Study plan

Name of study plan: Electrical Engineering and Computer Science (EECS)

Faculty/Institute/Others: Faculty of Electrical Engineering

Department:

Branch of study guaranteed by the department: Common courses

Garantor of the study branch:

Program of study: Electrical Engineering and Computer Science

Type of study: Bachelor full-time

Required credits: 160 Elective courses credits: 20 Sum of credits in the plan: 180

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 122

The role of the block: P

Code of the group: 2018_BEECSBAP Name of the group: Bachelor Thesis

Requirement credits in the group: In this group you have to gain 20 credits

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

Credits in the group: 20 Note on the group:

	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
BEBAP20	Bachelor thesis	Z	20	12S	L,Z	Р

Characteristics of the courses of this group of Study Plan: Code=2018_BEECSBAP Name=Bachelor Thesis

BEBAP20	Bachelor thesis	Z	20
Independent final thesis	s of a bachelor's study of a complex nature. The student chooses the topic of the thesis from the list of topics related to the stu	udied program, wl	nich are listed by
the FEL departments at	t KOS. The thesis will be defended before the commission for state final exams		

Code of the group: 2018_BEECSP

Name of the group: Compulsory subjetcs of the programme

Requirement credits in the group: In this group you have to gain 102 credits

Requirement courses in the group: In this group you have to complete at least 18 courses

Credits in the group: 102

Note on the group:

Note on the gr	`					
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
BEEZZ	Basic health and occupational safety regulations Radek Havlí ek, Vladimír K la, Ivana Nová Radek Havlí ek Vladimír K la (Gar.)	Z	0	2BP+2BC	Z	Р
BE5B16EPD	Business Economics Tomáš Podivínský Tomáš Podivínský (Gar.)	KZ	4	2P+2S	Z,L	Р
BE5B01MA1	Calculus 1 Paola Vivi Paola Vivi (Gar.)	Z,ZK	7	4P+2S	Z	Р
BE5B01MA2	Calculus 2 Paola Vivi Paola Vivi Petr Habala (Gar.)	Z,ZK	7	4P+2S	L	Р
BE5B01DEN	Differential Equations&Numerical Methods Petr Habala Petr Habala (Gar.)	Z,ZK	7	4P+2C	L	Р
BE5B01DMG	Discrete Mathematics and Graphs Daniel Gromada Marie Demlová Marie Demlová (Gar.)	Z,ZK	5	3P+1S	Z	Р
BE5B34ELP	Electron Devices Adam Bou a Adam Bou a Pavel Hazdra (Gar.)	Z,ZK	5	2P+2L	L	Р

BE5B31ZEO	Fundamentals of Electrical Circuits Pavel Máša Pavel Máša Ji í Hospodka (Gar.)	Z,ZK	5	2P+2S	Z	Р
BE5B01LAL	Linear Algebra Paola Vivi Paola Vivi Paola Vivi (Gar.)	Z,ZK	8	4P+2S	Z	Р
BE5B15MAA	Mathematical Applications Stanislav Vítek, Jan Kyncl, Václav Vencovský Jan Kyncl Jan Kyncl (Gar.)	Z,ZK	4	0P+4C	L	Р
BE5B34MIK	Microcontrollers Tomáš Teplý, Vladimír Janí ek Tomáš Teplý Vladimír Janí ek (Gar.)	Z,ZK	6	2P+2L	L	Р
BE5B02PH1	Physics 1 Stanislav Pekárek, Jaroslav Jíra Stanislav Pekárek Stanislav Pekárek (Gar.)	Z,ZK	8	4P+1L+2C	L	Р
BE5B02PH2	Physics 2 Stanislav Pekárek, Jaroslav Jíra Stanislav Pekárek Stanislav Pekárek (Gar.)	Z,ZK	7	3P+1L+2C	Z	Р
BE5B01PRS	Probability and Statistics Kate ina Helisová Kate ina Helisová (Gar.)	Z,ZK	7	4P+2S	Z	Р
BE5B33PRG	Programming Essentials Milan N mý Tomáš Svoboda Tomáš Svoboda (Gar.)	Z,ZK	6	2P+2C	Z	Р
BE5B33PGE	Programming for Engineers Marko Genyk-Berezovskyj Marko Genyk-Berezovskyj Marko Genyk-Berezovskyj (Gar.)	Z,ZK	6	2P+2C	L	Р
BE5B99PRO	Project Jaroslav Knápek, Jan Jandera Jan Jandera Jaroslav Knápek (Gar.)	Z	10	2P+2S+6D	Z	Р
BEEZB	Safety in Electrical Engineering for a bachelor's degree Radek Havlí ek, Vladimír K la, Ivana Nová Radek Havlí ek Vladimír K la (Gar.)	Z	0	2BP+2BC	Z,L	Р

BEEZB	Radek Havlí ek, Vladimír K la, Ivana Nová Radek Havlí ek (Gar.)	Vladimír K la	Z	0 2	BP+2BC	Z,L	Р
Characteristics of the	courses of this group of Study Plan: Code=2018_I	BEECSP Na	me=Compuls	ory subje	etcs of th	e progra	mme
BEEZZ Bas The guidelines were worked which was provided by the R	sic health and occupational safety regulations out based on The Training Scheme for Health and Occupational Safet ector's Office of the CTU. Safety is considered one of the basic duties	y designed for e	mployees and stud	dents of the C	Zzech Techr	Z nical Univers	0 sity in Prague,
	and permanent part of qualification requirements. This program is oblisiness Economics	ligatory.			k	Z	4
	ess, corporation life cycle. Cost classification, cost calculation, cost c	urves. Profit. pro	duction, price and	cost relation			•
_	Business plan. Management functions, corporation organizational sch	-	· ·				
BE5B01MA1 Cal	culus 1				Z.	ZK	7
	calculus of functions of one variable. It starts with limit and continuity	of functions, de	rivative and its ge	ometrical me	aning and p	roperties, g	raphing of
functions. Then it covers inde	finite integral, basic integration methods and integrating rational funct	ions, definite inte	egral and its applic	cations. It cor	ncludes with	introduction	n to Taylor
series.							
BE5B01MA2 Cal	culus 2				Z,	ZK	7
The subject covers an introdu	ction to the differential and integral calculus in several variables and ba	asic relations bet	ween curve and su	urface integra	ıls. Fourier s	eries are als	so introduced.
BE5B01DEN Diff	erential Equations&Numerical Methods				Z,	ZK	7
This course introduces stude	nts to the classical theory of ordinary differential equations (separable	and linear ODE:	s) and also to bsic	s of numerica	al methods (errors in cal	culations and
stability, numerical solutions	of algebraic and differential equations and their systems). The course	takes advantage	of the synnergy l	between the	oretical and	practical po	int of view.
BE5B01DMG Dis	crete Mathematics and Graphs				Z,	ZK	5
The aim of the course is to in	troduce students to fundamentals of Discrete Mathematics with focus	on electrical en	gineering. The cor	ntent of the c	ourse cover	s fundamen	tals of
propositional and predicate lo	ogic, infinite sets with focus on the notion of cardinality of sets, binary	relations with foo	us on equivalence	es and partia	l orderings;	integers, rel	ation modulo;
algebraic structures including	Boolean algebras. Further, the course covers basics of the Theory o	f Graphs.					
BE5B34ELP Ele	ctron Devices				Z,	ZK	5
This course introduces the ba	asic theory, principles of operation and properties of electron devices.	Physical princip	es of operation, d	evice structu	res and cha	racteristics	are explained
together with adequate mode	ls for small- and large-signal. Basic applications in analogue and digi	tal electronics ar	e examined. In se	minars and la	abs, studen	ts are introd	uced to basic
· · · · ·	n, measurement of device characteristics and extraction of device par	ameters. Operat	ion of electron de	vices in elect	ronic device	s is then an	alyzed using
the Spice simulator.							
BE5B31ZEO Fur	ndamentals of Electrical Circuits				Z,	ZK	5
•	nental methods of electrical circuit analysis. After a brief introductory	•					
· ·	ctive circuit elements are then defined. Next, basic circuit quantities a			-			-
	rems, an analysis of DC circuits, AC circuits, first-order and second-or		-		-		
, , ,	n, pulse excitation) is done. The seminars are focused on getting a th	eoretical experie	nce in analysis of	electrical cir	cuits, supple	emented wit	h simulations
and simple measurement.							
	ear Algebra				1 '	ZK	8
	pasics of matrix calculus (determinants, inverse matrix) and linear alg			luct spaces, l	linear transf	ormations) i	ncluding
	s. Matrix similarity, orthogonal bases, and bilinear and quadratic forms	s are also covere	ed.				
					Z,	ZK	4
	thematical Applications						
mathematical model assessn	otain knowledge about mathematic programs used in electrical engine	eering. Student v	vill acquire basic k	nowledge ab	out MATLA	B, MATHEN	IATICA and
	otain knowledge about mathematic programs used in electrical engine ment.	eering. Student v	vill acquire basic k	knowledge ab			
	otain knowledge about mathematic programs used in electrical engine nent. rocontrollers				Z,	ZK	6
The goal of this course is to r	otain knowledge about mathematic programs used in electrical enginement. Procontrollers Prokument acquainted with recent interesting applications, smart sections.	sensors circuits	and peripherals ha	andled by mid	Z,	ZK rs. In a lab s	6 tudents will
The goal of this course is to reprogram their own application	otain knowledge about mathematic programs used in electrical enginement. Procontrollers nake students acquainted with recent interesting applications, smart in and measure its properties. Because of usage of a programming lar	sensors circuits	and peripherals ha	andled by mid	Z, crocontrolle	ZK rs. In a lab s the realizat	6 tudents will ion.
The goal of this course is to reprogram their own application BE5B02PH1 Physics	otain knowledge about mathematic programs used in electrical enginement. Procontrollers make students acquainted with recent interesting applications, smart in and measure its properties. Because of usage of a programming lares is 1	sensors circuits and aguage C it will be	and peripherals had been been been been been been been bee	andled by mid s on the prac	Z, crocontrollectical part of	ZK rs. In a lab s the realizat	6 tudents will ion.
The goal of this course is to reprogram their own application BE5B02PH1 Phys The basic course of physics at	otain knowledge about mathematic programs used in electrical enginement. Procontrollers nake students acquainted with recent interesting applications, smart in and measure its properties. Because of usage of a programming lar visics 1 at the Faculty of Electrical Engineering - Physics 1, is devoted to the interest.	sensors circuits and aguage C it will but	and peripherals ha e possible to focu wo important area	andled by mid s on the practs	Z, crocontrolled ctical part of Z,	ZK rs. In a lab s the realizat ZK e is a classic	6 tudents will ion. 8 cal mechanics
The goal of this course is to reprogram their own application BE5B02PH1 Physics a and the second one is the ele	otain knowledge about mathematic programs used in electrical enginement. Procontrollers Inake students acquainted with recent interesting applications, smart in and measure its properties. Because of usage of a programming lar visics 1 In the Faculty of Electrical Engineering - Physics 1, is devoted to the inctric and magnetic field. Within the framework of the classical mechanic	sensors circuits and aguage C it will be troduction into the circ, the students	and peripherals had possible to focutive important areas study the particle	andled by mid s on the praces s of physics.	Z, crocontroller ctical part of Z, The first one dynamics of	ZK rs. In a lab s the realizat ZK e is a classic the mass pa	6 tudents will ion. 8 all mechanics urticle, system
The goal of this course is to reprogram their own application BE5B02PH1 Phy The basic course of physics a and the second one is the ele of mass particles and rigid both.	otain knowledge about mathematic programs used in electrical enginement. Procontrollers That the Faculty of Electrical Engineering - Physics 1, is devoted to the inctric and magnetic field. Within the framework of the classical mechanishies. The students should be able to solve basic problems dealing with the field.	sensors circuits anguage C it will but troduction into the students the the description	and peripherals had be possible to focular wo important areas study the particle on of mechanical states.	andled by mid s on the praces s of physics. kinematics; d ystems, whice	Z, crocontroller stical part of Z, The first one lynamics of the they can re-	ZK rs. In a lab s the realizat ZK e is a classic the mass pa meet during	6 tudents will ion. 8 cal mechanics irticle, system their further
The goal of this course is to reprogram their own application BE5B02PH1 Phy The basic course of physics a and the second one is the ele of mass particles and rigid by studies. The classical mechanisms	otain knowledge about mathematic programs used in electrical enginement. Procontrollers Inake students acquainted with recent interesting applications, smart in and measure its properties. Because of usage of a programming lar visics 1 In the Faculty of Electrical Engineering - Physics 1, is devoted to the inctric and magnetic field. Within the framework of the classical mechanic	sensors circuits and aguage C it will be stroduction into twices, the students the description and control of the descriptio	and peripherals had be possible to focular or important areas study the particle on of mechanical stary as well as non	andled by mid s on the prace s of physics. kinematics; d ystems, whice -stationary. T	Z, crocontrolled stical part of Z, The first one dynamics of the students	ZK rs. In a lab s the realizat ZK e is a classic the mass pa meet during can use the	6 tudents will ion. 8 cal mechanics irticle, system their further e facts gained

consecutive course Physics 2.

BE5B02PH2	Physics 2	Z,ZK	7
Within the framework of	this course the students will first of all learn foundations of thermodynamics. Following topic - the theory of waves - will give	to the students ba	sic insight into
the properties of waves	and will help to the students to understand that the presented description of the waves has a universal character in spite of	the waves characte	er. Particular
types of waves, such as	s acoustic or optical waves are the subjects of the following section. Quantum mechanics and nuclear physics will complete t	he student?s gene	ral education in
physics. The knowledge	gained in this course will help to the students in study of such modern areas as robotics, computer vision, measuring technique	e and will allow the	m to understand
the principles of novel to	echnologies and functioning of new electronic devices.		
BE5B01PRS	Probability and Statistics	Z,ZK	7
Introduction to the theor	ry of probability, mathematical statistics and computing methods together with their applications of praxis.		
BE5B33PRG	Programming Essentials	Z,ZK	6
The course focuses on	understanding and mastering basic design principles of algorithms. It develops data abstraction coupled with the essential pro	gramming pattern	s. The emphasis
is on creating readable	and reusable programs.		
BE5B33PGE	Programming for Engineers	Z,ZK	6
BE5B99PRO	Project	Z	10
An individual student pr	oject. The student works on a topic of his or her interest under supervision of a faculty staff member. The topic selection is si	upposed to be con	sulted with the
tutor. Aside the individua	al work and consultancies the project course is accompanied by lectures and practical seminars about economic aspects of	projects, presenta	tion skills and
technical writing.			
BEEZB	Safety in Electrical Engineering for a bachelor's degree	Z	0
The purpose of the safe	ty course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from oper	ation of it. This intr	oductory course
contains fundamentals	of Safety Electrical Engineering. In this way the students receive qualification of instructed person that enables them to work	on electrical equip	ment.

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 38

The role of the block: PV

Code of the group: 2018_BEECSPV

Name of the group: Compulsory subjetcs of the branch

Requirement credits in the group: In this group you have to gain at least 38 credits (at most 87)

Requirement courses in the group: In this group you have to complete at least 7 courses

Credits in the group: 38 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
BE5B33ALG	Algorithms Marko Genyk-Berezovskyj Marko Genyk-Berezovskyj Marko Genyk-Berezovskyj (Gar.)	Z,ZK	6	2P+2C	Z	PV
BE5B35ARI	Automatic Control Martin Hrom ík, Tomáš Haniš Tomáš Haniš Martin Hrom ík (Gar.)	Z,ZK	7	4P+2L	L	PV
BE5B99CPL	C Programming Language Tomáš Krajník, Yuliia Prokop Jan Faigl Jan Faigl (Gar.)	Z,ZK	6	2P+2C+5D	Z	PV
BE5B32PKS	Computer and Communication Networks Leoš Bohá, Tomáš Van k, Pavel Bezpalec Zbyn k Kocur Leoš Bohá (Gar.)	Z,ZK	6	2P + 2C	Z	PV
BE5B35APO	Computer Architectures Pavel Píša, Richard Šusta Pavel Píša Pavel Píša (Gar.)	Z,ZK	6	2P+2L	L	PV
BE5B33KUI	Cybernetics and Artificial Intelligence Tomáš Svoboda, Petr Pošík Tomáš Svoboda Tomáš Svoboda (Gar.)	Z,ZK	6	2P+2C	L	PV
BE5B14SP1	Electric Machinery and Apparatus 1 Pavel Mindl, Miroslav Chomát Pavel Mindl Pavel Mindl (Gar.)	Z,ZK	5	3P+2L	L	PV
BE5B17EMT	Electromagnetic Field Theory Jan Machá, Zbyn k Škvor Zbyn k Škvor (Gar.)	Z,ZK	6	3P+2C	Z	PV
BE5B35LSP	Logic Systems and Processors Richard Šusta, Martin Hlinovský Martin Hlinovský Richard Šusta (Gar.)	Z,ZK	6	3P+2L	Z	PV
BE5B13MVE	Materials for Power Electrical Engineering Jan Zemen, Pavel Ctibor, Pavel Mach, Josef Sedlá ek, Karel Dušek, Neda Neykova Pavel Mach Pavel Mach (Gar.)	Z,ZK	5	2P+2L	Z	PV
BE5B33RPZ	Pattern Recognition and Machine Learning Ond ej Drbohlav, Ji í Matas, Jan Šochman Ji í Matas Ji í Matas (Gar.)	Z,ZK	6	2P+2C	Z	PV
BE5B15EN1	Power Engineering 1 Ivo Doležel, Zden k Müller Zden k Müller (Gar.)	Z,ZK	5	2P+2C	L	PV
BE5B15EN2	Power Engineering 2 Zden k Müller	Z,ZK	6	2P+2L	Z	PV
BE5B38SME	Sensors and Measurement Pavel Ripka, Mattia Butta Mattia Butta Pavel Ripka (Gar.)	Z,ZK	6	4P+2L	Z	PV
BE5B31TES	Signal Theory Radoslav Bortel Radoslav Bortel (Gar.)	Z,ZK	5	2P+2C	L	PV

Characteristics of the courses of this group of Study Plan: Code=2018_BEECSPV Name=Compulsory subjetcs of the branch

BE5B33ALG **Algorithms** In the course, the algorithms development is constructed with minimum dependency to programming language; nevertheless the lectures and seminars are based on Python. Basic data types a data structures, basic algorithms, recursive functions, abstract data types, stack, queues, trees, searching, sorting, special application algorithms, Dynamic programming. Students are able to design and construct non-trivial algorithms and to evaluate their affectivity. **Automatic Control** Foundation course of automatic control. Introduction to basic concepts and properties of dynamic systems of physical, engineering, biological, economics, robotics and informatics nature. Basic principles of feedback and its use as a tool for altering the behavior of systems and managing uncertainty. Classical and modern methods for analysis and design of automatic control systems. Students specialized in systems and control will build on these ideas and knowledge in the advanced courses to follow. Students of other branches and programs will find out that control is a inspiring, ubiquitous and entertaining field worth of a future cooperation. BE5B99CPL C Programming Language Z,ZK The course provides complete knowledge of the C programming language regarding a program structure operation, memory access, and multi-thread applications. The course emphasis a ?good? programming style to develop clean, easy-to-read, and re-usable code. Students are introduced into the process of the source code compilation and active debugging. Lectures introduce basic code structures and demonstration applications which link together partial constructs and practical coding aiming for cleanliness and structure of the source code, computational efficiency optimized using code profiling and debugging. Students are introduced into the fundamental principles of parallel multi-thread programming, synchronization mechanism and multi-thread application models. The end of the course presents introduction to principles of object oriented programming and C++. BE5B32PKS Computer and Communication Networks Z,ZK 6 The aim of the course is to familiarize students with current trends in the switched local networks and the key functions of routing protocols in IP networks. The course is aimed rather primarily practically then theoretically. Computer Architectures BE5B35APO 6 Subject provides overview of basic building blocks of computer systems. Explanation starts from hardware side where it extends knowledge presented in the previous lectures of Structures of computer systems. Topics cover building blocks description, CPU structure, multiple processors interconnections, input/output subsystem and basic overview of network and buses topologies. Emphasis is placed on clarification of interconnection of hardware components with software support, mainly lower levels of operating systems, device drivers and virtualization techniques. General principles are more elaborated during presentation of examples of multiple standard CPU architectures. Exercises are more focused on the software view to the contrary. Students are lead from basic programming on CPU level to the interaction with raw hardware. Cybernetics and Artificial Intelligence The course introduces the students into the field of artificial intelligence and gives the necessary basis for designing machine control algorithms. It advances the knowledge of state space search algorithms by including uncertainty in state transition. Students are introduced into reinforcement learning for solving problems when the state transitions are unknown, which also connects the artificial intelligence and cybernetics fields. Bayesian decision task introduces supervised learning. Learning from data is demonstrated on a linear classifier. Students practice the algoritms in computer labs. BE5B14SP1 Electric Machinery and Apparatus 1 Z,ZK 5 Electric drive and its components. Electromechanical energy conversion. Rotational converters - DC machines, induction motors, synchronous generators and motors. Special electric machines, actuators. Static converters - transformers. There are presented operational principles, main constructional scheme and characteristics, applications. Switching theory. Interaction between turn-off switch and switched circuit. Basic theory and characteristic of electric arc. Transient recovery voltage. Switching overvoltage. Low voltage protection apparatuses BE5B17EMT **Electromagnetic Field Theory** Z.ZK This course presents fundamentals of electromagnetic field theory and its applications. Analysis methods proper for static, stationary as well as dynamic fields and waves in free space and on basic transmission lines are presented as well. This course provides students with physics - based view on studied effects, which is applied then on engineering problems. At the end of the course, all effects should not only be described, but quantified as well. Basic knowledge and insight into communication devices, systems and techniques is provided, applicable not only to systems currently taught in other courses, but to future systems as well. BE5B35LSP Logic Systems and Processors Z,ZK The course introduces the basic hardware structures of computing resources, their design, and architecture. It provides an overview of the possibilities of performing data operations at the hardware level and the design of embedded processor systems with peripherals on modern FPGA programmable logic circuits, which are increasingly widely used today. Students will learn their description in VHDL, from logic to more complex sequential circuits to practical finite state machine (FSM) designs. They will also master the correct design procedure using circuit simulation. Practical problems are solved using development boards used at hundreds of leading universities around the world. The course ends with RISC-V processor structure, cache, and pipeline processing. Materials for Power Electrical Engineering At first a physical description of basic properties and basic types of materials for electrical engineering is carried out. Types of conductors, superconductors, insulators, magnetic materials and semiconductors, which are used in power electrical engineering, are presented. The stress is put on relationships between properties, technology and the use. The student will meet, in higher detail, with ceramics for electrical engineering, with properties of mica, glass and their applications, with environmental conductive joining, with materials for thin and thick films and with selected nanomaterials and their applications. Pattern Recognition and Machine Learning Z,ZK 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. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor. BE5B15EN1 Power Engineering 1 Z,ZK 5 The course informs students about basic principles and topologies of electrical transmission and distribution systems. There are explained key system elements and their parameters, steady, transient and failure phenomena, main rules for dimensioning and protecting. Power Engineering 2 This course is an introduction to the field of thermodynamic processes in thermal power plants, energy balances and structure of various renewable and conventional energy production technologies. Students will became also familiar with individual components of self consumption of power plants. The power generation and distribution are linked to high voltage systems and insulation materials. The fundamental theory of often used insulation materials and their propertis will be explained. Lightning and switching overvoltages and their impact to the insulation of electric power system will be discussed at the end of the course. BE5B38SME Sensors and Measurement 7.7K 6 Basic circuits and instruments for measurement of electrical quantities, AD and DA converters, sensors focused to use in robotics and automation, intelligent sensors, methods of decreasing uncertainties Z,ZK BE5B31TES Signal Theory Course explains basic terms and methods for representation and analysis of continuous-time and discrete-time signals and systems. Representations of signals and systems in continuous and discrete-time is developed for time and frequency domains through the Fourier transform. Bode and Nyquist plots as well as the Laplace transform and the Z-transform are used for stability analysis of feedback systems. Linearization by small-signal analysis is introduced. Filtering and filter design, sampling and interpolation are discussed. Analog and pulse modulation fundamentals and their characteristics are introduced. Characteristics of band-pass signals are discussed, including Hilbert transform and complex envelope. Fundamentals of random signals and their parameters are reviewed.

Name of the block: Elective courses
Minimal number of credits of the block: 0

The role of the block: V

Code of the group: 2018_BEECSVOL

Name of the group: Elective special subjects

Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code

BE5B01DEN

~Student can choose arbitrary subject of the bachelor's program (EEM - Electrical Engineering, Power Engineering and Management, KME - Communications, Multimedia and Electronics, KYR - Cybernetics and Robotics, OI - Open Informatics, OES - Open Electronics Systems) which is not part of his curriculum. Student can choose with consideration of recommendation of the branch guarantee.\\

Completion

Credits

List of courses of this pass:

Name of the course

Differential Equations&Numerical Methods

DEODO IDEIN	Differential Equations are interiors	_,	
	ices students to the classical theory of ordinary differential equations (separable and linear ODEs) and also to bsics of numerical metho		
stability, numerica	al solutions of algebraic and differential equations and their systems). The course takes advantage of the synnergy between theoretical	and practical po	int of view.
BE5B01DMG	Discrete Mathematics and Graphs	Z,ZK	5
The aim of the o	course is to introduce students to fundamentals of Discrete Mathematics with focus on electrical engineering. The content of the cours	e covers fundam	entals of
oropositional and pr	redicate logic, infinite sets with focus on the notion of cardinality of sets, binary relations with focus on equivalences and partial orderin	gs; integers, rela	ion modulo;
	algebraic structures including Boolean algebras. Further, the course covers basics of the Theory of Graphs.		
BE5B01LAL	Linear Algebra	Z,ZK	8
The course cover	rs standard basics of matrix calculus (determinants, inverse matrix) and linear algebra (basis, dimension, inner product spaces, linear	transformations)	including
	eigenvalues and eigenvectors. Matrix similarity, orthogonal bases, and bilinear and quadratic forms are also covered.		
BE5B01MA1	Calculus 1	Z.ZK	7
It is an introductor	ry course to calculus of functions of one variable. It starts with limit and continuity of functions, derivative and its geometrical meaning	and properties, o	raphing of
functions. Then it	covers indefinite integral, basic integration methods and integrating rational functions, definite integral and its applications. It conclude:	s with introduction	n to Taylor
	series.		,
BE5B01MA2	Calculus 2	Z,ZK	7
	an introduction to the differential and integral calculus in several variables and basic relations between curve and surface integrals. Fouri	•	l
BE5B01PRS		Z,ZK	7
DESDO II INS	Introduction to the theory of probability, mathematical statistics and computing methods together with their applications of prax	•	,
BE5B02PH1		Z,ZK	8
	Physics 1	•	_
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BE5B15EN2 Power Engineering 2 Z,ZK 6 This course is an introduction to the field of thermodynamic processes in thermal power plants, energy balances and structure of various renewable and conventional energy production technologies. Students will became also familiar with individual components of self consumption of power plants. The power generation and distribution are linked to high voltage systems and insulation materials. The fundamental theory of often used insulation materials and their propertis will be explained. Lightning and switching overvoltages and their impact to the insulation of electric power system will be discussed at the end of the course. BE5B15MAA Mathematical Applications Z.ZK The aim of the course is to obtain knowledge about mathematic programs used in electrical engineering. Student will acquire basic knowledge about MATLAB, MATHEMATICA and mathematical model assessment. BE5B16EPD **Business Economics** Targets and function of business, corporation life cycle. Cost classification, cost calculation, cost curves. Profit, production, price and cost relation. Taxes. Financial calculus and investment decision-making. Business plan. Management functions, corporation organizational schemes. Processes and firm management. BE5B17EMT Electromagnetic Field Theory This course presents fundamentals of electromagnetic field theory and its applications. Analysis methods proper for static, stationary as well as dynamic fields and waves in free space and on basic transmission lines are presented as well. This course provides students with physics - based view on studied effects, which is applied then on engineering problems. At the end of the course, all effects should not only be described, but quantified as well. Basic knowledge and insight into communication devices, systems and techniques is provided, applicable not only to systems currently taught in other courses, but to future systems as well. BE5B31TES Signal Theory Z,ZK Course explains basic terms and methods for representation and analysis of continuous-time and discrete-time signals and systems. Representations of signals and systems in continuous and discrete-time is developed for time and frequency domains through the Fourier transform. Bode and Nyquist plots as well as the Laplace transform and the Z-transform are used for stability analysis of feedback systems. Linearization by small-signal analysis is introduced. Filtering and filter design, sampling and interpolation are discussed. Analog and pulse modulation fundamentals and their characteristics are introduced. Characteristics of band-pass signals are discussed, including Hilbert transform and complex envelope. Fundamentals of random signals and their parameters are reviewed. BE5B31ZEO Fundamentals of Electrical Circuits The subject describes fundamental methods of electrical circuit analysis. After a brief introductory part where the difference between an electrical device and its models is introduced, the basic ideal passive and active circuit elements are then defined. Next, basic circuit quantities are defined; lectures are then focused on important laws and methods of analysis of electrical circuits. Circuit theorems, an analysis of DC circuits, AC circuits, first-order and second-order circuits are described. Finally, a brief description of more sophisticated methods of analysis (Laplace transform, pulse excitation) is done. The seminars are focused on getting a theoretical experience in analysis of electrical circuits, supplemented with simulations and simple measurement. BE5B32PKS Computer and Communication Networks Z,ZK 6 The aim of the course is to familiarize students with current trends in the switched local networks and the key functions of routing protocols in IP networks. The course is aimed rather primarily practically then theoretically. BE5B33ALG Algorithms In the course, the algorithms development is constructed with minimum dependency to programming language; nevertheless the lectures and seminars are based on Python. Basic data types a data structures, basic algorithms, recursive functions, abstract data types, stack, queues, trees, searching, sorting, special application algorithms, Dynamic programming. Students are able to design and construct non-trivial algorithms and to evaluate their affectivity. Cybernetics and Artificial Intelligence BE5B33KUL The course introduces the students into the field of artificial intelligence and gives the necessary basis for designing machine control algorithms. It advances the knowledge of state space search algorithms by including uncertainty in state transition. Students are introduced into reinforcement learning for solving problems when the state transitions are unknown, which also connects the artificial intelligence and cybernetics fields. Bayesian decision task introduces supervised learning. Learning from data is demonstrated on a linear classifier. Students practice the algoritms in computer labs. BE5B33PGE Programming for Engineers Z,ZK 6 BE5B33PRG **Programming Essentials** 7.7K 6 The course focuses on understanding and mastering basic design principles of algorithms. It develops data abstraction coupled with the essential programming patterns. The emphasis is on creating readable and reusable programs. BE5B33RPZ 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. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor. BE5B34ELP **Electron Devices** Z,ZK 5 This course introduces the basic theory, principles of operation and properties of electron devices. Physical principles of operation, device structures and characteristics are explained together with adequate models for small- and large-signal. Basic applications in analogue and digital electronics are examined. In seminars and labs, students are introduced to basic principles of device simulation, measurement of device characteristics and extraction of device parameters. Operation of electron devices in electronic devices is then analyzed using the Spice simulator. BE5B34MIK Microcontrollers The goal of this course is to make students acquainted with recent interesting applications, smart sensors circuits and peripherals handled by microcontrollers. In a lab students will program their own application and measure its properties. Because of usage of a programming language C it will be possible to focus on the practical part of the realization. BE5B35APO **Computer Architectures** Z,ZK Subject provides overview of basic building blocks of computer systems. Explanation starts from hardware side where it extends knowledge presented in the previous lectures of Structures of computer systems. Topics cover building blocks description, CPU structure, multiple processors interconnections, input/output subsystem and basic overview of network and buses topologies. Emphasis is placed on clarification of interconnection of hardware components with software support, mainly lower levels of operating systems, device drivers and virtualization techniques. General principles are more elaborated during presentation of examples of multiple standard CPU architectures. Exercises are more focused on the software view to the contrary. Students are lead from basic programming on CPU level to the interaction with raw hardware. BE5B35ARI **Automatic Control** Foundation course of automatic control. Introduction to basic concepts and properties of dynamic systems of physical, engineering, biological, economics, robotics and informatics nature. Basic principles of feedback and its use as a tool for altering the behavior of systems and managing uncertainty. Classical and modern methods for analysis and design of automatic control systems. Students specialized in systems and control will build on these ideas and knowledge in the advanced courses to follow. Students of other branches and programs will find out that control is a inspiring, ubiquitous and entertaining field worth of a future cooperation. BE5B35LSP Logic Systems and Processors Z,ZK The course introduces the basic hardware structures of computing resources, their design, and architecture. It provides an overview of the possibilities of performing data operations at the hardware level and the design of embedded processor systems with peripherals on modern FPGA programmable logic circuits, which are increasingly widely used today. Students will learn their description in VHDL, from logic to more complex sequential circuits to practical finite state machine (FSM) designs. They will also master the correct design procedure

using circuit simulation. Practical problems are solved using development boards used at hundreds of leading universities around the world. The course ends with RISC-V processor structure, cache, and pipeline processing. Z.ZK BE5B38SME Sensors and Measurement 6 Basic circuits and instruments for measurement of electrical quantities, AD and DA converters, sensors focused to use in robotics and automation, intelligent sensors, methods of decreasing uncertainties. BE5B99CPL C Programming Language The course provides complete knowledge of the C programming language regarding a program structure operation, memory access, and multi-thread applications. The course emphasis a ?good? programming style to develop clean, easy-to-read, and re-usable code. Students are introduced into the process of the source code compilation and active debugging. Lectures introduce basic code structures and demonstration applications which link together partial constructs and practical coding aiming for cleanliness and structure of the source code, computational efficiency optimized using code profiling and debugging. Students are introduced into the fundamental principles of parallel multi-thread programming, synchronization mechanism and multi-thread application models. The end of the course presents introduction to principles of object oriented programming and C++. BE5B99PRO Project An individual student project. The student works on a topic of his or her interest under supervision of a faculty staff member. The topic selection is supposed to be consulted with the tutor. Aside the individual work and consultancies the project course is accompanied by lectures and practical seminars about economic aspects of projects, presentation skills and technical writing. Ζ BEBAP20 Bachelor thesis 20 Independent final thesis of a bachelor's study of a complex nature. The student chooses the topic of the thesis from the list of topics related to the studied program, which are listed by the FEL departments at KOS. The thesis will be defended before the commission for state final exams. Safety in Electrical Engineering for a bachelor's degree The purpose of the safety course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from operation of it. This introductory course contains fundamentals of Safety Electrical Engineering. In this way the students receive qualification of instructed person that enables them to work on electrical equipment. BFF*77* Basic health and occupational safety regulations 7 The guidelines were worked out based on The Training Scheme for Health and Occupational Safety designed for employees and students of the Czech Technical University in Prague, which was provided by the Rector's Office of the CTU. Safety is considered one of the basic duties of all employees and students. The knowledge of Health and Occupational Safety

regulations forms an integral and permanent part of qualification requirements. This program is obligatory.

For updated information see http://bilakniha.cvut.cz/en/f3.html Generated: day 2024-05-19, time 17:34.