Recomended pass through the study plan

Name of the pass: Electronics and Integrated Systems

Faculty/Institute/Others: Faculty of Electrical Engineering
Department:
Pass through the study plan: Electronics and Integrated Systems
Branch of study guranteed by the department: Welcome page
Guarantor of the study branch:
Program of study: Electronics and Integrated Systems
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
BE2M34NDIO	**Digital Chip Design**	Z,ZK	6	2P+2C	L	P
BE2M31IASA	**Implementation of analog systems**	Z,ZK	6	2P+2C	Z	P
BE2M34EPL	**Solid State Electronics** ***Jan Voves***	Z,ZK	6	3P+1C		P
2026_MEISEPV	**Compulsory subjects of the programme** *BE2M34PNIS,BE4M35PAP,..... (see the list of groups below)*	Min. cours. 6 Max. cours. 6	Min/Max 36/36			PV

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
BE2M34NAIO	**Analog Chip Design**	Z,ZK	6	2P+2C	Z	P
BE2M34NSV	**VLSI System Design** *Pavel Hazdra **Pavel Hazdra** Pavel Hazdra (Gar.)*	Z,ZK	6	2P+2L	Z	P
2026_MEISEPV	**Compulsory subjects of the programme** *BE2M34PNIS,BE4M35PAP,..... (see the list of groups below)*	Min. cours. 6 Max. cours. 6	Min/Max 36/36			PV
2026_MEISEVOL	**Elective subjects**	Min. cours. 0	Min/Max 0/999			V

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
BE2M34PKO	**Defence Preparation**	Z	2	2P+15C+35D		P
BE2MPROJ6	**Project** *Jan Šístek, Pavel Máša, Ivan Pravda, Lubor Jirásek, Zdeněk Bečvář, František Rund **František Rund** František Rund (Gar.)*	Z	6	0p+6s		P
2026_MEISEPV	**Compulsory subjects of the programme** *BE2M34PNIS,BE4M35PAP,..... (see the list of groups below)*	Min. cours. 6	Min/Max 36/36			PV

		Max. cours. 6				
2026_MEISEVOL	**Elective subjects**	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
BDIP30	**Diploma Thesis**	Z	30	22s	L	P

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
2026_MEISEPV	**Compulsory subjects of the programme**	**Min. cours. 6 Max. cours. 6**	**Min/Max** 36/36			**PV**

BE2M34PNIS	Advanced Chip Design	BE4M35PAP	Advanced Computer Architectures	BE2M31ZASA	Analog Signal Processing
BE0M17NKA	Antenna Design and Technology	BE4M38AVS	Application of Embedded Systems	BE2M37ART	Architecture of Radio Receivers ...
BE3M38ASE	Automotive sensors and networks	BE2M17CADA	CAD in HF Technique	BE2M34ZETA	Custom Electronics Design
BECM33DPL	Deep Learning Essentials	BE2M37EAK	Electroacoustics	BE2M37OBFA	Image Photonics
BEAM17EMC	Introduction to Electromagnetic ...	BE2M37AMP	Microprocessor Applications	BE2M34MST	Microsystems
BE2M17MIOA	Microwave Circuits	BE2M17MIMA	Microwave Measurements	BE2M34NANA	Nanoelectronics and Nanotechnolo ...
BE0M31DSP	Advanced DSP methods	BE2M34VKEA	Power Electronics	BE0M38PSR	Real -Time Systems Programming

2026_MEISEVOL	**Elective subjects**	**Min. cours. 0**	**Min/Max** 0/999			**V**

List of courses of this pass:

Code	Name of the course	Completion	Credits
BDIP30	Diploma Thesis	Z	30
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.			
BE0M17NKA	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.			
BE0M31DSP	Advanced DSP methods	Z,ZK	6
The course introduces advanced methods of analysis and processing of digital signals such as correlation, spectral, coherence or cepstral analysis, as well as methods of decomposition into principal and independent components, methods for determining the relationship between random signals and basic classification techniques used in signal analysis. Attention is paid to practical applications of the mentioned techniques, e.g. for noise suppression or compression.			
BE0M38PSR	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.			
BE2M17CADA	CAD in HF Technique	Z,ZK	6
Introduction into principles and techniques used in modern microwave circuit design.			
BE2M17MIMA	Microwave Measurements	Z,ZK	6
Fast development of wireless radio data communications (both mobile and stationary) also results in requirements for measurement of numerous related electrical parameters in frequency band ranging from hundreds of MHz to tens of GHz. The "Microwave measurements" subject brings description of all important measurement instruments and measurement methods used in this field. Instructions devoted to measurement devices also cover detailed inner structures, principles of operation, common measurement setups and optimum setting. Even relatively complex measurement instruments and setups are discussed, for example those used for measurement of noise and non-linear parameters. Exercises are focused on			

	practical measurements commonly performed in the wireless communication field. Besides modern measurement instruments, students also learn a number of typical RF and microwave components, circuits, subsystems and digitally modulated signals.		
BE2M17MIOA	Microwave Circuits	Z,ZK	6
	Subject is focused on the design of planar passive and active microwave circuits.		
BE2M31IASA	Implementation of analog systems	Z,ZK	6
	The goal of the subject is to make students familiar with the new trends and concepts in analog circuits with an emphasis on the applications in the digital system peripherals. Here, the stress is placed on the design and implementation procedures of Application Specific Integrated Circuits (ASICs). Current design trends are discussed, including the analysis and test of analog and mixed signal circuits. The course provides knowledge for the development and design of electronic systems taking into account the aspects of current manufacturing technology of integrated circuits.		
BE2M31ZASA	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.		
BE2M34EPL	Solid State Electronics	Z,ZK	6
BE2M34MST	Microsystems	Z,ZK	6
	The course deals with system integration applied in the design of digital and analog systems. It demonstrates the new possibilities of implementation and application of integrated microelectronic devices based on various physical and biochemical principles. It presents primarily MEMS technology that increases reliability with all its attributes. The course presents the modern action elements and microactuators, whose operation is based on fundamental physical and biochemical principles, including basic applications in micromanipulation, microrobots, microdrives, microsurgery, multimedia, medical, industrial control, automotive, etc. In the course are presented the principles of touch screens, microgenerators of electrical energy. There are mentioned basic elements of the use of nanotechnology and nanoelectronic structures and basic microsystem technologies.		
BE2M34NAIO	Analog Chip Design	Z,ZK	6
BE2M34NANA	Nanoelectronics and Nanotechnology	Z,ZK	6
	The subject is oriented on the present nanotechnologies in the connection with their electronic, photonic and spintrinic applications. Quantum theory basics are used to explain the effects observed in nanostructures. Basic nanoelectronic structures are described with their possible applications. Modern computer methods and models, which are able to simulate the operation of nanoelectronic structures and which are the important tools for their design and optimalisation, are studied.		
BE2M34NDIO	Digital Chip Design	Z,ZK	6
BE2M34NSV	VLSI System Design	Z,ZK	6
	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.		
BE2M34PKO	Defence Preparation	Z	2
BE2M34PNIS	Advanced Chip Design	Z,ZK	6
BE2M34VKEA	Power Electronics	Z,ZK	6
	The course introduces into the problematic of power electronics. First part of lectures deals with principles and structures of contemporary semiconductor power devices. The impact of novel semiconductor materials is discussed, as well. Circuit models of particular devices will be then explained, driving circuits, switching of the resistive, inductive and capacitive loads, power losses and device operation reliability will be thoroughly discussed. Second part of lectures is dedicated to the problematic of power converters, their topologies, control techniques and circuits. Electromagnetic compatibility and PCB design for power converters will be discussed, as well.		
BE2M34ZETA	Custom Electronics Design	KZ	6
	The course deals with the design methodology of advanced custom electronics. The aim is to convert theoretical knowledge of previous studies into specific proposals for practical applications. Student are getting familiar with the problems encountered in the professional electronic design and manufacturing. This course is based on real experience in development and production, showing the latest technological trends and component base.		
BE2M37AMP	Microprocessor Applications	Z,ZK	6
	The aim of the course is to familiarize students with the properties of microprocessor systems, teach them to effectively use the internal peripherals of the processor, connect external circuits to the processor bus, and create a moderately complex microprocessor system. Students will learn to write programs in the C language and possibly combine it with the symbolic address language.		
BE2M37ART	Architecture of Radio Receivers and Transmitters	Z,ZK	6
	The subject deals with the architecture of the radio receivers and transmitters and software radio. The student s familiarize with the design and the modern methods of optimization of the radio receivers and transmitters' functional blocks and with the phenomena related with frequency conversion, noise sources and noise analyses. They learn conceptual radio receiver and transmitter design, including the level and frequency plans and their optimization. The course also deals with the digital signal processing blocks of the modern radio receivers and their practical implementation.		
BE2M37EAK	Electroacoustics	Z,ZK	6
	The course introduces the principles of electroacoustic and electromechanical transducers from the perspective of physicas background and technological solutions. It also focuses on methods of analysis of transducers and electroacoustic systems. The main topics are acoustic transmitters (speakers, actuators) and acoustic receivers (microphones, sensors) and the principles of electroacoustic conversion used in them, as well as related electrical and acoustic systems (crossovers, baffles, waveguides) and, last but not least, measurement and calibration.		
BE2M37OBFA	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.		
BE2MPROJ6	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. List of possible topics: http://www.fel.cvut.cz/en/education/semestral-projects.html		
BE3M38ASE	Automotive sensors and networks	Z,ZK	6
	The course provides students with a deeper insight into the functional principles of advanced sensor systems in cars, methods of signal processing in sensors and explains how to use them in vehicle subsystems. It also deals with distributed vehicle systems for real-time control and methods of their testing. Theoretical lectures are complemented by practical laboratory teaching with real elements (ECUs, sensors) of modern vehicles.		
BE4M35PAP	Advanced Computer Architectures	Z,ZK	6
BE4M38AVS	Application of Embedded Systems	Z,ZK	6
	This course presents applications of embedded systems and their specifics. It is expected that the students have had a programming course, and thus the course is more oriented on explaining and describing the blocks and functions of embedded systems and their use in signal processing, rather than writing code. After completing this course, students should		

	have an overview of usability and power of available processors, and their peripherals, on the basis of which, they should be able to independently design embedded systems for a wide spectrum of applications.		
BEAM17EMC	Introduction to Electromagnetic Compatibility	Z,ZK	6
	The course dwells on problems of electromagnetic compatibility. Students obtain the basic knowledges in the field of electromagnetic compatibility - electromagnetic interference, susceptibility and testing methods. The course leads to gain professional skills in the field of electrical engineering.		
BECM33DPL	Deep Learning Essentials	Z,ZK	6
	The course teaches deep learning methods on known robotic problems, such as semantic segmentation or reactive motion control. The overall goal is timeless, universal knowledge rather than listing all known deep learning architectures. Students are assumed to have working prior knowledge of mathematics (gradient, jacobian, hessian, gradient descent, Taylor polynomial) and machine learning (Bayes risk minimization, linear classifier). The labs are divided into two parts; in the first one, the students will solve elementary deep ML tasks from scratch (including the reimplementation of autograd backpropagation), and in the second one, students will build on existing templates in order to solve complex tasks including RL, vision transformers and generative networks. This course is part of inter-university program prg.ai Minor. This program includes the best of AI education in Prague with the goal to provide the students depper and broader view of arificial intelligence. More info on the program web https://prg.ai/minor.		

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