

## Recommended pass through the study plan

### Name of the pass: Specialization Audiovisual Technology and Signal Processing - Passage through study

Faculty/Institute/Others: Faculty of Electrical Engineering

Department:

Pass through the study plan: Electronics and Communications - Audiovisual Technology and Signal Processing

Branch of study guaranteed 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	<b>Safety in Electrical Engineering for a master's degree</b> Vladimír K la, Radek Havlí ek, Ivana Nová, Josef ernohous, Pavel Mlejnek <b>Radek Havlí ek</b> Vladimír K la (Gar.)	Z	0	2BP+2BC	Z	P
B2M37MAM	<b>Microprocessors</b> Petr Skalický, Stanislav Vítek <b>Stanislav Vítek</b> Stanislav Vítek (Gar.)	Z,ZK	6	2P+2L	Z	P
B2M37OBT	<b>Image Technology</b> Lukáš Krauz, Petr Páta, Miloš Klíma <b>Karel Fliegel</b> Petr Páta (Gar.)	Z,ZK	6	2p+2l	Z	P
B2M31DSP	<b>Advanced DSP methods</b> Pavel Sovka, Petr Pollák <b>Pavel Sovka</b> Pavel Sovka (Gar.)	Z,ZK	6	2P+2C	Z,L	P
B2M31SYN	<b>Synthesis of Audio Signals</b> Roman mejla <b>Roman mejla</b> Roman mejla (Gar.)	Z,ZK	6	2P+2C	Z	P
B2M99ZVT	<b>Audio technology 1</b> Ond ej Ji í ek, Libor Husník, František Rund <b>František Rund</b> Ond ej Ji í ek (Gar.)	Z,ZK	6	2P+2L	Z	P

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	<b>Wireless Technologies</b> Zden k Be vá , Lukáš Vojt ch, Zbyn k Kocur, Pavel Mach <b>Ján Ku erák</b> Zden k Be vá (Gar.)	Z,ZK	6	2P + 2L	L	P
B2M37KASA	<b>Compression of images and signals</b> Stanislav Vítek, Karel Fliegel, František Rund, Václav Vencovský <b>Karel Fliegel</b> Stanislav Vítek (Gar.)	Z,ZK	6	2P+2C	L	P
B2M31ZRE	<b>Speech Processing</b> Petr Pollák <b>Petr Pollák</b> Petr Pollák (Gar.)	Z,ZK	6	2P+2C	L	P
2018_MEKPV2	<b>Povinn volitelné p edm ty programu</b> B2M31ADAA,B2M31AEDA,..... (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
B2MPROJ6	<b>Project</b> František Rund, Jiří Jakovenko, Pavel Máša, Ivan Pravda, Jan Šístek, Lubor Jirásek, Tomáš Zeman, Ladislav Oppl <b>František Rund František Rund (Gar.)</b>	Z	6	0p+6s	Z,L	P
2018_MEKPV2	<b>Povinn volitelné p edm ty programu</b> B2M31ADAA,B2M31AEDA,..... (see the list of groups below)	Min. cours. 5 Max. cours. 5	Min/Max 30/30			PV
2018_MEKVOL	<b>Volitelné odborné p edm ty2018</b>	Min. cours. 0	Min/Max 0/999			V

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	<b>Diploma Thesis</b>	Z	25	22s	L	P
2018_MEKVOL	<b>Volitelné odborné p edm ty2018</b>	Min. cours. 0	Min/Max 0/999			V

### 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
<b>2018_MEKPV2</b>	<b>Povinn volitelné p edm ty programu</b>	Min. cours. 5 Max. cours. 5	Min/Max 30/30			PV
B2M31ADAA	Adaptive signal processing	B2M31AEDA	Experimental Data Analysis	BAM31BSG	Biological signals	
B2M37DTRA	Digital Video and Audio Broadcas ...	B0M37FAV	Physiology and modeling of heari ...	B2M37MOTA	Advanced areas in image and vide ...	
B2M37OBFA	Image Photonics	B2M37SSPA	Statistical Signal Processing	B2M37TAV	Technology of Audiovisual Produc ...	
B2M31ZASA	Analog Signal Processing	B2M37ZV2A	Audio Technology 2			
<b>2018_MEKVOL</b>	<b>Volitelné odborné p edm ty2018</b>	Min. cours. 0	Min/Max 0/999			V

### List of courses of this pass:

Code	Name of the course	Completion	Credits
B0M37FAV	Physiology and modeling of hearing and vision The primary aim of the course is to study the physiology of sensors and processes of perception of audio and visual information by human subjects as two central and most important communication channels, i.e., Human Auditory System (HAS) and Human Visual System (HVS). The course summarizes current knowledge in the field of human vision and hearing physiology and, at the same time, presents their description using mathematical models using the latest computational tools and procedures, including Machine Learning (ML), Deep Learning (DL) and Artificial Intelligence (AI). Emphasis is also placed on current and prospective applications of the mentioned knowledge. The main application area is the audiovisual technology related to human perception, but the direct employment of the acquired knowledge also includes the areas of multimedia technology, control systems, automation, robotics, safety and security technology, bioinspired systems, etc. At the same time, students gain a general overview of information processing in biological systems. A separate part is the objectification of audiovisual information perceived quality, i.e., Quality of Experience (QoE). The course is intended for students of master's degree in technical fields. The exercises will be devoted to fundamental experiments to determine the most important characteristics of HAS and HVS, including computational models and simulation of vision and hearing processes.	Z,ZK	6
B2M31ADAA	Adaptive signal processing This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming.	Z,ZK	6
B2M31AEDA	Experimental Data Analysis In the course of subject "Experimental Data Analysis", students will acquire knowledge regarding fundamental methods for data analysis and machine learning for evaluation and interpretation of data. In the course of practical lectures, students will solve individual tasks using real data from signal processing in neuroscience research. In the course of semestral	Z,ZK	6

project, student will solve complex task and present obtained results. The aim of the subject is to introduce practical application of fundamental statistical methods as well as to teach students to use critical thinking and to acquire additional knowledge in solution of practical tasks.			
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 become 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.			
B2M31SYN	Synthesis of Audio Signals	Z,ZK	6
This course introduces the fundamentals of sound synthesis algorithms (everyday, music and speech), digital audio effects and sonification. Audio synthetic signals are used in modern digital systems, virtual reality systems, computer animations, games and film. Understanding of theoretical concepts will be consolidated through practical programming assignments in Matlab.			
B2M31ZASA	Analog Signal Processing	Z,ZK	6
The course deals with analog input-output blocks for signal transmission and processing. They discussed circuit solution of amplifiers and filters, including their design process, simulation and measurement. Students learn the circuit concepts and possibilities for solving the contemporary analogue structures. The second part of the course describes the design and implementation of analog filters, including discrete-time circuits. The conclusion is devoted to the possibilities of computer optimization of electronic circuits and filters.			
B2M31ZRE	Speech Processing	Z,ZK	6
The subject is devoted to basis of speech processing addressed to students of master program. Discussed speech technology is currently applied in many systems in different fields (e.g. information dialogue systems, voice controlled devices, dictation systems or transcription of audio-video recordings, support for language teaching, etc.). Students will learn basic algorithms for speech analysis (spectral analysis, LPC, cepstral analysis, pitch, formants, etc.), principles of speech recognition (GMM-HMM, ANN-HMM systems, small and large vocabulary recognizers), speaker recognition (based on VQ and GMM), speech synthesis or speech enhancement. Further information can be found at &lt;a href=http://noel.feld.cvut.cz/vyu/ae2m31zre&gt;http://noel.feld.cvut.cz/vyu/ae2m31zre&lt;/a&gt;. Pro zapsané studenty jsou detailní informace na výukovém portálu &lt;a href=https://moodle.fel.cvut.cz&gt;Moodle FEL&lt;/a&gt;.			
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.			
B2M37DTRA	Digital Video and Audio Broadcasting	Z,ZK	6
The subject makes students familiar with topics related to video and audio transmission. Described are methods of data stream creation, methods of source and channel coding, error correction principles and modulation formats. Attention is paid to transmission systems standards with regard to transmission channel properties. The subject also deals with multimedia data services and with measurement in transmission systems.			
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 compression 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.			
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.			
B2M37MOTA	Advanced areas in image and video technology	Z,ZK	6
This course focuses on 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. A significant part of the course is focused on the methods of image signal processing and main hardware and software functional blocks of related imaging systems. The aim of the laboratory exercises is to familiarize with advanced methods for capturing, processing and reproduction of image information. Due to the fast progress in this area, the content of the lectures and exercises is being continuously updated.			
B2M37OBFA	Image Photonics	Z,ZK	6
The subject offers a detailed overview of applied imaging photonic elements and systems. The subject deals with fundamentals of optics, Fourier optics and optical computing. Fourier optics. Image sensors - tube, CCD, CMOS. Image displays. Image converters and amplifiers. Photography and holography - sensitometry and densitometry. Photonic (optical) computing. Electron optics. Image processing in biosystems. Image processing for photonics.			
B2M37OBT	Image Technology	Z,ZK	6
This course deals with multimedia technology and it is focused mainly on acquisition, processing and reproduction of image information. It covers area of measurements in photometry, radiometry and colorimetry; design of objective lenses, image sensors and displays including their parameters. Further the course deals with cinematography, photography and with other special methods of image reproduction, e.g. polygraphy and digital printing techniques. Studied problems are completed with explanation of advanced methods of image processing (preprocessing, compression, image reconstruction, etc.).			
B2M37SSPA	Statistical Signal Processing	Z,ZK	6
The course provides fundamentals in three main domains of the statistical signal processing: 1) estimation theory, 2) detection theory, 3) optimal and adaptive filtering. The statistical signal processing is a core theory with many applications ranging from digital communications, audio and video processing, radar and radio navigation, measurement and experiment evaluation, etc.			
B2M37TAV	Technology of Audiovisual Production	Z,ZK	6
B2M37ZV2A	Audio Technology 2	Z,ZK	6
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.			
B2M99ZVT	Audio technology 1	Z,ZK	6
The course provides fundamentals of physical acoustics and acoustic measurement, including problems of noise from technical and perceptual point of view. In the second part principles of electroacoustic and electromechanical transducers are explained along with their analysis. Principles of sound compressing systems and spacial sound processing are also treated.			
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 <a href="http://www.fel.cvut.cz/en/education/semestral-projects.html">http://www.fel.cvut.cz/en/education/semestral-projects.html</a>			
BAM31BSG	Biological signals	Z,ZK	6
BDIP25	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			

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

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