Study plan

Name of study plan: Cybernetics and Robotics 2016

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: Cybernetics and Robotics Type of study: Bachelor full-time Required credits: 174 Elective courses credits: 6 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: 158 The role of the block: P

Code of the group: 2021_BKYRBAP Name of the group: Bachelor Project 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 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
BBAP20	Bachelor thesis Roman mejla Roman mejla (Gar.)	Z	20	12S	L,Z	Р

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Characteristics of the courses of this group of Study Plan: Code=2021_BKYRBAP Name=Bachelor Project

BBAP20	Bachelor thesis
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Code of the group: 2021_BKYRBBE

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

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 2 courses Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BEZB	Safety in Electrical Engineering for a Bachelor's Degree Ivana Nová, Radek Havlí ek, Vladimír K la Radek Havlí ek Vladimír K la (Gar.)	Z	0	2BP+2BC	Z,L	Р
BEZZ	Basic Health and Occupational Safety Regulations Ivana Nová, Radek Havlí ek, Vladimír K la Radek Havlí ek Vladimír K la (Gar.)	Z	0	2BP+2BC	Z	Р

Characteristics of the courses of this group of Study Plan: Code=2021_BKYRBBE Name=Safety of the bachelor's studies

BEZB	Safety in Electrical Engineering for a Bachelor's Degree	Z	0			
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 equir	pment.			
BEZZ	Basic Health and Occupational Safety Regulations	Z	0			
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 int	regulations forms an integral and permanent part of qualification requirements. This program is obligatory.					

Code of the group: 2021_BKYRP

Name of the group: Compulsory subjects of the programme

Requirement credits in the group: In this group you have to gain 138 credits

Requirement courses in the group: In this group you have to complete 24 courses

Credits in the group: 138

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		Semester	Role
B3B33ALP	Algorithms and Programming Vojt ch Vonásek Vojt ch Vonásek Vojt ch Vonásek (Gar.)	Z,ZK	6	2P+2C	Z	Р
B3B35ARI1	Automatic Control Michael Šebek, Tomáš Haniš, Martin Hrom ík Tomáš Haniš Michael Šebek (Gar.)	Z,ZK	6	4P+2L	L	Р
B0B01DRN	Differencial Equations and Numerical Analysis Petr Habala, Jakub Rondoš, Jakub Stan k, Daniel Gromada, Josef Dvo ák Petr Habala Petr Habala (Gar.)	Z,ZK	4	2P+2C	L	Ρ
B3B31EPO	Electronic Devices and Circuits Ji í Hospodka, Ond ej Brunner, Tomáš Kouba, Jan Havlík Ji í Hospodka Ji í Hospodka (Gar.)	Z,ZK	6	4P+2L	Z	Р
B3B02FY1A	Physics 1 Petr Koní ek, Michal Bedna ík Michal Bedna ík Michal Bedna ík (Gar.)	Z,ZK	7	4P+1L+2C	L	Ρ
B3B02FY2	Physics 2 Petr Koní ek, Michal Bedna ík, Marek Brothánek, Vojt ch Jandák Michal Bedna ík Michal Bedna ík (Gar.)	Z,ZK	6	3P+1L+2C	z	Ρ
B3B35HSS	Humanitní, um lecký a spole enskov dní seminá Michael Šebek, Martin Hlinovský Michael Šebek Michael Šebek (Gar.)	Z	4	3S	L	Ρ
B3B01KAT1	Complex Analysis and Transformations Martin Bohata, Hana Tur inová Martin Bohata Martin Bohata (Gar.)	Z,ZK	6	4P+2S	Z	Ρ
B3B38KDS1	Communication and Distributed Systems Jan Holub, Ji í Novák Ji í Novák Ji í Novák (Gar.)	Z,ZK	6	4P+2L	Z	Ρ
B3B33KUI	Cybernetics and Artificial Intelligence Tomáš Svoboda, Petr Pošík Tomáš Svoboda Tomáš Svoboda (Gar.)	Z,ZK	6	2P+2C	L	Ρ
B0B01LAG	Linear Algebra Jakub Rondoš, Daniel Gromada, Josef Dvo ák, Ji í Velebil, Natalie Žukovec, Mat j Dostál Ji í Velebil Ji í Velebil (Gar.)	Z,ZK	8	4P+2S	Z	Ρ
B0B35LSP	Logic systems and processors Martin Hlinovský, Richard Šusta Martin Hlinovský Zden k Hurák (Gar.)	Z,ZK	6	2P+2L	L	Ρ
B0B01LGR	Logic and Graphs Natalie Žukovec, Mat j Dostál, Alena Gollová Alena Gollová Marie Demlová (Gar.)	Z,ZK	5	3P+2S	Z,L	Р
B0B01MA1	Mathematical Analysis 1 Josef Dvo ák, Martin K epela, Josef Tkadlec, Veronika Sobotíková Josef Tkadlec Josef Tkadlec (Gar.)	Z,ZK	7	4P+2S	Z,L	Р
B0B01MA2	Mathematical Analysis 2 Martin Bohata, Hana Tur inová, Miroslav Korbelá, Petr Hájek, Jaroslav Tišer, Karel Pospíšil, Paola Vivi Petr Hájek Jaroslav Tišer (Gar.)	Z,ZK	7	4P+2S	L,Z	Р
B0B33OPT	Optimization Tornáš Werner, Petr Olšák, Mirko Navara, Tornáš Kroupa Tomáš Werner Tornáš Werner (Gar.)	Z,ZK	7	4P+2C	Z,L	Р
B0B01PST1	Probability and Statistics Kate ina Helisová Kate ina Helisová Petr Hájek (Gar.)	Z,ZK	6	4P+2S	Z	Ρ
B3B04PRE	Presentation Skills Petra Juna Jennings, Jitka Pinková Jitka Pinková Petra Juna Jennings (Gar.)	KZ	2	2C	L	Ρ
B3B36PRG	Programming in C Jan Faigl Jan Faigl (Gar.)	Z,ZK	6	2P+2C	L	Ρ
B3BPROJ5	Bachelor project Martin Hlinovský, Petr Pošík, Tomáš Drábek, Kamila Krupková, Drahomíra Hejtmanová, Šárka Hejtmanová, Jana Zichová Martin Hlinovský Martin Hlinovský (Gar.)	Z	5	4s	Z	Ρ
B3B35RO1	Robots Martin Hlinovský, Vojt ch Petrucha, Pavel Krsek, Mat j Št tka Vojt ch Petrucha Martin Hlinovský (Gar.)	ΚZ	4	1P+3L	Z	Ρ
B3B33ROB1	Robotics Vladimír Petrík Vladimír Smutný Vladimír Petrík (Gar.)	Z,ZK	6	2P+2L	Z	Р
B3B38SME1	Sensors and Measurement Vojt ch Petrucha, Pavel Ripka Vojt ch Petrucha Vojt ch Petrucha (Gar.)	Z,ZK	6	3P+2L	L	Р
B3B31SSI	Signals, systems and inference Radoslav Bortel, Michal Šimek Radoslav Bortel Radoslav Bortel (Gar.)	Z,ZK	6	4P+2C	Z	Р

Characteristics of the courses of this group of Study Plan: Code=2021_BKYRP Name=Compulsory subjects of the programme

B3B33ALP	Algorithms and Programming	Z,ZK	6
	idents a basic understanding of algorithms and programming and teach them to design, implement and test algorithms for si	-	
	f computational complexity. They will learn about basic program building blocks such as loops, conditional statements, variab		
	often used data structures (queue, stack, list, array etc) and operations on them. We will show the basic algorithms, for example a structure is Data as	ple for searching a	and sorting.
	ite simple programs in Python.	771	
B3B35ARI1	Automatic Control utomatic control. Introduction to basic concepts and properties of dynamic systems of physical, engineering, biological, econo	Z,ZK	6 d information
	of feedback and its use as a tool for altering the behavior of systems and managing uncertainty. Classical and modern method		
	ns. Students specialized in systems and control will build on these ideas and knowledge in the advanced courses to follow. S	-	-
-	at control is an inspiring, ubiquitous and entertaining field worth of a future cooperation. Students? creativity is developed in		
B0B01DRN	Differencial Equations and Numerical Analysis	Z,ZK	4
This course introduces	students to the classical theory of ordinary differential equations (separable and linear ODEs) and also to bsics of numerical m	nethods (errors in	calculations and
stability, numerical solu	ions of algebraic and differential equations and their systems). The course takes advantage of the synnergy between theoret	tical and practical	point of view.
B3B31EPO	Electronic Devices and Circuits	Z,ZK	6
	students to the basic principles and methods of analysis of electrical circuits. Defines the circuit elements and gives their elem		
	electronic systems based on analog as well as digital circuits. The course presents operational principles and methods of ana	alysis of these circ	uits with respect
to the use of cybernetic		Z,ZK	7
B3B02FY1A	Physics 1 sics at the Faculty of Electrical Engineering - Physics 1, is devoted to the introduction into two important areas of physics. The	I ' I	
	the electric and magnetic field. Within the framework of the classical mechanics, the students study the particle kinematics; dyna		
	gid bodies. The students should be able to solve basic problems dealing with the description of mechanical systems, which the		
·	echanics is followed by the relativistic mechanics, electric and magnetic field - both stationary as well as non-stationary. The		*
in this course in the stu	dy of electrical circuits, theory of electrotechnical materials or radioelectronics. Apart of this, the knowledge gained in this cou	irse is required for	the study of the
consecutive course Phy	sics 2.		
B3B02FY2	Physics 2	Z,ZK	6
	closely linked with the course Physics 1. Within the framework of this course the students will first of all learn foundations of		• ·
-	vill give to the students basic insight into the properties of waves and will help to the students to understand that the presente		
	bite of the waves character. Particular types of waves, such as acoustic or optical waves are the subjects of the following sect		
	nplete the student?s general education in physics. The knowledge gained in this course will help to the students in study of su ring technique and will allow them to understand the principles of novel technologies and functioning of new electronic devic		as robotics,
B3B35HSS		z	4
	Humanitní, um lecký a spole enskov dní seminá		
B3B01KAT1	Complex Analysis and Transformations	Z,ZK	6
B3B38KDS1	Communication and Distributed Systems	Z,ZK	6
The course is devoted t	o the principles of communication in distributed systems (DS), both in common computer networks and in specialized networ	ks for industrial c	Shuoi and in
notworks for the Interne	t of Things 1. Introduction, basic concents, ISO / OSI model 2. Systems with distributed parameters, physical channel (metal		
	t of Things. 1. Introduction, basic concepts, ISO / OSI model 2. Systems with distributed parameters, physical channel (metal ation channel models (AWGN_BSC), parrowband analog and digital modulation 4. Entropy of information source, source and	llic, optical and rad	dio) and its
properties 3. Communic	ation channel models (AWGN, BSC), narrowband analog and digital modulation 4. Entropy of information source, source and	llic, optical and rad channel coding, o	dio) and its channel capacity
properties 3. Communic 5. Codes for error detec		llic, optical and rad channel coding, o ption, key distribu	dio) and its channel capacity tion, certificates,
properties 3. Communic 5. Codes for error detec digital signature 7. Type	ation channel models (AWGN, BSC), narrowband analog and digital modulation 4. Entropy of information source, source and tion and correction (groups and solids, linear and cyclic codes) 6. Information confidentiality, symmetric and asymmetric encry	llic, optical and rad channel coding, o ption, key distribu ethods, heterogene	dio) and its channel capacity tion, certificates, eous distributed
properties 3. Communio 5. Codes for error detec digital signature 7. Type systems 9. Industrial dis	ation channel models (AWGN, BSC), narrowband analog and digital modulation 4. Entropy of information source, source and tion and correction (groups and solids, linear and cyclic codes) 6. Information confidentiality, symmetric and asymmetric encry s of data transmissions, multiplexing, methods of access control to shared media 8. Physical and logical topologies, ARQ me	llic, optical and rad channel coding, o ption, key distribu ethods, heterogen utions 11. Compu	dio) and its channel capacity tion, certificates, eous distributed ter and LAN
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B0B01PST1	Probability and Statistics	Z,ZK	6
Basics of probability f	heory and mathematical statistics. Includes descriptions of probability, random variables and their distributions, characteristics and	operations with ra	andom variables.
Basics of mathemativ	al statistics: Point and interval estimates, methods of parameters estimation and hypotheses testing, least squares method. Bas	ic notions and res	ults of the theory
of Markov chains.			
B3B04PRE	Presentation Skills	KZ	2
B3B36PRG	Programming in C	Z,ZK	6
The course targets to	gain a deep, comprehensive knowledge of the C programming language in terms of program operation, access and memory m	nanagement, and	the development
of multi-threaded app	lications. The course emphasizes acquiring programming habits for creating readable and reusable programs. Students get ac	quainted with the	compilation of
the source codes and	their debugging. Lectures are based on the presentation of basic software constructs and demonstration of motivational program	ns with practical co	nstructs pointing
to the readability and	structure of source code, real computational complexity, and related tools for profiling and debugging. Students get acquainted	d with the principle	s of parallel
programming of multi	threaded applications, synchronization mechanisms, and models of multi-threaded applications. At the end of the semester, the b	asic features of the	e object-oriented
C ++ extension are b	riefly presented.		
B3BPROJ5	Bachelor project	Z	5
B3BPROJ5 B3B35RO1	Bachelor project Robots	Z KZ	5 4
B3B35RO1			
B3B35RO1 B3B33ROB1	Robots	KZ	4
B3B35RO1 B3B33ROB1 B3B38SME1	Robots Robotics	KZ Z,ZK Z,ZK	4 6 6
B3B35RO1 B3B33ROB1 B3B38SME1 1. Sampling, D / A ar	Robots Robotics Sensors and Measurement	KZ Z,ZK Z,ZK ring instruments) r	4 6 6 neasurement of
B3B35RO1 B3B33ROB1 B3B38SME1 1. Sampling, D / A ar frequency and phase	Robots Robotics Sensors and Measurement d A / D converters, digital oscilloscope 2. Measurement of voltage and current (digital voltmeter and multimeter, analog measurement)	KZ Z,ZK Z,ZK ring instruments) r t, resistance temp	4 6 6 measurement of erature and
B3B35RO1 B3B33ROB1 B3B38SME1 1. Sampling, D / A ar frequency and phase deformation sensors	Robots Robotics Sensors and Measurement d A / D converters, digital oscilloscope 2. Measurement of voltage and current (digital voltmeter and multimeter, analog measure difference, error and uncertainty, Measurement of effective value, power and energy consumption 3. Resistance measurement	KZ Z,ZK Z,ZK ring instruments) r t, resistance temp nd current transfor	4 6 6 measurement of erature and rmer Sensors el
B3B35RO1 B3B33ROB1 B3B38SME1 1. Sampling, D / A ar frequency and phase deformation sensors. Proudu. Impedance r	Robots Robotics Sensors and Measurement d A / D converters, digital oscilloscope 2. Measurement of voltage and current (digital voltmeter and multimeter, analog measured) difference, error and uncertainty, Measurement of effective value, power and energy consumption 3. Resistance measurement Low voltage measurement, thermocouple temperature measurement 4. Magnetic sensors, magnetic measurements, voltage and sensors.	KZ Z,ZK Z,ZK ring instruments) r t, resistance temp nd current transfor nsors 6. sensors f	4 6 6 measurement of erature and rmer Sensors el or measuring
B3B35RO1 B3B33ROB1 B3B38SME1 1. Sampling, D / A ar frequency and phase deformation sensors Proudu. Impedance r speed and speed, ser	Robots Robotics Sensors and Measurement d A / D converters, digital oscilloscope 2. Measurement of voltage and current (digital voltmeter and multimeter, analog measuredifference, error and uncertainty, Measurement of effective value, power and energy consumption 3. Resistance measurement Low voltage measurement, thermocouple temperature measurement 4. Magnetic sensors, magnetic measurements, voltage an easurement 5 Capacitive and inductive sensors Measurement of linear and angular position - magnetic and optoelectronic sensors	KZ Z,ZK Z,ZK ring instruments) r t, resistance temp nd current transfor nsors 6. sensors for contact temperatu	4 6 6 measurement of erature and rmer Sensors el or measuring re measuremen
B3B35RO1 B3B33ROB1 B3B38SME1 1. Sampling, D / A ar frequency and phase deformation sensors Proudu. Impedance r speed and speed, ser 9. Measurement of fo	Robots Robotics Sensors and Measurement d A / D converters, digital oscilloscope 2. Measurement of voltage and current (digital voltmeter and multimeter, analog measure difference, error and uncertainty, Measurement of effective value, power and energy consumption 3. Resistance measurement Low voltage measurement, thermocouple temperature measurement 4. Magnetic sensors, magnetic measurements, voltage a neasurement 5 Capacitive and inductive sensors Measurement of linear and angular position - magnetic and optoelectronic sensors and transducers for measuring acceleration. Vibration measurement 7 Temperature measurement by contact sensors 8. Non-	KZ Z,ZK Z,ZK ring instruments) r t, resistance temp nd current transfor nsors 6. sensors for contact temperatu	4 6 neasurement of erature and rmer Sensors el. or measuring re measurement

Code of the group: 2021_BZAJ

Name of the group: Exam from the english language

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete 2 courses

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
B0B04B1K	English language B1 - classified assessment Petra Juna Jennings, Markéta Havlí ková, Pavla Péterová, Erik Peter Stadnik, Michael Ynsua, Dana Saláková Petra Juna Jennings Petra Juna Jennings (Gar.)	ΚZ	0	0C	Z,L	Ρ
B0B04B2Z	English language B2 - exam Petra Juna Jennings, Markéta Havlí ková, Michael Ynsua, Dana Saláková Petra Juna Jennings Petra Juna Jennings (Gar.)	Z,ZK	0	0C	Z,L	Р

Characteristics of the courses of this group of Study Plan: Code=2021_BZAJ Name=Exam from the english language

B0B04B1K	English language B1 - classified assessment	KZ	0
verifying of the stud	ent's skills of B1 level		
B0B04B2Z	English language B2 - exam	Z,ZK	0
I) The B2 English E	am is a compulsory subject for all Faculty of Electrical Engineering students at the Czech Technical University. According to the	Study and Exami	nation Rules and
Regulations for Stud	ents at CTU (Part III, Article 4), a compulsory subject is one whose completion is a necessary condition in order to successfully	complete the stud	ly programme. Ir
addition, this require	s the passing of an examination evaluated on the scale A, B, C, D, or E (SERR Part III, Article 6). II) According to the Common E	European Framew	ork of Reference
for Languages (CEF	R), an international standard for describing language ability, the definition of an English language learner who has achieved the	B2 (Upper-Intern	nediate) level is
one who can unders	tand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specia	lisation. Can intera	act with a degree
of fluency and spon	aneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detaile	ed text on a wide r	ange of subjects
and explain a viewp	pint on a topical issue giving the advantages and disadvantages of various options. III) Students who have successfully passed	an approved inter	national exam
within the past five y	ears may present their certificate to the Department of Languages, Faculty of Electrical Engineering. Upon approval, students are	then exempt from	both the Writter
Test and the Oral Pa	rt. For a list of approved international exams go the department website: http://jazyky.fel.cvut.cz/		

Name of the block: Compulsory elective courses Minimal number of credits of the block: 16 The role of the block: PV

Code of the group: 2021_BKYRPV Name of the group: Compulsory subjects of the programme Requirement credits in the group: In this group you have to gain 12 credits Requirement courses in the group: In this group you have to complete 2 courses Credits in the group: 12 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
A8B37DCMA	Digital Communications Jan Sýkora Jan Sýkora Jan Sýkora (Gar.)	Z,ZK	6	3P+1C	Z	PV
B3B14EPR1	Electric Drives for Automation and Robotics Jan Bauer, Vít Hlinovský Jan Bauer Jan Bauer (Gar.)	Z,ZK	6	2P+2L	L	PV
B0B02FVK	Physics of waves and oscillations	Z,ZK	6	2P+2C+4D	L	PV
B3B35JVC	How to make (almost) anything Ji í Zemánek Ji í Zemánek Ji í Zemánek (Gar.)	KZ	6	2P+4L	L	PV
B3B35MSD1	Modeling and simulation of dynamic systems Zden k Hurák, Ji í Zemánek Ji í Zemánek Zden k Hurák (Gar.)	Z,ZK	6	2P+2C	Z	PV
B3B38OTE1	Circuit Technologies Jan Holub Jan Holub Jan Holub (Gar.)	Z,ZK	6	2P+2L	L	PV
B0B01PAN	Advanced Analysis Veronika Sobotíková, Jan Hamhalter Veronika Sobotíková Jan Hamhalter (Gar.)	Z,ZK	6	2P+2S	L	PV
B3B35PAR1	Programming of logic controllers and robots Martin Hlinovský, Pavel Burget Pavel Burget (Gar.)	Z,ZK	6	1P+3L	L	PV
B3B33UROB	Robot Learning Karel Zimmermann Karel Zimmermann (Gar.)	Z,ZK	6	2P+2C	Z	PV
B3B38VSY1	Embedded Systems Vojt ch Petrucha, Jan Fischer Jan Fischer Jan Fischer (Gar.)	Z,ZK	6	2P+2L	Z	PV

Characteristics of the courses of this group of Study Plan: Code=2021_BKYRPV Name=Compulsory subjects of the programme

 A8B37DCMA
 Digital Communications
 Z,ZK
 6

 The course provides fundamentals of digital communications theory: modulation, classical coding, channel models, and basic principles of decoding. The exposition is systematically built along the theoretical lines which allow to reveal all inner connections and principles. This allows students to develop the knowledge and use it in an active way in a design and construction of the communication systems. The course provides a necessary fundamental background for subsequent more advanced communications theory courses.

7.7K

B3B14EPR1 Electric Drives for Automation and Robotics

The aim of the course is to understand the basic principles of rotating machines, to gain an overview of their properties and capabilities, control methods, including respecting the influence of the load on the drive. The course provides a brief overview of the basic types of electric drives. It deals with drives that are used as servo drives, ie DC, asynchronous, synchronous with permanent magnets and marginally special motors. The course discusses the topologies of power electronic converters, including basic modulation strategies and strategies for the control of servo drives such as vector, direct, MTPA control with emphasis on today's most commonly used PMSM motors. The course is focused not only on understanding the physical nature of the type of drive, but also on understanding the principles of operation of other important components such as sensors, semiconductor converters and digital controllers themselves. It also includes a description of the interaction of the drive with the inertial mass of the load in servomechanisms and other typical types of load in general.

0			
B0B02FVK	Physics of waves and oscillations	Z,ZK	6
B3B35JVC	How to make (almost) anything	KZ	6
B3B35MSD1	Modeling and simulation of dynamic systems	Z,ZK	6
B3B38OTE1	Circuit Technologies	Z,ZK	6

Students will get acquainted with the basic types of circuits and structural blocks of digital instruments and equipment. Emphasis is placed on the continuity of individual circuits in terms of accuracy in analog or. analog-to-digital circuits. 1. Structure of digital measuring instruments and signal generators 2. Directly coupled amplifiers and attenuators 3. Isolation and modulation amplifiers 4. Circuits for conversion of mean and rms value, peak detectors 5. Circuits for frequency signal conditioning, oscillators, mixers 6. Reference voltage and current sources, sine and function generators 7. Design of strings and channels of analog blocks - signal levels, linearity, interference 8. Switching and coupling circuits 9. Time and amplitude discretization of signal, samplers, errors 10. Advanced analog-to-digital converters 11. Digital-to-analog converters, signal reconstruction 12. Digital circuits for frequency and phase measurement, phase synchronization, direct digital synthesis 13. Circuits for the implementation of interfaces for connection to buses 14. Design of analog and digital part in terms of self-radiation and resistance to interference The laboratory exercises of the first part of the semester take place on suitable universal preparations, enabling students to work with HW in an efficient and at the same time creative way. In the second part of the semester, laboratory exercises will be solved in the form of an individual project, the content of which is the design and implementation of a model of an analog signal preprocessing block and comparison of its properties with a professional product.

B0B01PAN Advanced Analysis	Z,ZK	6				
Subject serves as an introduction to measure and integration theory and functional analysis. The first part deals with Lebesgue integration theory. Next parts are devoted to basic						
concepts of the theory of Banach and Hilbert spaces and their connection to harmonic analysis. Last part deals with spectral theory of operators and their application to matrix analysis.						
B3B35PAR1 Programming of logic controllers and robots	Z,ZK	6				
B3B33UROB Robot Learning	Z,ZK	6				
The course teaches deep learning methods on known robotic problems, such as semantic segmenation or reactive motion control. The overall goal is	timeless univers	al knowledge				
rather than listing all known deep learning architectures. Students are assumed to have working prior knowledge of mathematics (gradient, jacobian, he	nessian, gradient	descend, 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 dee	p ML tasks from				
scratch (including the reimplementation of autograd backpropagation), in the second one, students will build on existing templates in order to solve complex tasks including RL,						
tranformers and generative networks.						
B3B38VSY1 Embedded Systems	Z,ZK	6				

The course is focused on the means, components and solutions of embedded systems, with microcontrollers with ARM Cortex-M core. After introductory tasks within the lab. students solve two smaller and two larger vest projects. system with a microcontroller and other electronic blocks on a solderless contact field. Projects include program and circuit implementation.

Code of the group: 2021_BKYRLAB

Name of the group: Compulsory subjects of the programme

Requirement credits in the group: In this group you have to gain at least 4 credits (at most 12) Requirement courses in the group: In this group you have to complete at least 1 course (at most 3) Credits in the group: 4 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
B3B35LAR	Laboratory of applied electronics and control Martin Hlinovský Martin Hlinovský Martin Hlinovský (Gar.)	KZ	4	0P+4L	L	PV
B3B38LPE1	Laboratories of Industrial Electronics Tomáš Drábek, Vojt ch Petrucha, Michal Janošek, Jan Fischer Vojt ch Petrucha Vojt ch Petrucha (Gar.)	КZ	4	0P+4L	L	PV
B3B33LAR	Laboratory of robotics Pavel Krsek, Vladimír Petrík, Libor Wagner Pavel Krsek Pavel Krsek (Gar.)	KZ	4	0P+4L	L	PV

Characteristics of the courses of this group of Study Plan: Code=2021_BKYRLAB Name=Compulsory subjects of the programme

B3B35LAR	Laboratory of applied electronics and control	KZ	4			
B3B38LPE1	Laboratories of Industrial Electronics	KZ	4			
B3B33LAR	Laboratory of robotics	KZ	4			
During this laboratory of	During this laboratory courses the students are introduced with the practical robotics through solving of practical tasks. Students are working in laboratories in groups which consist of					
3 or 4 members. During	the semester, each group of students jointly solve one practical problem in the field of robotics. Tasks are designed to introd	uce students with	robotics			
(manipulators and mob	(manipulators and mobile robots). The students should utilize the basic knowledge obtained in previous study (eg. mathematics, physics, electronics, software development). Students					

can select specific task from few tasks with different specialization, which are announced each semester. Tasks differs between semesters. An integral part of the solution of the problem is cooperation and communication in the student team.

Name of the block: Elective courses Minimal number of credits of the block: 0 The role of the block: V

Code of the group: 2021_BKYRH Name of the group: Humanities subjects Requirement credits in the group: Requirement courses in the group: Credits in the group: 0 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 Completion Credits Code Scope Semester Role members) Tutors, authors and guarantors (gar.) Ethic 1 B0B16ET1 ΚZ 2P+2C Ζ 4 V Vladimír Sláme ka Vladimír Sláme ka Vladimír Sláme ka (Gar.) Philosophy B0B16FIL ΖK 2 2P+0S Z,L v Peter Zamarovský **Peter Zamarovský** Peter Zamarovský (Gar.) Philosophy 1 B0B16FI1 ΚZ 4 2P+2S Ζ v Peter Zamarovský Peter Zamarovský Peter Zamarovský (Gar.) History of technology and economic B0B16HTE ΖK 2 2P+0S Z,L V Marcela Efmertová, Jan Mikeš Marcela Efmertová Marcela Efmertová (Gar.) History of science and technology 1 Marcela Efmertová, Jan Mikeš Marcela Efmertová Marcela Efmertová (Gar.) B0B16HT1 2P+2S Ζ ΚZ 4 v History 1 B0B16HI1 ΚZ 4 2P+2S Ζ V Milena Josefovi ová Milena Josefovi ová Milena Josefovi ová (Gar.) Psychology B0B16MPS Z.ZK 4 2P+2S Z.L V Jan Fiala Jan Fiala Jan Fiala (Gar.) Psychology for managers B0B16MPL ΖK 2 2P+0S Z,L V Jan Fiala Jan Fiala Jan Fiala (Gar.) Physical Education A003TV Ζ 2 0+2L,Z v Ji í Drnek

Characteristics of the courses of this group of Study Plan: Code=2021_BKYRH Name=Humanities subjects

B0B16ET1 Ethic 1 ΚZ 4 Aim of this subject is to provide the students an orientation not only in general problems of ethics but above all to offer instructions for solving various situations of human life. Essential parts of the subject are discussions in which students can react to lectures but also to actual questions coming with news and look for the communal answers. B0B16FIL Philosophy ZK 2 We deal with the most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy and connection of old philosophical thoughts with recent problems of science, technology, economics and politics. B0B16FI1 Philosophy 1 ΚZ 4 We deal with the most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy and connection of old philosophical thoughts with recent problems of science, technology, economics and politics. B0B16HTE History of technology and economic ΖK 2 B0B16HT1 History of science and technology 1 ΚZ 4 B0B16HI1 ΚZ 4 History 1 Z,ZK B0B16MPS 4 Psychology B0B16MPL ΖK 2 Psychology for managers

Code of the group: 2021_BJKA Name of the group: English language courses Requirement credits in the group: Requirement courses in the group: Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
B0B04A21	English Language A2-1 Dana Saláková	Z		2s	Z	V
B0B04A22	English Language A2-2 Dana Saláková	Z	0	2s	L	V
B0B04B11	English Language B1-1 Petra Juna Jennings Petra Juna Jennings (Gar.)	Z	0	2C	Z	V
B0B04B12	English Language B1-2 Petra Juna Jennings Petra Juna Jennings (Gar.)	Z	0	2C	L	V
B0B04B21	English Language B2-1 Petra Juna Jennings Petra Juna Jennings (Gar.)	Z	3	2C	Z	V
B0B04B22	English Language B2-2 Petra Juna Jennings Petra Juna Jennings (Gar.)	Z	3	2C	Z,L	V

Ζ

2

Characteristics of the courses of this group of Study Plan: Code=2021_BJKA Name=English language courses

B0B04A21	English Language A2-1	Z			
The course is open to s	tudents who are beginners in their second language. Course objective: Achieving competence in basic English.				
B0B04A22	English Language A2-2	Z	0		
The course is open to s	tudents who are beginners in their second foreign language. The course objective is to develop and sustain their basic knowle	edge of the Englis	sh language.		
B0B04B11	English Language B1-1	Z	0		
Course objective: Broadening the basic knowledge of general English; mastering basic specialised language; focusing on text analysis and vocabulary expansion; understanding spoken					
English.					
B0B04B12	English Language B1-2	Z	0		
Course objective: Broad	ening the basic knowledge of general English; mastering basic specialised language; focusing on text analysis and vocabulary	expansion; under	standing spoken		
English.					
B0B04B21	English Language B2-1	Z	3		
This course is designed	as a full-year, two semester preparation course for the universitys compulsory B2-level English Examination (Anglický jazyk E	32 - zkouška - BO	B04B2Z*). While		
	n helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher mark				
	vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an approp	priate level of Eng	lish for Erasmus		
/ International Study.					
B0B04B22	English Language B2-2	Z	3		
•	as a full-year, two semester preparation course for the universitys compulsory B2-level English Examination (Anglický jazyk B		,		
the course is focused on helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher mark), it also focuses more on the					
	vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an appropriate the students at the university level.	priate level of Eng	lish for Erasmus		
/ International Study.					

Code of the group: BTV Name of the group: Physical education

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
TVV	Physical education	Z	0	0+2	Z,L	V
A003TV	Physical Education Ji í Drnek	Z	2	0+2	L,Z	V
TV-V1	Physical education	Z	1	0+2	Z,L	V
TVV0	Physical education	Z	0	0+2	Z,L	V

Characteristics of the courses of this group of Study Plan: Code=BTV Name=Physical education

A003TV	Physical Education	Z	2
TVV	Physical education	Z	0
TV-V1	Physical education	Z	1

TVV0 Physical education	Z	0
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Code of the group: BTVK Name of the group: Physical education courses Requirement credits in the group: Requirement courses in the group: Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
TVKLV	Physical Education Course	Z	0	7dní	L	V
TVKZV	Physical Education Course	Z	0	7dní	Z	V

Characteristics of the courses of this group of Study Plan: Code=BTVK Name=Physical education courses

TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0
		-	

Code of the group: 2021_BKYRVOL Name of the group: Elective subjects Requirement credits in the group: Requirement courses in the group: Credits in the group: 0 Note on the group:

~Nabídku volitelných předmětů uspořádaných podle kateder najdete na webových stránkách http://www.fel.cvut.cz/cz/education/volitelne-predmety.html\\

List of courses of this pass:

	Name of the course	Completion	Credits
A003TV	Physical Education	Z	2
A8B37DCMA	Digital Communications	Z,ZK	6
The course provide	es fundamentals of digital communications theory: modulation, classical coding, channel models, and basic principles of decoding. Th	ne exposition is sys	stematically
built along the the	oretical lines which allow to reveal all inner connections and principles. This allows students to develop the knowledge and use it in a	in active way in a c	lesign and
construction	of the communication systems. The course provides a necessary fundamental background for subsequent more advanced communi	cations theory cou	irses.
B0B01DRN	Differencial Equations and Numerical Analysis	Z,ZK	4
	ces students to the classical theory of ordinary differential equations (separable and linear ODEs) and also to bsics of numerical meth	,	
stability, numerica	I solutions of algebraic and differential equations and their systems). The course takes advantage of the synnergy between theoretica	al and practical po	int of view.
B0B01LAG	Linear Algebra	Z,ZK	8
The course covers t	he initial parts of linear algebra. Firstly, the basic notions of a linear space and linear mappings are covered (linear dependence and inde	ependence, basis, o	coordinates,
etc). The calculus of	of matrices (determinants, inverse matrices, matrices of a linear map, eigenvalues and eigenvectors, diagonalisation, etc) is covered		ons include
	solving systems of linear equations, the geometry of a 3D space (including the scalar product and the vector product) and SV	/D.	
B0B01LGR	Logic and Graphs	Z,ZK	5
This course covers	basics of mathematical logic and graph theory. Syntax and semantics of propositional and predicate logic are introduced. The importanc		onsequence
	and of the relationship between a formula and its model is stressed. Further, basic notions from graph theory are introduced	d.	
B0B01MA1	Mathematical Analysis 1	Z,ZK	7
	The aim of the course is to introduce students to basics of differential and integral calculus of functions of one variable.		
B0B01MA2	Mathematical Analysis 2	Z,ZK	7
The subject cover	s an introduction to the differential and integral calculus in several variables and basic relations between curve and surface integrals.	Other part contain	ns function
The subject cover	s an introduction to the differential and integral calculus in several variables and basic relations between curve and surface integrals. series and power series with application to Taylor and Fourier series.	Other part contair	ns function
The subject cover B0B01PAN		Other part contair	hs function
B0B01PAN	series and power series with application to Taylor and Fourier series.	Z,ZK	6
B0B01PAN Subject serves a	series and power series with application to Taylor and Fourier series. Advanced Analysis	Z,ZK	6 d to basic
B0B01PAN Subject serves a	series and power series with application to Taylor and Fourier series. Advanced Analysis s an introduction to measure and integration theory and functional analysis. The first part deals with Lebesgue integration theory. New	Z,ZK	6 d to basic
B0B01PAN Subject serves a concepts of the the B0B01PST1	series and power series with application to Taylor and Fourier series. Advanced Analysis s an introduction to measure and integration theory and functional analysis. The first part deals with Lebesgue integration theory. New ory of Banach and Hilbert spaces and their connection to harmonic analysis. Last part deals with spectral theory of operators and their	Z,ZK t parts are devote application to mat Z,ZK	6 d to basic rix analysis. 6
B0B01PAN Subject serves a concepts of the the B0B01PST1 Basics of probability	series and power series with application to Taylor and Fourier series. Advanced Analysis s an introduction to measure and integration theory and functional analysis. The first part deals with Lebesgue integration theory. New ory of Banach and Hilbert spaces and their connection to harmonic analysis. Last part deals with spectral theory of operators and their Probability and Statistics	Z,ZK tt parts are devote application to mat Z,ZK erations with rando	6 d to basic rix analysis. 6 m variables.
B0B01PAN Subject serves a concepts of the the B0B01PST1 Basics of probability	series and power series with application to Taylor and Fourier series. Advanced Analysis s an introduction to measure and integration theory and functional analysis. The first part deals with Lebesgue integration theory. Nex ory of Banach and Hilbert spaces and their connection to harmonic analysis. Last part deals with spectral theory of operators and their Probability and Statistics theory and mathematical statistics. Includes descriptions of probability, random variables and their distributions, characteristics and operators and their distributions.	Z,ZK tt parts are devote application to mat Z,ZK erations with rando	6 d to basic rix analysis. 6 m variables.
B0B01PAN Subject serves a concepts of the the B0B01PST1 Basics of probability	series and power series with application to Taylor and Fourier series. Advanced Analysis s an introduction to measure and integration theory and functional analysis. The first part deals with Lebesgue integration theory. Nex ory of Banach and Hilbert spaces and their connection to harmonic analysis. Last part deals with spectral theory of operators and their Probability and Statistics theory and mathematical statistics. Includes descriptions of probability, random variables and their distributions, characteristics and oper tical statistics: Point and interval estimates, methods of parameters estimation and hypotheses testing, least squares method. Basic no	Z,ZK tt parts are devote application to mat Z,ZK erations with rando	6 d to basic rix analysis. 6 m variables.
B0B01PAN Subject serves a concepts of the the B0B01PST1 Basics of probability Basics of mathema	series and power series with application to Taylor and Fourier series. Advanced Analysis s an introduction to measure and integration theory and functional analysis. The first part deals with Lebesgue integration theory. New ory of Banach and Hilbert spaces and their connection to harmonic analysis. Last part deals with spectral theory of operators and their Probability and Statistics theory and mathematical statistics. Includes descriptions of probability, random variables and their distributions, characteristics and operation statistics: Point and interval estimates, methods of parameters estimation and hypotheses testing, least squares method. Basic no of Markov chains.	Z,ZK tt parts are devote application to mat Z,ZK erations with rando btions and results of	6 d to basic rix analysis. 6 m variables. of the theory

B0B04A22	English Language A2-2	Z	0
	en to students who are beginners in their second foreign language. The course objective is to develop and sustain their basic knowled	dge of the English	language.
B0B04B11	English Language B1-1	Z	0
Course objective: B	roadening the basic knowledge of general English; mastering basic specialised language; focusing on text analysis and vocabulary exp	ansion; understan	ding spoken
	English.		
B0B04B12	English Language B1-2	Z	0
Course objective: B	roadening the basic knowledge of general English; mastering basic specialised language; focusing on text analysis and vocabulary exp	bansion; understan	ding spoken
	English.		
B0B04B1K	English language B1 - classified assessment	KZ	0
	verifying of the student's skills of B1 level	•	I
B0B04B21	English Language B2-1	Z	3
This course is desig	gned as a full-year, two semester preparation course for the universitys compulsory B2-level English Examination (Anglický jazyk B2 -	zkouška - B0B04	32Z*). While
the course is focu	used on helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher mark)	, it also focuses mo	ore on the
academic and tech	nical vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an appropria	ate level of English	for Erasmus
	/ International Study.		1
B0B04B22	English Language B2-2	Z	3
	gned as a full-year, two semester preparation course for the universitys compulsory B2-level English Examination (Anglický jazyk B2 -		
	used on helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher mark)		
academic and tech	nical vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an appropria	ate level of English	for Erasmus
	/ International Study.	7 71/	0
B0B04B2Z	English language B2 - exam	Z,ZK	0
, ,	xam is a compulsory subject for all Faculty of Electrical Engineering students at the Czech Technical University. According to the Stud dents at CTU (Part III, Article 4), a compulsory subject is one whose completion is a necessary condition in order to successfully corr		
	es the passing of an examination evaluated on the scale A, B, C, D, or E (SERR Part III, Article 6). II) According to the Common Euro		•
	ER), an international standard for describing language ability, the definition of an English language learner who has achieved the B2		
	stand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisat		-
	taneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed te		-
	vpoint on a topical issue giving the advantages and disadvantages of various options. III) Students who have successfully passed an	•	
within the past five	years may present their certificate to the Department of Languages, Faculty of Electrical Engineering. Upon approval, students are the	n exempt from both	n the Written
	Test and the Oral Part. For a list of approved international exams go the department website: http://jazyky.fel.cvut.cz/		
B0B16ET1	Ethic 1	KZ	4
Aim of this subject	s to provide the students an orientation not only in general problems of ethics but above all to offer instructions for solving various situ	uations of human li	fe. Essential
parts of	the subject are discussions in which students can react to lectures but also to actual questions coming with news and look for the co	ommunal answers.	
B0B16FI1	Philosophy 1	KZ	4
We deal with the	e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philos	ophy and connecti	on of old
	philosophical thoughts with recent problems of science, technology, economics and politics.		
	P		
B0B16FIL	Philosophy	ZK	2
	Philosophy most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philos		1
We deal with the	Philosophy		1
	Philosophy most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philos		1
We deal with the	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philos philosophical thoughts with recent problems of science, technology, economics and politics.	sophy and connecti	on of old
We deal with the B0B16HI1	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philos philosophical thoughts with recent problems of science, technology, economics and politics. History 1	ophy and connecti	on of old
We deal with the B0B16HI1 B0B16HT1 B0B16HTE	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophical thoughts with recent problems of science, technology, economics and politics. History 1 History of science and technology 1 History of technology and economic	KZ KZ KZ ZK	on of old 4 4 2
We deal with the B0B16HI1 B0B16HT1 B0B16HTE B0B16MPL	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophical thoughts with recent problems of science, technology, economics and politics. History 1 History of science and technology 1 History of technology and economic Psychology for managers	KZ KZ ZK ZK	on of old 4 4 2 2 2
We deal with the B0B16HI1 B0B16HT1 B0B16HTE B0B16MPL B0B16MPS	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philos philosophical thoughts with recent problems of science, technology, economics and politics. History 1 History of science and technology 1 History of technology and economic Psychology for managers Psychology	KZ KZ ZK ZK Z,ZK	on of old 4 2 2 4
We deal with the B0B16HI1 B0B16HT1 B0B16HTE B0B16MPL B0B16MPS B0B330PT	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophical thoughts with recent problems of science, technology, economics and politics. History 1 History of science and technology 1 History of technology and economic Psychology for managers Psychology Optimization	KZ KZ ZK ZK Z,ZK Z,ZK	on of old 4 4 2 2 4 7
We deal with the B0B16HI1 B0B16HT1 B0B16HTE B0B16MPL B0B16MPS B0B330PT	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philos philosophical thoughts with recent problems of science, technology, economics and politics. History 1 History of science and technology 1 History of technology and economic Psychology for managers Psychology	KZ KZ ZK ZK Z,ZK Z,ZK	on of old 4 4 2 2 4 7
We deal with the B0B16HI1 B0B16HT1 B0B16HTE B0B16MPL B0B16MPS B0B330PT The course provide	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophical thoughts with recent problems of science, technology, economics and politics. History 1 History of science and technology 1 History of technology and economic Psychology for managers Psychology Optimization s an introduction to mathematical optimization, specifically to optimization in real vector spaces of finite dimension. The theory is illustrat You will refresh and extend many topics that you know from linear algebra and calculus courses.	KZ KZ ZK ZK Z,ZK Z,ZK ted with a number of	on of old 4 2 2 4 7 of examples.
We deal with the B0B16HI1 B0B16HT1 B0B16HTE B0B16MPL B0B16MPS B0B330PT The course provide B0B35LSP	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophical thoughts with recent problems of science, technology, economics and politics. History 1 History of science and technology 1 History of technology and economic Psychology for managers Psychology Optimization s an introduction to mathematical optimization, specifically to optimization in real vector spaces of finite dimension. The theory is illustrat You will refresh and extend many topics that you know from linear algebra and calculus courses. Logic systems and processors	KZ KZ ZK ZK Z,ZK Z,ZK ted with a number of Z,ZK	on of old 4 4 2 2 4 7 of examples. 6
We deal with the B0B16HI1 B0B16HT1 B0B16HTE B0B16MPL B0B16MPS B0B330PT The course provide B0B35LSP The course introduc	Philosophy e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophical thoughts with recent problems of science, technology, economics and politics. History 1 History of science and technology 1 History of technology and economic Psychology for managers Psychology Optimization s an introduction to mathematical optimization, specifically to optimization in real vector spaces of finite dimension. The theory is illustrat You will refresh and extend many topics that you know from linear algebra and calculus courses.	KZ KZ ZK ZK Z,ZK Z,ZK ted with a number of Z,ZK tata operations at th	on of old 4 2 2 4 7 of examples. 6 ne hardware
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We deal with the B0B16HI1 B0B16HTE B0B16HTE B0B16HTE B0B16MPL B0B30PT The course provide B0B35LSP The course introduc level and designin description in VHI simulation. Practica B3B01KAT1 B3B02FY1A The basic course o and the second one of mass particles a studies. The classic in this course in the B3B02FY2 The course Physic - the theory of wav universal charact nuclear physics w com B3B04PRE B3B14EPR1	Philosophy Prost important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philos philosophical thoughts with recent problems of science, technology, economics and politics. History 1 History of science and technology 1 History of technology and economic Psychology for managers Psychology Optimization s an introduction to mathematical optimization, specifically to optimization in real vector spaces of finite dimension. The theory is illustrat You will refresh and extend many topics that you know from linear algebra and calculus courses. Logic systems and processors bes computing resources' basic hardware structures, design, and architecture. It provides an overview of the possibilities of performing d g embedded processor systems with peripherals on modern FPGA programmable logic circuits, which are increasingly widely used 10, from logic to more complex sequential circuits to practical finite state machine (FSM) designs. They will also master the correct d 11 problems are solved using development boards that hundreds of leading universities worldwide also use. The course ends with RISC and pipeline processing. [last updated January 2024] Complex Analysis and Transformations Physics 1 f physics at the Faculty of Electrical Engineering - Physics 1, is devoted to the introduction into two important areas of physics. The firs is the electric and magnetic field. Within the framework of the classical mechanics, the students study the particle kinematics; dynami and rigid bodies. The students should be able to solve basic problems dealing with the description of mechanical systems, which they all mechanics is followed by the relativistic mechanics, electric and magnetic field - both stationary as well as non-stationary. The stud study of electrical circuits, theory of electrotechnical materials or radicelectronics. Apart of this, the knowledge gained in this course e vill give to the students basic insight into the prosperites of wav	KZ KZ KZ ZK ZK Z,ZK Z,ZK ted with a number of Z,ZK ted with a number of Z,ZK ted with a number of Z,ZK tata operations at th oday. Students will esign procedure us -V processor struct Z,ZK Z,ZK st one is a classica cs of the mass part dents can use the f is required for the Z,ZK to an meet during t dents can use the f is required for the Z,ZK the modynamics. Foll description of the w on. Quantum mech th modern areas as ctronic devices. KZ Z,ZK	A A A A A A A A A A A A A A A A A A A
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strategies for the understanding the p	permanent magnets and marginally special motors. The course discusses the topologies of power electronic converters, including ba e control of servo drives such as vector, direct, MTPA control with emphasis on today's most commonly used PMSM motors. The cou- shysical nature of the type of drive, but also on understanding the principles of operation of other important components such as sensi ers themselves. It also includes a description of the interaction of the drive with the inertial mass of the load in servomechanisms and	irse is focused not ors, semiconducto	only on r converters
	general.	other typical type	3 01 1040 111
B3B31EPO	Electronic Devices and Circuits	Z,ZK	6
1	ces students to the basic principles and methods of analysis of electrical circuits. Defines the circuit elements and gives their element	tary application. It	deals with
the basic fundamen	ts of electronic systems based on analog as well as digital circuits. The course presents operational principles and methods of analysi	s of these circuits	with respect
	to the use of cybernetics and control systems.		
B3B31SSI	Signals, systems and inference	Z,ZK	6
B3B33ALP	Algorithms and Programming	Z,ZK	6
	give students a basic understanding of algorithms and programming and teach them to design, implement and test algorithms for sim	-	
	ion of computational complexity. They will learn about basic program building blocks such as loops, conditional statements, variables		
will introduce the	most often used data structures (queue, stack, list, array etc) and operations on them. We will show the basic algorithms, for exampl Students will learn to write simple programs in Python.	e for searching an	a sorting.
B3B33KUI		Z.ZK	6
	Cybernetics and Artificial Intelligence ces the students into the field of artificial intelligence and gives the necessary basis for designing machine control algorithms. It adva	, ,	-
	ithms by including uncertainty in state transition. Students are introduced into reinforcement learning for solving problems when the s		-
-	s the artificial intelligence and cybernetics fields. Bayesian decision task introduces supervised learning. Learning from data is demo		
	Students practice the algoritms in computer labs.		
B3B33LAR	Laboratory of robotics	KZ	4
During this laborato	ry courses the students are introduced with the practical robotics through solving of practical tasks. Students are working in laborator	ies in groups whic	h consist of
3 or 4 members	. During the semester, each group of students jointly solve one practical problem in the field of robotics. Tasks are designed to introd	uce students with	robotics
	nobile robots). The students should utilize the basic knowledge obtained in previous study (eg. mathematics, physics, electronics, sof		
can select specific t	ask from few tasks with different specialization, which are announced each semester. Tasks differs between semesters. An integral par	t of the solution of	the problem
DODODOD4	is cooperation and communication in the student team.	7 71/	0
B3B33ROB1	Robotics	Z,ZK	6
B3B33UROB	Robot Learning	Z,ZK	6
	es deep learning methods on known robotic problems, such as semantic segmenation or reactive motion control. The overall goal is t		
	I known deep learning architectures. Students are assumed to have working prior knowledge of mathematics (gradient, jacobian, hes chine learning (bayes risk minimization, linear classifier). The labs are divided into two parts, in the first one, the students will solve el		
	g the reimplementation of autograd backpropagation), in the second one, students will build on existing templates in order to solve or		
	tranformers and generative networks.		ug : . <u>_</u> ,
B3B35ARI1	Automatic Control	Z,ZK	6
1	e of automatic control. Introduction to basic concepts and properties of dynamic systems of physical, engineering, biological, econom	· ·	-
	ciples of feedback and its use as a tool for altering the behavior of systems and managing uncertainty. Classical and modern method		
automatic control	systems. Students specialized in systems and control will build on these ideas and knowledge in the advanced courses to follow. Stu	dents of other brai	nches and
	vill find out that control is an inspiring, ubiquitous and entertaining field worth of a future cooperation. Students? creativity is develope		
B3B35HSS	Humanitní, um lecký a spole enskov dní seminá	Z	4
B3B35JVC	How to make (almost) anything	KZ	6
B3B35LAR	Laboratory of applied electronics and control	KZ	4
B3B35MSD1	Modeling and simulation of dynamic systems	Z,ZK	6
B3B35PAR1	Programming of logic controllers and robots	Z,ZK	6
B3B35RO1	Robots	KZ	4
B3B36PRG	Programming in C	Z,ZK	6
The course targets	to gain a deep, comprehensive knowledge of the C programming language in terms of program operation, access and memory mana	gement, and the d	evelopment
	applications. The course emphasizes acquiring programming habits for creating readable and reusable programs. Students get acqua		
	d their debugging. Lectures are based on the presentation of basic software constructs and demonstration of motivational programs wi		
	and structure of source code, real computational complexity, and related tools for profiling and debugging. Students get acquainted v		
programming of mul	ti-threaded applications, synchronization mechanisms, and models of multi-threaded applications. At the end of the semester, the basic	features of the obj	ect-oriented
B3B38KDS1	C ++ extension are briefly presented. Communication and Distributed Systems	Z,ZK	6
	oted to the principles of communication in distributed systems (DS), both in common computer networks and in specialized networks		
	Internet of Things. 1. Introduction, basic concepts, ISO / OSI model 2. Systems with distributed parameters, physical channel (metalli		
	unication channel models (AWGN, BSC), narrowband analog and digital modulation 4. Entropy of information source, source and cha		
5. Codes for error de	etection and correction (groups and solids, linear and cyclic codes) 6. Information confidentiality, symmetric and asymmetric encryptio	n, key distribution,	certificates,
digital signature 7.	Types of data transmissions, multiplexing, methods of access control to shared media 8. Physical and logical topologies, ARQ metho	ds, heterogeneous	s distributed
-	rial distributed systems (IDS), virtual field device, object directory 10. Functional principles of IDS, typical applications and their solut		
	I principles, implementation of real-time functions, time synchronization 12. Wireless LANs and Internet of Things networks 13. TCP / II		
	P, NAT, 14. Transport protocols of the TCP / IP, UDP, TCP, RTP family, data flow control, congestion control Laboratory exercises will accurate the transport protocol evaluating the method.		
-	etical knowledge. They will require home preparation in the form of self-study, subsequent elaboration of a protocol evaluating the me ement with theoretical assumptions and justifying any differences. The credit project will focus on the practical implementation of dat		
	properties in the IP network environment.		
B3B38LPE1	Laboratories of Industrial Electronics	KZ	4
B3B38OTE1	Circuit Technologies	Z,ZK	6
	quainted with the basic types of circuits and structural blocks of digital instruments and equipment. Emphasis is placed on the continuit		-
-	log or. analog-to-digital circuits. 1. Structure of digital measuring instruments and signal generators 2. Directly coupled amplifiers and	-	
	rs 4. Circuits for conversion of mean and rms value, peak detectors 5. Circuits for frequency signal conditioning, oscillators, mixers 6.		
	inction generators 7. Design of strings and channels of analog blocks - signal levels, linearity, interference 8. Switching and coupling		
	gnal, samplers, errors 10. Advanced analog-to-digital converters 11. Digital-to-analog converters, signal reconstruction 12. Digital circ		· ·
	se synchronization, direct digital synthesis 13. Circuits for the implementation of interfaces for connection to buses 14. Design of anal		
sell-radiation and re	ssistance to interference The laboratory exercises of the first part of the semester take place on suitable universal preparations, enab	ing sudents to wo	

in an efficient and at the same time creative way. In the second part of the semester, laboratory exercises will be solved in the form of an individual project, the content of which is the

In an efficient and a	at the same time creative way. In the second part of the semester, laboratory exercises will be solved in the form of an individual proj	,	which is the
	design and implementation of a model of an analog signal preprocessing block and comparison of its properties with a professiona	-	<u> </u>
B3B38SME1	Sensors and Measurement	Z,ZK	6
	and A / D converters, digital oscilloscope 2. Measurement of voltage and current (digital voltmeter and multimeter, analog measuring	· · · ·	
	nase difference, error and uncertainty, Measurement of effective value, power and energy consumption 3. Resistance measurement,		
	s. Low voltage measurement, thermocouple temperature measurement 4. Magnetic sensors, magnetic measurements, voltage and of		
	e measurement 5 Capacitive and inductive sensors Measurement of linear and angular position - magnetic and optoelectronic sens		0
1 1 7	ensors and transducers for measuring acceleration. Vibration measurement 7 Temperature measurement by contact sensors 8. Non-con		
9. Measurement of	force and pressure. Level measurement 10. Flow and level measurement 11. Measuring systems, sensor buses. Logic analyzer 12.	Other measuring ir	nstruments
	standards of electrical quantities 13. Chemical sensors 14. Repetition, solution of test examples		
B3B38VSY1	Embedded Systems	Z,ZK	6
The course is focus	ed on the means, components and solutions of embedded systems, with microcontrollers with ARM Cortex-M core. After introductor	y tasks within the la	ab. studen
solve two smaller ar	nd two larger vest projects. system with a microcontroller and other electronic blocks on a solderless contact field. Projects include progr	ram and circuit impl	ementatio
B3BPROJ5	Bachelor project	Z	5
BBAP20	Bachelor thesis	Z	20
BEZB	Safety in Electrical Engineering for a Bachelor's Degree	Z	0
The purpose of the	safety course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from operatio	n of it. This introduc	ctory cours
contains funda	mentals of Safety Electrical Engineering. In this way the students receive qualification of instructed person that enables them to wor	k on electrical equi	pment.
BEZZ	Basic Health and Occupational Safety Regulations	Z	0
The guidelines were	e worked out based on The Training Scheme for Health and Occupational Safety designed for employees and students of the Czech	Technical Universit	y in Prague
which was provide	d by the Rector's Office of the CTU. Safety is considered one of the basic duties of all employees and students. The knowledge of H	ealth and Occupati	onal Safet
	regulations forms an integral and permanent part of qualification requirements. This program is obligatory.		
TV-V1	Physical education	Z	1
TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0
TVV	Physical education	Z	0

Physical education

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For updated information see <u>http://bilakniha.cvut.cz/en/f3.html</u> Generated: day 2025-06-07, time 17:25.

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