies and Semantic Web" will guide students through current trends and technologies in the semantic web field. Students will learn designing complex ontologies, thesauri, formalizing them in a suitable formal language, querying them and creating semantic web applications on their top. The second part of the course will be devoted to the efficient management of ontological data and other selected topics. All course materials are in English. In case all attendees are Czech speaking Czech can be spoken.			
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.			
A0M38PPT	Advanced Instrumentation	Z,ZK	5
The course is dedicated to principle, properties and applications of measuring instruments used for precise measurement, measuring of extremely low signals, HF measurement etc. Above the knowledge obtained in basic course Sensors and Measurement. Labs are focused to their optimum usage both in standard and less frequent applications.			
A0M38PMZ	Advanced Signal Processing	Z,ZK	5
The course introduces advanced signal processing methods and their applications and implementation in information systems. In the labs real application using Matlab and digital signal processor will be developed (de-noising, multimedia effects, telecommunication).			
A0M32PST	Advaced Network Technologies	Z,ZK	5
Subject Advanced Network Technologies expands students' knowledge of modern network technologies. The course is practically oriented and focused on explaining the function of advanced network protocols as used in modern data networks of today and tomorrow. Students will gain practical experience with the issues like Internet routing, software-defined networks, multicast routing, IPv6, and MPLS networks. Part of the course is also devoted to a detailed explanation of transport protocols TCP/UDP and a manner in which software applications can access transportation services of TCP/IP data networks.			
A0M32PRD	Data Communication Means	Z,ZK	5

A0M13PRE	Industrial electronics	Z,ZK	5
Electronic components , resistors, capacitors, HF coils, transformers Semiconductor devices Mounting technologies Senzore, regulating equipments Power converters.HF heating equipments. Electromagnetic compatibility in power electronic.			
A0M02POS	Scientific View of the World	Z	2
Scientific view of the world in broader relations to human knowledge, philosophy and culture. The subject motivates an interest in new and open problems and deeper philosophical connections. Rationality, mathematics, physics Space-time, gravitation. Structure and evolution of the Universe. Quantum phenomena and their philosophical aspects. Deterministic chaos, fractals. Information and entropy. Evolution, evolution of man. Technology and perspectives.			
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.			
A0M38SPP	Signal Processors in Practice	Z,ZK	5
Basic architecture of digital signal processors, main features and properties, description of important processor blocks (ALU, MAC). Development and supporting tools for design and debug. Fundamental method of digital signal processing including practise implementation on digital signal processor (DSP). Demonstration of HW design with application of DSP. Within laboratory exercises, realisation of scheduled or own complex project.			
A0M15SZS	Reliability and Security of Power Systems	Z,ZK	5
The aim of the subject is acquiring basic knowledge of security and reliability of power electrical systems based on the deterministic and mainly probabilistic analysis. After the introductory summarisation and extension of the mathematical tools for probabilistic and statistic calculations, the methodology of evaluation of the reliability of the systems is mainly discussed starting from the reliability of its particular elements in various operation regimes. Attention is also paid to problems of maintenance and mathematical simulation of the destructive tests.			
A0M37SEK	Synchronization and equalization in digital communications	Z,ZK	4
We explain principles of the receiver signal processing (synchronization and equalization) for the parametric channel including variety of the implementation possibilities. We focus on the essential particular forms of the channel phase, frequency and timing parameterization, channels with multipath propagation and MIMO channels. We develop the ideas of synchronization and equalization in the context of the data decoding in the parametric channel. All basic categories of the CSE algorithms are targeted: feed-forward, feed-back, iterative and recursive, including the theoretical background of the parameter estimation theory, and theory of the feed-back and iterative systems.			
A0M37TAV	Technology of Audiovisual Production	Z,ZK	4
A0M13TKS	Technology of Cables and Optical waveguides	Z,ZK	5
- Cable engineering-materials,machines and production methods - The engineering and properties of metal cables - The technology and properties of optical fibres and cables - The fibre connectors evaluation - Ending end branching of power cables - The power cables and optical fibres diagnostics			
A0M14TDT	Thermomechanics and fluid dynamics	Z,ZK	4
Dynamics of hydraulic systems (transport losses, unsteady phenomena, water impact, hydrodynamic forces). Fundamentals of theory of similitude, dimensional analysis, Buckingham theorem. Thermodynamics of power machines, steam and gas turbines, increasing of efficiency (regeneration). Introduction to dynamics of gas and vapour (critical state, adiabatic flow without and with losses, nozzles and diffusers). Fundamentals of heat transfer, heat exchangers.			
A0M17TMS	Perspectives in Millimetre and Submillimetre Technology	Z,ZK	5
The subject gives practical knowledge dealing with emerging technology in new progressive frequency bands. It gives the basement of millimeter and submillimeter technology and mutual interactions submm and optical technology. In frame of the subject the theoretical principles as well as specific approaches to solution of transmission lines, subsystems and links in mm and submm region are mentioned.			
A0M02UFL	Introduction to Laser Physics	KZ	4
A0M38VIP	Virtual Instruments	Z,ZK	5
A subject deals with programming virtual instruments based on standardized interfaces (PCI, PXI, VXI). Lectures are focused on application of up-to-date standards for data acquisition systems programming (VXIplug&play, VISA, IVI) and selected software techniques in Windows, Linux and Phar Lap operating systems. Assigned software tasks in laboratories are solved using C/C++ language or LabVIEW environment.			
A0M17VOD	Fiber Optic Detection	KZ	5
A0M17EMC	Introduction to Electromagnetic Compatibility	KZ	4
The subject dwells on problems of electromagnetic compatibility. Students obtain the basic knowledges in the field of electromagnetic compatibility - electromagnetic interference, susceptibility and testing methods. The subject leads to gain professional skills in the field of electrical engineering.			
A0M32ZST	Fundamentals of Network Technologies	Z,ZK	5
The course Fundamentals of Network Technologies is focused on principles of data networks. It describes functionality of the three bottom layers of the ISO/OSI network layer model. Students will learn the basics of the configuration of network devices with regards to routing, dynamic routing protocols and addressing in IPv4 including VLSM.			
A0M37ZV2	Audio Technology 2	Z,ZK	4
This course deals with advanced topics related to audio technology in recording studios, namely room acoustics, multichannel signal recording and reproduction, digital audio signal processing, its impact on auditory perception, audio signal optimization from the psychoacoustic point of view. Measuring methods related to these topics are also presented.			
A0M02ZIP	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
A0B04CA	Technical English for Pre-Intermediate	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	
A0B04CIN		Z	2
A0B04F1	French language 1	Z	2
A0B04F2	French language 2	Z	2
A0B04F3	French Language 3	Z	2
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.			
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
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
A0B04PPR	Professional Presentation	Z	2
The objective of the subject is to master and improve skills necessary for successful professional 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 in public speeches so that the students can create a good image. The course "Profesni prezentace" is a follow up course which further develops the themes comprised in "Retorika". It is a synthesis of rhetoric, stylistics, psychology and semantics. The course focuses on students own presentations. It is supposed that the students already have certain rhetorical skills.			
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
A0M02AKA	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.			
A0M02ASF	Astrophysics	KZ	4
Astrophysics follows up freely the standard lectures from physics. In relatively attractive area then student recapitulates the knowledge of some parts of the physics (mechanics, optics, relativity, quantum mechanics, radiation, differential and integral calculations).			
A0M02DCE	Determinism, chaos, evolution	KZ	2
The subject deals with broader philosophical connections of these concepts. Necessity and chance in natural processes. Determinism in classical physics and in the theory of relativity. Statistical physics and thermodynamics. Determinism and probability in quantum physics, quantum information. Information and entropy, irreversibility of natural events. Formation of structures, evolution, life, evolution of man.			
A0M02DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			
A0M02EKE	Environmental Engineering	KZ	3
Environmental natural and physical components e.g. mechanic, electric, magnetic fields, excited and ionising particles and waste are treated in this course. Measuring systems, methods of measurement and sensors of environmental quantities are dealt with. Many of these methods are practically exercised in laboratories.			
A0M02FEN	Physics for Electroenergetics	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.			
A0M02FPL	Solid State Physics	Z,ZK	5
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.			
A0M02MFK	Modern Physics for Cybernetics	Z,ZK	3
Concepts and problems in the frontiers of physics, computer science, informatics and cybernetics. Information as a physical concept. Connection of space and time, relativistic paradoxes. Evolution of the Universe and its structure. Deterministic chaos, fractals. Quantum phenomena, quantum information, quantum measurement, quantum computation, teleportation, cryptology. Entropy in physics and in information theory. Dissipation of energy. Synergetics and selforganization.			
A0M02POS	Scientific View of the World	Z	2
Scientific view of the world in broader relations to human knowledge, philosophy and culture. The subject motivates an interest in new and open problems and deeper philosophical connections. Rationality, mathematics, physics Space-time, gravitation. Structure and evolution of the Universe. Quantum phenomena and their philosophical aspects. Deterministic chaos, fractals. Information and entropy. Evolution, evolution of man. Technology and perspectives.			
A0M02UFL	Introduction to Laser Physics	KZ	4
A0M02ZIP	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.			
A0M12MDS	Simulation of dynamic systems	Z,ZK	4
A0M13KTM	Construction and Technology of Microcomputers	Z,ZK	5
Microcomputers for control of technological systems, architecture, timing, instructions, basic parts, embedded microprocessors, input/output. Supplementary circuits. Control of technological systems. Microprocessor development system, design of microcomputer and application. Industrial standards. Design of microcomputers - modular and built-in systems, industrial PC. SCADA systems.			
A0M13MKV	Advanced Components of Power Electronic	Z,ZK	5
Power semiconductor device (diodes, BJTs, thyristors, MOSFETs and IGBTs) and integrated structures (modules). Structures, function, characteristics and parameters, conditions for reliable operation. Connection of devices in parallel and in series. Operating reliability of power components and equipments.			
A0M13PRE	Industrial electronics	Z,ZK	5
Electronic components, resistors, capacitors, HF coils, transformers Semiconductor devices Mounting technologies Sensore, regulating equipments Power converters. HF heating equipments. Electromagnetic compatibility in power electronic.			
A0M13TKS	Technology of Cables and Optical waveguides	Z,ZK	5
- Cable engineering-materials, machines and production methods - The engineering and properties of metal cables - The technology and properties of optical fibres and cables - The fibre connectors evaluation - Ending end branching of power cables - The power cables and optical fibres diagnostics			
A0M14AML	Aerodynamics and Mechanics of Flight	Z,ZK	4
Subject clarifies substantial relations and effects of force influence of flowing fluid on surface of airfoil, wing or complete airplane at subsonic or supersonic airspeeds. Further, subject deals with basic tasks of airplane performance and necessary conditions for airplane stability and control.			
A0M14DGP	Electric Drive Diagnostics	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			

A0M14DMP	Dynamics of mechanical parts of drives	Z,ZK	4
Subject is oriented to mathematical description and solving of dynamic processes in mechanic parts of machines and drives. Dynamics of rotational and general plane motion, effects of inertial forces on body, balancing of rotors. Vector and analytic methods of composing equations of motion of systems and their solving. Vibration in machine set and vibration effects reducing. Stress and deformation in rotating parts, critical speed of rotors. Drives characteristics and transient events in systems with driving aggregates .			
A0M14FZP	Fundamentals of Electrical Devices	Z,ZK	5
Switching arc in contact switching apparatus, environmental influence on arc property. Switching ability of switching devices. Electrical contacts. Protecting of electric circuits. Breaking of electric circuits under current limiting. Breaking of special electric circuits. Switching over voltage. Surge arresters, its properties, characteristics and application			
A0M14KOP	Electric Drive Component Design	Z,ZK	5
Theoretical principles and pragmatic procedures in main types electric drives for transtort, automatization and manipulating technics design. Selection, dimensioning and realisation of drives components: power supply, switching devices, protection, semiconductor converter, electric motor. Project, verification of dimensioning and testing of drive components, realisation of selected part on model drive, experimental parameters examination. Semestrial project optionally fixed on theoterical design, realisation or experimental parameters verification			
A0M14KSP	Drive Communication Systems	Z,ZK	5
Electric drive distributed control system - system view, serial communication primer, computer network topology, point-to-point, bus, loop, bus access methods, master-slave, peer-to-peer, CSMA/CD, CSMA/CR, addressed transmission, broadcasting, baud-rate, synchronous and asynchronous transmission, channel bandwidth, transmission synchronization, bit and character stuffing/destuffing, modulation, bit encoding, frame, transfer protocol, protocol overhead, error detection, acknowledged and unacknowledged communication, transmission media and environment , OSI model and other layered models, overview of industrial communication technologies utilized in drives and their features, UART, USART, ProfiBus, HDLC, SDLC, Bitbus, LIN bus, CAN bus, CANOpen, LonWorks, EIB/KNX, Ethernet, TCN-MVB/WTB, Microwire, SPI, I2C, USB. Communication services programming and their implementation inside overall control computer software architecture. Communication development tools, communication services debugging, monitoring and logging. Noise resistance, cabling, connectors			
A0M14MDS	Simulation of dynamic systems	Z,ZK	4
Aim of subject is simulation of nonlinear problems from fields of dynamics of rigid bodies, fluid mechanics, aerodynamics, thermodynamics and their mutual combinations. In scope of subject is given overview of substantial derivations, relations, formulas and numeric methods. Seminars are focused on assembling of numeric models in program Matlab-Simulink			
A0M14TDT	Thermomechanics and fluid dynamics	Z,ZK	4
Dynamics of hydraulic systems (transport losses, unsteady phenomena, water impact, hydrodynamic forces). Fundamentals of theory of similitude, dimensional analysis, Buckingham theorem. Thermodynamics of power machines, steam and gas turbines, increasing of efficiency (regeneration). Introduction to dynamics of gas and vapour (critical state, adiabatic flow without and with losses, nozzles and diffusers). Fundamentals of heat transfer, heat exchangers.			
A0M15Ezs	Electrical Sources and Systems	Z,ZK	5
The subject is focused on the task of power quality, its operational criteria and improvement possibilities. There are also discussed specific tasks of dispersed generation and electrical systems. The student is then informed about basic electrical energy renewable sources and their connection possibilities to the system.			
A0M15SZS	Reliability and Security of Power Systems	Z,ZK	5
The aim of the subject is acquiring basic knowledge of security and reliability of power electrical systems based on the deterministic and mainly probabilistic analysis. After the introductory summarisation and extension of the mathematical tools for probabilistic and statistic calculations, the methodology of evaluation of the reliability of the systems is mainly discussed starting from the reliability of its particular elements in various operation regimes. Attention is also paid to problems of maintenance and mathematical simulation of the destructive tests.			
A0M16MPS	Psychology	Z,ZK	4
A0M17DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination. Diploma projects deals with microwave technique, antennas, propagation, optical communications, EMC, and medical applications.			
A0M17EMC	Introduction to Electromagnetic Compatibility	KZ	4
The subject dwells on problems of electromagnetic compatibility. Students obtain the basic knowledges in the field of electromagnetic compatibility - electromagnetic interference, susceptibility and testing methods. The subject leads to gain professional skills in the field of electrical engineering.			
A0M17MMS	Microwave Measurement Systems	KZ	4
The subject dwells on problems of rf. and microwave measurement in frequency band from 10 MHz to 100 GHz. Students are informed about principles and constructions of basic microwave instruments and complex processor controlled measurement systems including applied methods. Generators, synthesizers, power meters, frequency counters, noise figure meters, spectrum, scalar and vector network analyzers, oscilloscopes are browsed on. Sources of measurement errors and correction methods are analyzed. The subject leads to gain professional skills in the field of radiofrequency and microwave measurement including correct choice of measurement instruments, measurement method and measurement results evaluation.			
A0M17MVK	Measurement of Fiber Optical Communications	KZ	4
The main aim of this subject is to introduce with measurement techniques and measurement methods for optical fibers. The subject includes methodologies for measurement of constructive and transition parameters of optical communication systems such as numerical aperture, attenuation, dispersion etc. The measurements of principal characteristics of active and passive elements of optical systems are involved as well.			
A0M17NKA	Antenna Design and Technology	Z,ZK	5
Basics of practical design of antennas for specific frequency bands, modeling, design and construction of antenna and antenna systems. Antenna measurement methods, practical measurements in antenna laboratory. Modeling on professional software tools for antenna design.			
A0M17TMS	Perspectives in Millimetre and Submillimetre Technology	Z,ZK	5
The subject gives practical knowledge dealing with emerging technology in new progressive frequency bands. It gives the basement of millimeter and submillimeter technology and mutual interactions submm and optical technology. In frame of the subject the theoretical principles as well as specific approaches to solution of transmission lines, subsystems and links in mm and submm region are mentioned.			
A0M17VOD	Fiber Optic Detection	KZ	5
A0M31ACS	Architectures of Digital Systems	Z,ZK	4
Types of processor architectures, singlechip and multichip computers. Processor structures for real-time digital signal processing. Data flow driven computers. Artificial neural nets. Structures designed in accordance with procedures of data processing, architectural considerations. Design of circuits for digital signal processing and arithmetic operations, design of processors and peripherals, low-power design techniques. Data synchronization and communication between asynchronous clock-domains			
A0M31ASN	Algorithms and Structures of Neurocomputers	Z,ZK	5
Information about the basic principles and possibility of the application of the neural informative technology for the signal processing are the main topic. The lectures are devoted to the introduction into the artificial neural networks (NN) theory and applications, to the choice and the optimisation of the structures, the choice of the data, and to the solutions of the classification. The neural network applications at the speech and image processing are investigated in detail. Some neural network applications in the biomedical engineering and hardware realization of the SOM are described. The applications are o focused to EEG and ECG processing, also to possibilities of applications ANN at physiotherapy,			
A0M31DIP	Diploma Thesis	Z	25

A0M31EOF	Electronic Circuits and Filters	Z,ZK	5
Subject deepens and consolidates knowledge in the field of analog electronic circuits and frequency-selection filters. Analytical procedures are the gist that lead from complete models of analog integrated circuit structures, through the simplification, to a deeper understanding of their characteristic. Design fundamental is obtained by the analysis of the dominant influences to the circuit activities. Design and realizations of analog filters is introduced in the next part.			
A0M32IBE	Informační bezpečnost	KZ	5
The Information Security course provides a complete source of information on the field of security of information systems and information technologies. The most of information in today society is created, transferred, stored in electronic form so information security is very important part of it. Technical background for information security is provided by cryptology.			
A0M32PRD	Data Communication Means	Z,ZK	5
A0M32PST	Advanced Network Technologies	Z,ZK	5
Subject Advanced Network Technologies expands students' knowledge of modern network technologies. The course is practically oriented and focused on explaining the function of advanced network protocols as used in modern data networks of today and tomorrow. Students will gain practical experience with the issues like Internet routing, software-defined networks, multicast routing, IPv6, and MPLS networks. Part of the course is also devoted to a detailed explanation of transport protocols TCP/UDP and a manner in which software applications can access transportation services of TCP/IP data networks.			
A0M32ZST	Fundamentals of Network Technologies	Z,ZK	5
The course Fundamentals of Network Technologies is focused on principles of data networks. It describes functionality of the three bottom layers of the ISO/OSI network layer model. Students will learn the basics of the configuration of network devices with regards to routing, dynamic routing protocols and addressing in IPv4 including VLSM.			
A0M33DIP	Diploma Thesis	Z	25
A0M33EOA	Evolutionary Optimization Algorithms	Z,ZK	6
The course aims at issues related to the application of evolutionary algorithms in practice and at the methods used to solve them. Evolutionary algorithms are optimization metaheuristics that use analogies with natural evolution to solve complex optimization tasks. The course builds on and extends knowledge from the course Bio-inspired algorithms. In the seminar and lab lectures, the students will get hands-on tutorials and will be obliged to implement their own evolutionary algorithm to solve an optimization task as part of their project.			
A0M33OSW	Ontologies and Semantic Web	KZ	4
The course "Ontologies and Semantic Web" will guide students through current trends and technologies in the semantic web field. Students will learn designing complex ontologies, thesauri, formalizing them in a suitable formal language, querying them and creating semantic web applications on their top. The second part of the course will be devoted to the efficient management of ontological data and other selected topics.			
A0M34DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			
A0M34Ezs	Electronic Security Systems	Z,ZK	5
The subject describes the system design, electronic solutions, conception characteristics, reliability and its increasing of electronic security and safety systems. It reports solutions of electronic sensor systems and methods of security system design, usage of modern electronic components and microprocessors. It offers practical applications suitable for safety systems of houses, cars, industry companies.			
A0M34NFO	Design of Photonic Circuits	Z,ZK	4
Students obtain practical skills with design of photonics devices and their applications in photonics systems. Students acquaint with BMP, FULL WAVE and TCAD programs. These software allowed design optics structures and devices using for controlling and distribution optical signals. Software TCAD is used for design of injection optical sources. Optoelectronic integrated circuits will be design by WINMIDE and ORCAD programmes.			
A0M34NNZ	Design of Power Supplies for Electronics	Z,ZK	5
The subject describes the basic principles and concepts of power supplies. The subject explains the behavior of linear stabilizers, basic switching regulators, supplies protections, electrochemical supply cells and trends in power supply designs. The subject is meant for diploma project students designing the switching power supplies. It treats the switching power supply design programs and switching regulators component using PC. A special attention is devoted to EMC requirements in switch-mode power supplies as well as to the cost versus operational efficiency ratio. Design of a switch-mode power supply.			
A0M34NSV	VLSI System Design	Z,ZK	4
Introduction to basic building blocks, architecture and design methodologies of advanced VLSI systems. Structure and design of digital and analogue integrated circuit subsystems. Integrated system description and synthesis using cell libraries and IP cores. Synchronization, power consumption and parasitics reduction issues. Testing and reliability of integrated systems. In seminars and labs, the hardware description language VHDL will be explained and used for practical design, synthesis and testing of a system on chip.			
A0M37CIR	Implementation of the digital circuits in Radio	Z,ZK	5
The course is base for student, which want practically designed circuits of the digital signal processing with the signal processors and specialised circuits. Attention is concentration to realisation of the modulators and circuit of the numerical conversion of the signal, algorithms coding/decoding, which contains in the communication chain. Dominantly is concentration to effective realization with minimal computing power.			
A0M37DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			
A0M37DUP	Satellite navigation systems	Z,ZK	4
Existing, future and past radio satellite navigation systems. Course is addressed to students without knowledge of radio engineering. Attention is paid to measurements and practical tasks in laboratory and to experimental receiver programming.			
A0M37MOT	Advanced areas in image and video technology	KZ	5
This course presents the state-of-the-art techniques for digital image and video technology. These techniques and their applications cover almost all areas of technical professions dealing with human interaction. The content of lectures is being updated rapidly and continuously according to a remarkable progress in this field. The course deals with the principal functional blocks of mentioned systems both hardware and software implemented.			
A0M37SEK	Synchronization and equalization in digital communications	Z,ZK	4
We explain principles of the receiver signal processing (synchronization and equalization) for the parametric channel including variety of the implementation possibilities. We focus on the essential particular forms of the channel phase, frequency and timing parameterization, channels with multipath propagation and MIMO channels. We develop the ideas of synchronization and equalization in the context of the data decoding in the parametric channel. All basic categories of the CSE algorithms are targeted: feed-forward, feed-back, iterative and recursive, including the theoretical background of the parameter estimation theory, and theory of the feed-back and iterative systems.			
A0M37TAV	Technology of Audiovisual Production	Z,ZK	4
A0M37ZV2	Audio Technology 2	Z,ZK	4
This course deals with advanced topics related to audio technology in recording studios, namely room acoustics, multichannel signal recording and reproduction, digital audio signal processing, its impact on auditory perception, audio signal optimization from the psychoacoustic point of view. Measuring methods related to these topics are also presented.			
A0M38DIP	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			

A0M38MAP	Magnetic Elements and Magnetic Measurements Measurement of magnetic field, NMR. Typical soft and hard magnetic materials. Measurement of properties of soft and hard magnetic materials. DC and AC magnetised circuits, circuits with permanent magnet. Current and voltage instrument transformers, current comparators. Sources of magnetic field. Magnetic shielding.	Z,ZK	5
A0M38MET	Metrology After a brief description of the role of the most important domestic and foreign metrological organizations and institutions, explanation is focused on units of measurable quantities and possibilities of their definition, realization, conservation and reproduction by means of measurement standards. After that, attention is paid to measurement methods and techniques for evaluating and increasing measurement accuracy. Facilities and methods applicable to precision measurements of both active and passive electrical quantities are described.	Z,ZK	5
A0M38OSE	Image Sensors This course explains the topics of optoelectronic image sensors, especially CCD and CMOS sensors, optical system, illuminators and their application in the computer vision.	Z,ZK	5
A0M38PMZ	Advanced Signal Processing The course introduces advanced signal processing methods and their applications and implementation in information systems. In the labs real application using Matlab and digital signal processor will be developed (de-noising, multimedia effects, telecommunication).	Z,ZK	5
A0M38PPT	Advanced Instrumentation The course is dedicated to principle, properties and applications of measuring instruments used for precise measurement, measuring of extremely low signals, HF measurement etc. Above the knowledge obtained in basic course Sensors and Measurement. Labs are focused to their optimum usage both in standard and less frequent applications.	Z,ZK	5
A0M38SPP	Signal Processors in Practice Basic architecture of digital signal processors, main features and properties, description of important processor blocks (ALU, MAC). Development and supporting tools for design and debug. Fundamental method of digital signal processing including practise implementation on digital signal processor (DSP). Demonstration of HW design with application of DSP. Within laboratory exercises, realisation of scheduled or own complex project.	Z,ZK	5
A0M38VIP	Virtual Instruments A subject deals with programming virtual instruments based on standardized interfaces (PCI, PXI, VXI). Lectures are focused on application of up-to-date standards for data acquisition systems programming (VXIplug&play, VISA, IVI) and selected software techniques in Windows, Linux and Phar Lap operating systems. Assigned software tasks in laboratories are solved using C/C++ language or LabVIEW environment.	Z,ZK	5
A2B37KMM	Communication and Measurement in Multimedia 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.	Z,ZK	6
A3B33OSD	Operating Systems and Databases 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.	Z,ZK	6
A4B33DS	Database Systems Database Systems and their architecture, query languages, transactions, object-relational mapping	Z,ZK	6
A4B33RPZ	Pattern Recognition and Machine Learning 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.	Z,ZK	6
A5M17BUP	Biological Effects of Electromagnetic Field Biophysical Aspects of Electromagnetic Fields (EF) coupling of Various Biological Systems (BS). Interaction of EF with BS - overview. Mechanism of Interaction and Biological Effects. Experimental Results and Hypotheses of Biological Effects of Static and Stationary Electrical, Magnetic and Nonstationary Fields. Mathematical Solution of Interaction. EF generated by living Organism. Applications of EF in Medicine. Hygienic Standards.	KZ	4
A6M02BFY	Biophysics Physical processes related to blood flow, measurement of haemodynamic parameters in vivo, properties of blood vessels. Special attention will be given to artificial capillary systems and their application in treatment of renal or lung insufficiency. The students will learn how to measure blood pressure under various degrees of load and they will observe their own ventilation parameters. Theoretical knowledge will be complemented by practical experience from excursions.	Z,ZK	4
A6M02FPT	Physics for Therapy Lectures will be focused to Over Using Syndrome problems. Besides that, there will be discussed pain treatment for patients with cancer. A significant room will be dedicated to electrotherapy, physiotherapy and phototherapy. Also healing processes, organ conservation methods and progressive surgery methods will be spoken about. Students will also gain many practical knowledge via labs.	Z,ZK	3
A6M02IND	Individual project Independent work in the form of a project. 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 project will be defended within the framework of a subject.	Z	4
A6M17IP	Individual Project Independent work in the form of a project. 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 project will be defended within the framework of a subject. Projects deals with microwave technique, antennas, propagation, optical communications, EMC, and medical applications.	KZ	4
A6M31ANS	Signal analysis Selected methods of biological signal processing and analysis	Z,ZK	6
A6M31BSG	Biological signals	Z,ZK	5
A6M31IP	Individual Project	KZ	4
A6M31LET	Medical Instrumentation and Devices Students will study fundamental principles applied within the modern medical devices and systems, esp. from the point of view of functional blocks and electronic circuits of diagnostical and therapeutical medical equipments including electrocardiographs, electroencephalographs, bedside and central monitors, equipments for anesthesiology, intensive and critical healthcare, equipments for clinical laboratory, electrostimulators, cardiostimulators and defibrilators, blood pressure and flow measurement (including dilution) and pulse oxymetry.	Z,ZK	6
A6M33AST	Assistive Technologies and Patient Supervision Systems The course offers a concise review of current ICT based approaches to development of assistive technologies and monitoring systems for persons with specific requirements and constraints (e.g. limited mobility, impairment of perception or cognition). Special attention is devoted to technical aspects related to construction of the corresponding tools and to the future trends in this domain incorporating results obtained in various modern disciplines (e.g. robotics, artificial intelligence) as well as necessary knowledge of medical background relevant for the most frequent impairments. Student will gain personal experience in using some selected assistive tools during the laboratories complementing the course.	Z,ZK	5

A6M33BEZ	Safety of Electric and Non-electric Devices and Management of Medical Technology	Z,ZK	4
The aim of the course is to introduce to students specific safety risks and measures for their elimination or their reduction during installation and utilization of technical equipment determined for health care provision - medical devices and some other devices and equipment of general character. In the first place safety against electric current accident. The students will be informed about safety against influence of gas pressure, medical gases and ionizing radiation. Important topics are not only organizational and technical measures concerning safety but also verifiable records about them. Therefore the course also focuses on the databases of medical technology in the health care institution. Further important topics linked to previous ones are management of health care technology (HCT), expert management of HCT, analysis of HCT failures, proposals of measures and solutions, safety and security technological checks- principles and application.			
A6M33BIO		KZ	4
The course focuses on introduction of basic principles of methods mostly used in biometry. It discuss security issues of biometrical systems. For every biometrical system, the evaluation of speed, price and accuracy is given. The course covers also the field of securing the biometrical systems, including the mostly used cryptographical methods.			
A6M33DVZ	Mining and Visualisation of Knowledge	Z,ZK	4
The subject reviews current tools for data mining and illustrates their properties using real-life tasks. Specific attention is devoted to descriptive presentation of the obtained results along the data-mining process - an approach that significantly improves and facilitates communication with the domain expert or data owner (e.g. medical professional) who can thus take active part in the process by focussing to the most promising direction.			
A6M33FZG	Physiology and Anatomy	Z,ZK	3
The subject is focused on physiology of specific organ systems in human physiology, it reviews the physiological functions on the level of cell and organ systems. There are described basic principles of physiological functions: attention is given to the connection between structure and function as well as to the role of biological membranes and their importance for body functions. Moreover, the subject studies specific systems, such as homeostasis and internal environment regulation, blood, basic principles of immunology. In addition to that, there are explained also some other systems, such as respiration, blood circulation, digestion (gastrointestinal tract), metabolism, renal functions, reproduction and development, aging, humoral regulation, neurophysiology and physiology of senses. From the view of anatomy there are emphasized basic morphological structures as cell, muscle composition and neuronal structures. There are reviewed in a systematic way the structures of respiratory tract, circulation system,gastrointestinal tract, renal, reproductive system and central and autonomous nervous system.			
A6M33IP	Individual Project	KZ	4
Independent work in the form of a project. 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 project will be defended within the framework of a subject. List of topics: http://cyber.felk.cvut.cz/study/student-projects/			
A6M33KSY	Cognitive Systems	KZ	4
This subject is conceived as the introduction to the cognitive psychology for the students of technical schools. The mind is considered as the information processing system in this approach so the students should find some similarities with the computational and mathematical theories. The lectures are divided to the several sections copying the way of informational processing in the human brain. There are lectures focused attention, perception, reasoning, mental imagery, knowledge representation and language acquisition. In the practical lessons student undergo experiments that demonstrates theories from the lectures.			
A6M33LEE	Medical Ethics	Z,ZK	3
The aim of the course is to provide orientation in the general issues of ethics and in medical ethics specially. The course is divided into three blocks. The first block is connected with issues of General Ethics, while the second and third blocks are devoted to the ethical issues related to the health, disease, death and problems with medical interventions. The course is read by teachers, who are or have been active for many years in medical and nursing care. Open discussions are an integral part of the course, which forces the students to consider ethical questions and respond to them. In this way, the students learn to argue, to advocate, to search for answers, and to find common solutions. At the end of the semester students present their reports related to selected ethical issues. After passing all lectures, students are able to discuss and solve not only the general ethical problems, but also medical ethical issues.			
A6M33LI	Medical Informatics	Z,ZK	5
The course explains specific problems of information systems in health care, protection of medical data, processing of medical data, and intelligent monitoring systems. Possibilities of application of telemedicine in different fields of health care are discussed. The computer labs are focused on practical tasks in medical informatics, as for example database technology, data protection and security, examples of health care information systems, applications of mobile technologies, resources of medical information.			
A6M33LTE	Medical Terminology	Z	2
In the course of medical terminology students learn to understand medical texts containing technical terms. Students read medical text based on clinical practice and are conducted towards understanding the medical text as a whole, not only its parts. Medical texts are medical reports, medical protocols, and other medical documents. Part of the course covers special issues related to clinical medicine, namely to Cardiology, Cardiosurgery, Neurology. The course also includes basics of pharmacologic terminology. The most commonly used medical shortcuts are explained. In the beginning of the course there are given selected themes for the home self- study.			
A6M33MBG	Molecular Biology and Genetics	Z,ZK	4
The goal of the subject is to broaden the knowledge in the fields of molecular biology and genetics, to give a more detailed overview of principles of the methods used, and to demonstrate the overlap of these fields into the modern biomedicine. Emphasis will be placed on understanding the thought of modern molecular biology and genetics, on the questions asked and problems solved, and on the increasing challenges to find new ways of processing of the large volumes of data generated by the current experiments. The course will also present a number of real cases analyzed in the laboratory of medical molecular genetics, including the bioinformatic approaches used.			
A6M33MOS	Modeling and Simulation	Z,ZK	5
The modelling techniques being frequently used in biomedical engineering and corresponding software tools: Matlab-Simulink, Modelica. Techniques of modelling and processes associated with them. Types of models, continuous and discrete time models, linear and nonlinear models with lumped parameters, models and their implementation in program environment. Formalization and model creation for a selected system, its identification, verification and interpretation. Equilibrium states (homeostasis) and their inquiry by simulation. Models of open and feedback systems. Use of fuzzy-neuronal models in biomedicine. Models of separate systems and whole constellations being defined in biomedical engineering. Models of cellular and physiological control, population models. Application of models for artificial organs production.			
A6M33OZL	Organization of the Health Care System and Legislation	Z,ZK	4
The course explains the problems of health care structure, its financial and legal context in Czech Republic and European Union. Further there are discussed legal aspects of development, implementation and utilization of information systems and development, production and distribution of medical technology.			
A6M33PFR	Disorders of Physiological Regulations	KZ	2
The course builds on knowledge gained in the subject devoted to physiology and anatomy. It acquaints with selected disorders of physiological function of organ systems, adaptive body's response to the disorder and the course of pathogenesis of organ failure. Emphasis is placed on understanding the interdependence of physiological systems and understanding of the regulatory response for each organ disorders. For clearer explanation computer models, e-learning resources and wiki pages will be widely used.			
A6M33SSL	Statistics and Reliability in Medicine	Z,ZK	5
The course extends previous course EA0B01PSI (Probability, Statistics, and Theory of Information) by specific statistical methods used in biology and medicine. Planning and evaluation of statistical studies is given particular attention. Moreover, the course deals with description, analysis and modeling of reliability issues in the context of technical systems, as well as elaborates reliability estimation for complex systems. Methods and tools for systems backup are introduced.			
A6M33ZMO	Medical Image Processing	Z,ZK	5
This subject describes algorithms for digital image processing of 2D and 3D images, with emphasis on biomedical applications. We shall therefore concentrate on the most often used techniques in medical image processing: segmentation, registration, and classification. The methods will be illustrated by a range of examples on medical data. The students will			

implement some of the algorithms during the practice sessions. Because of the very large overlap between courses A6M33ZMO and A4M33ZMO, the courses will be taught together this year.			
A6M33ZPP	First Aid Training Course The course provides the essential training for everyone seeking to learn proper CPR and first aid technique.	Z	1
A6M33ZSL	Medical Imaging Systems The course covers the principles, design and properties of currently used medical imaging devices. We shall deal with 2D microscopic, X-ray and ultrasound imaging systems, including advanced topics such as Doppler ultrasound. We will also study tomographic (3D) imaging systems: computed tomography (CT), magnetic resonance imaging (MRI) including functional MRI (fMRI) and nuclear imaging methods (PET,SPECT). For more information see https://cw.fel.cvut.cz/wiki/courses/zsl	Z,ZK	5
A6M34BMS	Biomedical sensors Sensors and microsensors for use in biomedicine. The physical principles of semicond. sensors and microsensors, classification, parameters, design, integration, construction, processing of sensor signals, linearisation, calibration, intelligent sensors, application of sensor (temperature, pressure, optoelectronic, fibre optic, radiation, chemical and biochemical, mechanical, level and flow, ...), microactuators and microsystems in medicine, nanotechnology.	Z,ZK	4
A6M38KLS	Construction of Medical Systems	Z,ZK	5
ADIP25	Diploma Thesis Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.	Z	25
AE0B04C0	Czech language 0 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.	Z	2
AE0M33OSW	Ontologies and Semantic Web The course "Ontologies and Semantic Web" will guide students through current trends and technologies in the semantic web field. Students will learn designing complex ontologies, thesauri, formalizing them in a suitable formal language, querying them and creating semantic web applications on their top. The second part of the course will be devoted to the efficient management of ontological data and other selected topics. All course materials are in English. In case all attendees are Czech speaking Czech can be spoken.	KZ	4
AE6M02BFY	Biophysics The course focuses on the physical processes related to blood flow, measuring hemodynamic parameters in vivo and properties of blood vessels. Special attention will be given to artificial capillary systems and their application in treatment of renal or lung insufficiency. Further properties of human tissue and body fluids will be discussed, including methods of measurement. Students will also learn about the measurement of fundamental physiological variables. This knowledge will be complemented with the basics of electrochemistry, optics and acoustics, always in relation to the human body and in biological systems. Theoretical knowledge will be complemented by practical experience in laboratories.	Z,ZK	4
BEZM	Safety in Electrical Engineering for a master's degree The course provides for students of all programs periodic training guidelines for health and occupational safety and gives knowledge of electrical hazard of given branch of study. Students receive indispensable qualification according to the current Directive of the Dean.	Z	0
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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