Recomended pass through the study plan

Name of the pass: Elektronika a komunikace - Komunikace a zpracování informace

Faculty/Institute/Others: Faculty of Electrical Engineering
Department:
Pass through the study plan: Electronics and Communications
Branch of study guranteed by the department: Welcome page
Guarantor of the study branch:
Program of study: Electronics and Communications
Type of study: Follow-up master full-time
Note on the pass:

Coding of roles of courses and groups of courses:
P - compulsory courses of the program, PO - compulsory courses of the branch, Z - compulsory courses, S - compulsory elective courses, PV - compulsory elective courses, F - elective specialized courses, V - elective courses, T - physical training courses

Coding of ways of completion of courses (KZ/Z/ZK) and coding of semesters (Z/L):
KZ - graded assesment, Z - assesment, ZK - examination, L - summer semester, Z - winter semester

Number of semester: 1

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors, **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, Pavel Mlejnek **Radek Havlíček** Vladimír Kůla (Gar.)*	Z	0	2BP+2BC	Z	P
B2M31DSP	**Advanced DSP methods** *Pavel Sovka, Petr Pollák **Pavel Sovka** Pavel Sovka (Gar.)*	Z,ZK	6	2P+2C	Z,L	P
B3M35DRS	**Dynamics and Control Networks** *Kristian Hengster-Movric **Kristian Hengster-Movric***	Z,ZK	6	2P+2C	Z	PV
B2M32MKSA	**Mobile Networks** *Zdeněk Bečvář, Robert Bešťák, Pavel Mach **Pavel Mach** Zdeněk Bečvář (Gar.)*	Z,ZK	6	2P + 2L	Z	PV
2021_MEKVOL	**Volitelné odborné předměty**	Min. cours. 0	Min/Max 0/999			V

Number of semester: 2

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors, **authors** and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
B2M32BTSA	**Wireless Technologies** *Zdeněk Bečvář, Pavel Mach, Lukáš Vojtěch, Zbyněk Kocur **Ján Kučerák** Zdeněk Bečvář (Gar.)*	Z,ZK	6	2P + 2L	L	P
B2M37KDKA	**Coding in digital communications** *Jan Sýkora **Jan Sýkora** Jan Sýkora (Gar.)*	Z,ZK	6	3P+1C	L	PV
B2M37KASA	**Compression of images and signals** *Karel Fliegel, Stanislav Vítek, František Rund, Václav Vencovský **Karel Fliegel** Stanislav Vítek (Gar.)*	Z,ZK	6	2P+2C	L	PV
2021_MEKPV8B	**Povinně volitelné předměty programu** *B2M31ADAA,B2M37CIR,..... (see the list of groups below)*	Min. cours. 5 Max. cours. 5	Min/Max 30/30			PV

Number of semester: 3

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors, **authors** and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
B2M37MAM	**Microprocessors** *Stanislav Vítek, Petr Skalický **Stanislav Vítek** Stanislav Vítek (Gar.)*	Z,ZK	6	2P+2L	Z	P

B2MPROJ6	**Project** *František Rund, Ivan Pravda, Jiří Jakovenko, Pavel Máša, Jan Šístek, Lubor Jirásek, Tomáš Zeman, Ladislav Oppl* ***František Rund*** *František Rund (Gar.)*	Z	6	0p+6s	Z,L	P
B2M37SEK	**Synchronization and equalization in digital communications** *Jan Sýkora* ***Jan Sýkora*** *Jan Sýkora (Gar.)*	Z,ZK	6	3P+1C	Z	PV
2021_MEKPV8B	**Povinně volitelné předměty programu** *B2M31ADAA,B2M37CIR,..... (see the list of groups below)*	Min. cours. 5 Max. cours. 5	Min/Max 30/30			PV

Number of semester: 4

Code	**Name of the course / Name of the group of courses** ***(in case of groups of courses the list of codes of their members)*** *Tutors,* ***authors*** *and guarantors (gar.)*	**Completion**	**Credits**	**Scope**	**Semester**	**Role**
BDIP25	**Diploma Thesis**	Z	25	22s	L	P
2021_MEKPV8B	**Povinně volitelné předměty programu** *B2M31ADAA,B2M37CIR,..... (see the list of groups below)*	Min. cours. 5 Max. cours. 5	Min/Max 30/30			PV

List of groups of courses of this pass with the complete content of members of individual groups

Kód	**Name of the group of courses and codes of members of this group (for specification see here or below the list of courses)**	**Completion**	**Credits**	**Scope**	**Semester**	**Role**
2021_MEKPV8B	**Povinně volitelné předměty programu**	**Min. cours. 5** **Max. cours. 5**	**Min/Max** 30/30			**PV**

B2M31ADAA	Adaptive signal processing	B2M37CIR	Implementation of the digital ci ...	B4M33DZO	Digital image
B2M32IBEA	Information Security	B3M35ORR	Optimal and Robust Control	B3M35PSR	Real -Time Systems Programming
B4M33SSU	Statistical Machine Learning	B2M17SBS	Wave Propagation for Wireless Li ...	B2M32THOA	Queueing Theory
B2M01TIK	Information Theory and Coding				

2021_MEKVOL	**Volitelné odborné předměty**	**Min. cours. 0**	**Min/Max** 0/999			**V**

List of courses of this pass:

Code	**Name of the course**	**Completion**	**Credits**
B2M01TIK	Information Theory and Coding	Z,ZK	6
Fundamentals of information theory with a view towards efficient data compression and reliable transmission of information using selfcorrecting codes.			
B2M17SBS	Wave Propagation for Wireless Links	Z,ZK	6
The aim of the course is to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and satellite wireless links. The syllabus includes both deeper theoretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite, fixed and mobile communications in various frequency bands.			
B2M31ADAA	Adaptive signal processing	Z,ZK	6
This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming.			
B2M31DSP	Advanced DSP methods	Z,ZK	6
The course follows the basic course in signal processing and introduces advanced methods of analysis and digital signal processing. Graduates will learn the methods of digital signals analysis and be able to practically use them. They learn to know the conditions of use of correlation, spectral and coherent analysis of random signals. They will became familiar with methods of signal decomposition and independent component analysis and the time-frequency transformations. Emphasis will be placed on an ability to interpret the results of signal analyses.			
B2M32BTSA	Wireless Technologies	Z,ZK	6
The lectures give overview of fundamental principles of wireless networks in various areas of their application. Students will understand architecture, principles and protocols used in different wireless technologies and learn how these technologies can be exploited in real world applications. The goal is to teach students how to solve problems related to deployment of wireless networks, their operation or development of wireless networks components.			

B2M32IBEA	Information Security	Z,ZK	6
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.			
B2M32MKSA	Mobile Networks	Z,ZK	6
The lectures introduce principles and functionalities of mobile networks with special focus on currently deployed technologies and future mobile networks. Furthermore, architecture and fundamental principles of GSM, UMTS, LTE/LTE-A, and 5G will be explained. Then, selected key technologies for future mobile networks (6G) will be explained.			
B2M32THOA	Queueing Theory	Z,ZK	6
The aim of the course is to present an overview of dimensioning of telecommunication networks on the basis of results of the queuing theory (QT) and to introduce possibilities of simulation and modelling of networks, both from the point of view of grade of service (GoS) and quality of service (QoS). Results of the QT are applied on different service systems and telecommunication networks being currently operated and developed. Theoretical knowledge about models of service systems can be applied on dimensioning of different service systems in real life - not only on the telecommunications one.			
B2M37CIR	Implementation of the digital circuits in Radio	Z,ZK	6
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, algoritms coding/decoding, which contains in the communication chain. Dominantly is concentration to effective realization with minimal computing power.			
B2M37KASA	Compression of images and signals	Z,ZK	6
The subject deals with compression methods and techniques. Main goal is to introduce basic concepts of lossless and lossy compresion of audiovisual information (entropy, redundancy and irrelevancy). Within the laboratory exercises students will work with implementations of particular algorithms, including objective and subjective methods of quality evaluation.			
B2M37KDKA	Coding in digital communications	Z,ZK	6
This course extends and deepens the topics of the basic communication theory courses in the following main areas. 1) Advanced information theory in coding and Network Information Theory develop a framework for understanding the principles of the channel coding in single-user and multi-node/multi-user scenarios. 2) The algebraic coding presents classical topics of block and convolutional codes. 3) Advanced coding technique focuses on turbo, LDPC, Space-Time codes and Wireless Network Coding. 4) Advanced decoding technique, namely iterative and multi-user decoding is a fundamental tool for decoding capacity approaching channel codes.			
B2M37MAM	Microprocessors	Z,ZK	6
The aim is to make students acquainted with the properties of microprocessor systems, make students familiar with on-chip peripherals, connect external circuit to the processor bus, and with implementation of the memory or I/O space address extension. Next, taught the students to make simple program in the assembly language, C language and combination of both. After completion of this subject student should be able to design and implement simpler microprocessor system including connection of necessary peripherals and software design.			
B2M37SEK	Synchronization and equalization in digital communications	Z,ZK	6
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.			
B2MPROJ6	Project	Z	6
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. Project list http://www.fel.cvut.cz/en/education/semestral-projects.html			
B3M35DRS	Dynamics and Control Networks	Z,ZK	6
This course responds to an ever-increasing demand for understanding contemporary networks large-scale complex systems composed of many components and subsystems interconnected into a single distributed entity. Herein, we will consider fundamental similarities between diverse areas such as e.g. forecasting the spread of global pandemics, public opinion dynamics and manipulation of communities through social media, formation controls for unmanned vehicles, energy generation and distribution in power grids, etc. Understanding such compelling issues goes far beyond the boundaries of any single physical, technological or scientific domain. Therefore, we will analyze phenomena across different domains, involving societal, economic and biological networks. For such networked systems, the resulting behavior depends not only on the characteristics of their individual components and details of their physical or logical interactions, but also on a precise way those components are interconnected the detailed interconnection topology. For that reason, the first part of the course introduces fundamental theoretical and abstract computational network analysis concepts; in particular, the algebraic graph theory, network measures and metrics and fundamental network algorithms. The second part of the course subsequently views networks as dynamical systems, studies their properties and ways in which these are controlled, using mainly methods of automatic control theory.			
B3M35ORR	Optimal and Robust Control	Z,ZK	6
B3M35PSR	Real -Time Systems Programming	Z,ZK	6
The goal of this course is to provide students with basic knowledge about software development for real-time systems, for example in control and embedded applications. The focus is on embedded systems equipped with a real-time operating system (RTOS). Lectures will cover real-time systems theory, which can be used to formally verify timing correctness of such systems. Another set of lectures will introduce methods and techniques used for development of safety-critical systems, whose failure may have catastrophic consequences. During labs, students will first solve a few simple tasks to familiarize themselves with basic components of VxWorks RTOS and to benchmark the used OS and hardware (Xilinx Zynq). The obtained metrics represent the typical criteria for assessing the suitability of a given platform for the given application. After the simple tasks, students will solve a complex task of time-critical motion control application which will require full utilization of RTOS features. All the tasks at the labs will be implemented in C (or C++) language.			
B4M33DZO	Digital image	Z,ZK	6
This course presents an overview of basic methods for digital image processing. It deals with practical techniques that have an interesting theoretical basis but are not difficult to implement. Seemingly abstract concepts from mathematical analysis, probability theory, or optimization come to life through visually engaging applications. The course focuses on fundamental principles (signal sampling and reconstruction, monadic operations, histogram, Fourier transform, convolution, linear and non-linear filtering) and more advanced editing techniques, including image stitching, deformation, registration, and segmentation. Students will practice the selected topics through six implementation tasks, which will help them learn the theoretical knowledge from the lectures and use it to solve practical problems			
B4M33SSU	Statistical Machine Learning	Z,ZK	6
The aim of statistical machine learning is to develop systems (models and algorithms) able to learn to solve tasks given a set of examples and some prior knowledge about the task. This includes typical tasks in speech and image recognition. The course has the following two main objectives 1. to present fundamental learning concepts such as risk minimisation, maximum likelihood estimation and Bayesian learning including their theoretical aspects, 2. to consider important state-of-the-art models for classification and regression and to show how they can be learned by those concepts.			
BDIP25	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			

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.			

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