Study plan

Name of study plan: Electronics and Communications

Faculty/Institute/Others: Faculty of Electrical Engineering Department: Branch of study guaranteed by the department: Welcome page Garantor of the study branch: Program of study: Electronics and Communications Type of study: Follow-up master full-time Required credits: 109 Elective courses credits: 11 Sum of credits in the plan: 120 Note on the plan:

Name of the block: Compulsory courses in the program Minimal number of credits of the block: 49 The role of the block: P

Code of the group: 2021_MEKDIP Name of the group: Diploma Thesis Requirement credits in the group: In this group you have to gain 25 credits Requirement courses in the group: In this group you have to complete 1 course Credits in the group: 25 Note on the group:

CodeName 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.)CompletionCreditsScopeSemesterRoleBDIP25Diploma ThesisZZ522sLP

Characteristics of the courses of this group of Study Plan: Code=2021_MEKDIP Name=Diploma Thesis

 BDIP25
 Diploma Thesis
 Z
 25

 Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.

Code of the group: 2021_MEKP8

Name of the group: Compulsory subjects of the programme Requirement credits in the group: In this group you have to gain 24 credits Requirement courses in the group: In this group you have to complete 4 courses Credits in the group: 24 Note on the group: Specializace Komunikace a zpracování informace (KZI)

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
B2M32BTSA	Wireless Technologies Zden k Be vá , Lukáš Vojt ch, Zbyn k Kocur, Pavel Mach Ján Ku erák Zden k Be vá (Gar.)	Z,ZK	6	2P + 2L	L	Ρ
B2M37MAM	Microprocessors Petr Skalický, Stanislav Vítek Stanislav Vítek (Gar.)	Z,ZK	6	2P+2L	Z	Ρ
B2M31DSP	Advanced DSP methods Pavel Sovka, Petr Pollák Pavel Sovka Pavel Sovka (Gar.)	Z,ZK	6	2P+2C	Z,L	Ρ
B2MPROJ6	Project Ji í Jakovenko, Pavel Máša, Ivan Pravda, František Rund, Jan Šístek, Lubor Jirásek, Tomáš Zeman, Ladislav Oppl František Rund František Rund (Gar.)	Z	6	0p+6s	Z,L	Ρ

Characteristics of the courses of this group of Study Plan: Code=2021_MEKP8 Name=Compulsory subjects of the programme

 B2M32BTSA
 Wireless Technologies
 Z,ZK
 6

 The lectures give overview of fundamental principles of wireless networks in various areas of their application. Students will understand architecture, principles and protocols used in different wireless technologies and learn how these technologies can be exploited in real world applications. The goal is to teach students how to solve problems related to deployment of wireless networks, their operation or development of wireless networks components.

The aim is to make students and with implementation of t	CTOPTOCESSOTS acquainted with the properties of microprocessor systems, make students familiar wi he memory or I/O space address extension. Next, taught the students to make simple subject student should be able to design and implement simpler microprocessor syst	program in the as	sembly lang	ct external c guage, C lar	nguage and co	ombination of
The course follows the basic analysis and be able to pract	vanced DSP methods course in signal processing and introduces advanced methods of analysis and digital tically use them. They learn to know the conditions of use of correlation, spectral and sition and independent component analysis and the time-frequency transformations. E	coherent analysis	of random s	will learn the	will became	familiar with
Independent work in the form	pject n of a project. A student will choose a topic from a range of topics related to his or her oject will be defended within the framework of a subject. Project list http://www.fel.cvut	-		-	Z y branch depa	6 artment or
	k: Compulsory elective courses of credits of the block: 60 ock: PV					
Name of the grou Requirement crea	•	ete 5 cours		ce (KZI)		
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
B2M31ADAA	Adaptive signal processing Pavel Sovka, Radoslav Bortel Radoslav Bortel (Gar.)	Z,ZK	6	2P+2C	Z	PV
B2M37CIR	Implementation of the digital circuits in Radio Petr Skalický, Stanislav Vítek Stanislav Vítek Petr Skalický (Gar.)	Z,ZK	6	2P+2L	L	PV
B4M33DZO	Digital image Ond ej Drbohlav, Daniel Sýkora Daniel Sýkora (Gar.)	Z,ZK	6	2P+2C	Z,L	PV
B2M32IBEA	Information Security Tomáš Van k Petr Hampl Leoš Bohá (Gar.)	Z,ZK	6	2P + 2C	L	PV
B3M35ORR	Optimal and Robust Control Zden k Hurák Zden k Hurák (Gar.)	Z,ZK	6	2P+2C	L	PV
B3M35PSR	Real -Time Systems Programming Michal Sojka Michal Sojka Michal Sojka (Gar.)	Z,ZK	6	2P+2C	Z	PV
B4M33SSU	Statistical Machine Learning	Z,ZK	6	2P+2C	Z	PV
B2M17SBS	Wave Propagation for Wireless Links Pavel Pecha Pavel Pecha Pavel Pecha (Gar.)	Z,ZK	6	2P+2C	L	PV
B2M32THOA	Queueing Theory Petr Hampl Petr Hampl (Gar.)	Z,ZK	6	3P + 1L	Z	PV
B2M01TIK	Information Theory and Coding	Z,ZK	6	3P+1C	L	PV
Characteristics of the	courses of this group of Study Plan: Code=2021_MEKPV8B N	lame=Compu	lsory su	bjects of	the progr	amme
	aptive signal processing : discourse on adaptive algorithms for filtering, decorrelation, separation and beamforr	mina		Z	Z,ZK	6
B2M37CIR Im The course is base for stude realisation of the modulators	plementation of the digital circuits in Radio nt, which want practically designed circuits of the digital signal processing with the sig and circuit of the numerical conversion of the signal, algoritms coding/decoding, whic	nal processors an	•	d circuits. A		
This course presents an ove implement. Seemingly abstra fundamental principles (sign techniques, including image learn the theoretical knowled	inimal computing power. gital image rview of basic methods for digital image processing. It deals with practical techniques act concepts from mathematical analysis, probability theory, or optimization come to lif al sampling and reconstruction, monadic operations, histogram, Fourier transform, co stitching, deformation, registration, and segmentation. Students will practice the selec lige from the lectures and use it to solve practical problems prmation Security	e through visually nvolution, linear a	engaging and non-linea	etical basis pplications. Ir filtering) a entation tas	The course fo nd more adva	cuses on nced editing
The Information Security cou	rse provides a complete source of information on the field of security of information system			ogies. The r	nost of inform	ation in today
-	d, stored in electronic form so information security is very important part of it. Technic timal and Robust Control	ai Dackground for	mation		rovided by cr	/ptology. 6

B3M35PSR	Real -Time Systems Programming	Z,ZK	6
The goal of this course	s to provide students with basic knowledge about software development for real-time systems, for example in control and en	nbedded applicati	ons. The focus
is on embedded system	s equipped with a real-time operating system (RTOS). Lectures will cover real-time systems theory, which can be used to for	mally verify timing	g correctness of
such systems. Another s	set of lectures will introduce methods and techniques used for development of safety-critical systems, whose failure may have	e catastrophic co	nsequences.
During labs, students wi	II first solve a few simple tasks to familiarize themselves with basic components of VxWorks RTOS and to benchmark the use	ed OS and hardwa	are (Xilinx Zynq).
The obtained metrics re	present the typical criteria for assessing the suitability of a given platform for the given application. After the simple tasks, stu	idents will solve a	complex task of
time-critical motion cont	rol application which will require full utilization of RTOS features. All the tasks at the labs will be implemented in C (or C++) la	anguage.	
B4M33SSU	Statistical Machine Learning	Z,ZK	6
The aim of statistical ma	achine learning is to develop systems (models and algorithms) able to learn to solve tasks given a set of examples and some	prior knowledge	about the task.
This includes typical tas	ks in speech and image recognition. The course has the following two main objectives 1. to present fundamental learning co	ncepts such as ris	sk minimisation,
maximum likelihood esti	mation and Bayesian learning including their theoretical aspects, 2. to consider important state-of-the-art models for classific	cation and regress	sion and to show
have the set of the lands of the second set of the second se	d by these sensents		
how they can be learned	by mose concepts.		
,	Wave Propagation for Wireless Links	Z,ZK	6
B2M17SBS		· ·	-
B2M17SBS The aim of the course is	Wave Propagation for Wireless Links	atellite wireless lir	nks. The syllabus
B2M17SBS The aim of the course is	Wave Propagation for Wireless Links to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and s oretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite	atellite wireless lir	nks. The syllabus
B2M17SBS The aim of the course is includes both deeper the	Wave Propagation for Wireless Links to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and s oretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite	atellite wireless lir	nks. The syllabus
B2M17SBS The aim of the course is includes both deeper the in various frequency bar B2M32THOA	Wave Propagation for Wireless Links to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and s oretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite nds.	atellite wireless lir , fixed and mobile Z,ZK	nks. The syllabus communications
B2M17SBS The aim of the course is includes both deeper the in various frequency bal B2M32THOA The aim of the course is	Wave Propagation for Wireless Links to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and s oretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite nds. Queueing Theory	atellite wireless lir , fixed and mobile Z,ZK nd to introduce po	nks. The syllabus communications 6 ossibilities of
B2M17SBS The aim of the course is includes both deeper the in various frequency bal B2M32THOA The aim of the course is simulation and modellin	Wave Propagation for Wireless Links to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and s oretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite nds. Queueing Theory to present an overview of dimensioning of telecommunication networks on the basis of results of the queuing theory (QT) a	atellite wireless lir , fixed and mobile Z,ZK nd to introduce po ed on different se	nks. The syllabus communications 6 ossibilities of rvice systems
B2M17SBS The aim of the course is includes both deeper the in various frequency bal B2M32THOA The aim of the course is simulation and modellin and telecommunication	Wave Propagation for Wireless Links to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and s oretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite nds. Queueing Theory to present an overview of dimensioning of telecommunication networks on the basis of results of the queuing theory (QT) a g of networks, both from the point of view of grade of service (GoS) and quality of service (QoS). Results of the QT are appli	atellite wireless lir , fixed and mobile Z,ZK nd to introduce po ed on different se	nks. The syllabus communications 6 ossibilities of rvice systems
B2M17SBS The aim of the course is includes both deeper the in various frequency bal B2M32THOA The aim of the course is simulation and modellin and telecommunication	Wave Propagation for Wireless Links to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and s oretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite nds. Queueing Theory to present an overview of dimensioning of telecommunication networks on the basis of results of the queuing theory (QT) a g of networks, both from the point of view of grade of service (GoS) and quality of service (QoS). Results of the QT are applied networks being currently operated and developed. Theoretical knowledge about models of service systems can be applied or	atellite wireless lir , fixed and mobile Z,ZK nd to introduce po ed on different se	nks. The syllabus communications 6 ossibilities of rvice systems
B2M17SBS The aim of the course is includes both deeper the in various frequency bar B2M32THOA The aim of the course is simulation and modellin and telecommunication systems in real life - not B2M01TIK	Wave Propagation for Wireless Links to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and s oretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite nds. Queueing Theory to present an overview of dimensioning of telecommunication networks on the basis of results of the queuing theory (QT) a g of networks, both from the point of view of grade of service (GoS) and quality of service (QoS). Results of the QT are applied networks being currently operated and developed. Theoretical knowledge about models of service systems can be applied or only on the telecommunications one.	atellite wireless lin , fixed and mobile Z,ZK nd to introduce po ed on different se n dimensioning of Z,ZK	ks. The syllabus communications 6 ossibilities of rvice systems different service

Code of the group: 2021_MEKPV8A

Name of the group: Compulsory subjects of the programme

Requirement credits in the group: In this group you have to gain 30 credits

Requirement courses in the group: In this group you have to complete 5 courses Credits in the group: 30

Note on the group:

Specializace Komunikace a zpracování informace (KZI)

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
B3M35DRS	Dynamics and Control Networks Kristian Hengster-Movric Kristian Hengster-Movric	Z,ZK	6	2P+2C	Z	PV
B2M37KDKA	Coding in digital communications Jan Sýkora Jan Sýkora Jan Sýkora (Gar.)	Z,ZK	6	3P+1C	L	PV
B2M37KASA	Compression of images and signals Stanislav Vítek, František Rund, Karel Fliegel, Václav Vencovský Karel Fliegel Stanislav Vítek (Gar.)	Z,ZK	6	2P+2C	L	PV
B2M32MKSA	Mobile Networks Zden k Be vá, Pavel Mach, Robert Bešák Pavel Mach Zden k Be vá (Gar.)	Z,ZK	6	2P + 2L	Z	PV
B2M37SEK	Synchronization and equalization in digital communications Jan Sýkora Jan Sýkora Jan Sýkora (Gar.)	Z,ZK	6	3P+1C	Z	PV

Characteristics of the courses of this group of Study Plan: Code=2021_MEKPV8A Name=Compulsory subjects of the programme

B3M35DRS Dynamics and Control Networks Z,ZK This course responds to an ever-increasing demand for understanding contemporary networks large-scale complex systems composed of many components and subsystems interconnected into a single distributed entity. Herein, we will consider fundamental similarities between diverse areas such as e.g. forecasting the spread of global pandemics, public opinion dynamics and manipulation of communities through social media, formation controls for unmanned vehicles, energy generation and distribution in power grids, etc. Understanding such compelling issues goes far beyond the boundaries of any single physical, technological or scientific domain. Therefore, we will analyze phenomena across different domains, involving societal, economic and biological networks. For such networked systems, the resulting behavior depends not only on the characteristics of their individual components and details of their physical or logical interactions, but also on a precise way those components are interconnected the detailed interconnection topology. For that reason, the first part of the course introduces fundamental theoretical and abstract computational network analysis concepts; in particular, the algebraic graph theory, network measures and metrics and fundamental network algorithms. The second part of the course subsequently views networks as dynamical systems, studies their properties and ways in which these are controlled, using mainly methods of automatic control theory. Z,ZK 6

B2M37KDKA Coding in digital communications

This course extends and deepens the topics of the basic communication theory courses in the following main areas. 1) Advanced information theory in coding and Network Information Theory develop a framework for understanding the principles of the channel coding in single-user and multi-node/multi-user scenarios. 2) The algebraic coding presents classical topics of block and convolutional codes. 3) Advanced coding technique focuses on turbo, LDPC, Space-Time codes and Wireless Network Coding. 4) Advanced decoding technique, namely iterative and multi-user decoding is a fundamental tool for decoding capacity approaching channel codes.

B2M37KASA	Compression of images and signals	Z,ZK	6
The subject deals with c	ompression methods and techniques. Main goal is to introduce basic concepts of lossless and lossy compresion of audiovisua	l information (entr	opy, redundancy
and irrelevancy). Within	the laboratory exercises students will work with implementations of particular algorithms, including objective and subjective r	methods of quality	evaluation.
B2M32MKSA	Mobile Networks	Z,ZK	6
The lectures introduce p	principles and functionalities of mobile networks with special focus on currently deployed technologies and future mobile netw	orks. Furthermor	e, architecture
and fundamental princin	los of GSM LIMTS LTE/LTE A and EG will be explained. Then, selected key technologies for future mobile networks (6G) w	ill be explained	

B2M37SEK Synchronization and equalization in digital communications

Z,ZK

6

We explain principles of the receiver signal processing (synchronization and equalization) for the parametric channel including variety of the implementation possibilities. We focus on the essential particular forms of the channel phase, frequency and timing parameterization, channels with multipath propagation and MIMO channels. We develop the ideas of synchronization and equalization in the context of the data decoding in the parametric channel. All basic categories of the CSE algorithms are targeted: feed-forward, feed-back, iterative and recursive, including the theoretical background of the parameter estimation theory, and theory of the feed-back and iterative systems.

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_MEKH 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:

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
B0M16FIL	Peter Zamarovský Peter Zamarovský Peter Zamarovský (Gar.)	Z,ZK	5	2P+2S	Z,L	V
B0M16HVT	History of science and technology 2 Marcela Efmertová, Jan Mikeš Marcela Efmertová Marcela Efmertová (Gar.)	Z,ZK	5	2P+2S	Z,L	V
B0M16HSD1	History of economy and social studies Marcela Efmertová	Z,ZK	5	2P+2S	Z,L	V
B0M16PSM	Psychology Jan Fiala Jan Fiala Jan Fiala (Gar.)	Z,ZK	5	2P+2S	Z,L	V
A003TV	Physical Education Ji í Drnek	Z	2	0+2	L,Z	V
B0M16TEO	Theology Vladimír Sláme ka Vladimír Sláme ka Vladimír Sláme ka (Gar.)	Z,ZK	5	2P+2S	Z,L	V

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

B0M16FIL		Z,ZK	5
B0M16HVT	History of science and technology 2	Z,ZK	5
This subject traces his	torical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate st	tudents' interest ir	h the history and
traditions of the subject	t, while highlighting the developments in technical education and professional organizations, the process of shaping scientific	life and the influe	nce of technical
engineers			
B0M16HSD1	History of economy and social studies	Z,ZK	5
This subject deals with	the history of the Czech society in the 19th - 21th centuries. It follows the forming of the Czech political representation, its aim	ns and achieved r	esults as well as
the social and cultural	development and coexistence of the various ethnical groups in the Czech countries.		
B0M16PSM	Psychology	Z,ZK	5
A003TV	Physical Education	Z	2
B0M16TEO	Theology	Z,ZK	5
This subject provides	to students the basic orientation in christian theology and requires no special previous education. After short philosophic lectu	re the basic theolo	ogic disciplines
are gone through. The	subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones	who want to get l	know Christianity
- religion from which g	raws our civilization up.		

Code of the group: MTV

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
TVKLV	Physical Education Course	Z	0	7dní	L	V

TVKZVPhysical Education CourseZ07dníZV		1	ı — — — — — — — — — — — — — — — — — — —				
	TVKZV	Physical Education Course	Z	0	7dní	Z	V

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

A003TV	Physical Education	Z	2
TVV	Physical education	Z	0
TV-V1	Physical education	Z	1
TVV0	Physical education	Z	0
TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0

Code of the group: 2021_MEKVOL 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: ~Nabío

~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 Compl	letion	Credits
A003TV	Physical Education Z	z	2
B0M16FIL	Ζ,Ζ	ZK	5
B0M16HSD1	History of economy and social studies Z,Z		5
	the history of the Czech society in the 19th - 21th centuries. It follows the forming of the Czech political representation, its aims and achiev	1	-
	the social and cultural development and coexistence of the various ethnical groups in the Czech countries.		
B0M16HVT	History of science and technology 2 Z,Z	ZK	5
	orical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate students' intere		
traditions of the subject	t, while highlighting the developments in technical education and professional organizations, the process of shaping scientific life and the ir engineers	nfluence	of technical
B0M16PSM	Psychology Z,Z	ZK	5
B0M16TEO	Theology Z,Z	ZK	5
This subject provides t	o students the basic orientation in christian theology and requires no special previous education. After short philosophic lecture the basic t	theologic	disciplines
are gone through. The s	subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones who want to g	get know	Christianity
	- religion from which graws our civilization up.		
B2M01TIK	Information Theory and Coding Z,Z	ZK	6
Fundam	nentals of information theory with a view towards efficient data compression and reliable transmission of information using selfcorrecting co	odes.	
B2M17SBS	Wave Propagation for Wireless Links Z,Z	ZK	6
The aim of the course is	to study the wireless transmission channel in real environments focusing on wave propagation for planning of terrestrial and satellite wireless	ss links. T	he syllabus
includes both deeper the	eoretical foundations of radio wave propagation in the atmosphere as well as ITU-R design procedures for terrestrial and satellite, fixed and mo	bile com	munications
	in various frequency bands.		
B2M31ADAA	Adaptive signal processing Z,Z	ZK	6
B2M31ADAA		ZK	6
B2M31ADAA B2M31DSP	Adaptive signal processing Z,z		6
B2M31DSP	Adaptive signal processing Z,Z This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming. Z,Z	ZK	6
B2M31DSP The course follows the b	Adaptive signal processing Z,Z This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming. Z,Z Advanced DSP methods Z,Z	ZK	6 gital signals
B2M31DSP The course follows the lanalysis and be able to	Adaptive signal processing Z,Z This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming. Advanced DSP methods Z,Z Advanced DSP methods Z,Z Z,Z <td>ZK</td> <td>6 gital signals amiliar with</td>	ZK	6 gital signals amiliar with
B2M31DSP The course follows the l analysis and be able to methods of signal deco	Adaptive signal processing Z,Z This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming. Advanced DSP methods Z,Z Advanced DSP methods Z,Z Z,Z <td>ZK hods of di became fa t the resu</td> <td>6 gital signals amiliar with Its of signal</td>	ZK hods of di became fa t the resu	6 gital signals amiliar with Its of signal
B2M31DSP The course follows the lanalysis and be able to methods of signal deco	Adaptive signal processing Z,Z This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming. Advanced DSP methods Z,Z Advanced DSP methods Z,Z basic course in signal processing and introduces advanced methods of analysis and digital signal processing. Graduates will learn the meth op practically use them. They learn to know the conditions of use of correlation, spectral and coherent analysis of random signals. They will be imposition and independent component analysis and the time-frequency transformations. Emphasis will be placed on an ability to interpret analyses. Wireless Technologies Z,Z	ZK hods of dia became fa t the resu ZK	6 gital signals amiliar with lts of signal 6
B2M31DSP The course follows the lanalysis and be able to methods of signal deco	Adaptive signal processing Z,Z This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming. Advanced DSP methods Z,Z Advanced DSP methods Z,Z basic course in signal processing and introduces advanced methods of analysis and digital signal processing. Graduates will learn the meth op practically use them. They learn to know the conditions of use of correlation, spectral and coherent analysis of random signals. They will be imposition and independent component analysis and the time-frequency transformations. Emphasis will be placed on an ability to interpret analyses. Wireless Technologies Z,Z view of fundamental principles of wireless networks in various areas of their application. Students will understand architecture, principles ar	ZK nods of dia became fa t the resu ZK nd protoc	6 gital signals amiliar with lts of signal 6 cols used in
B2M31DSP The course follows the lanalysis and be able to methods of signal deco	Adaptive signal processing Z,Z This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming. Advanced DSP methods Z,Z Advanced DSP methods Z,Z practically use them. They learn to know the conditions of use of correlation, spectral and coherent analysis of random signals. They will be practically use them. They learn to know the conditions of use of correlation, spectral and coherent analysis of random signals. They will be practically use them. They learn to know the conditions of use of correlation. Students will be placed on an ability to interpret analyses. Wireless Technologies Z,Z view of fundamental principles of wireless networks in various areas of their application. Students will understand architecture, principles are plogies and learn how these technologies can be exploited in real world applications. The goal is to teach students how to solve problems replaced in the solve problems replaced on the solve problems	ZK nods of dia became fa t the resu ZK nd protoc	6 gital signals amiliar with lts of signal 6 cols used in
B2M31DSP The course follows the lanalysis and be able to methods of signal decompany and the second	Adaptive signal processing Z,Z This course provides a basic discourse on adaptive algorithms for filtering, decorrelation, separation and beamforming. Advanced DSP methods Z,Z Advanced DSP methods Z,Z practically use them. They learn to know the conditions of use of correlation, spectral and coherent analysis of random signals. They will be practically use them. They learn to know the conditions of use of correlation, spectral and coherent analysis of random signals. They will be proved and independent component analysis and the time-frequency transformations. Emphasis will be placed on an ability to interpret analyses. Wireless Technologies Z,Z view of fundamental principles of wireless networks in various areas of their application. Students will understand architecture, principles are ologies and learn how these technologies can be exploited in real world applications. The goal is to teach students how to solve problems re of wireless networks, their operation or development of wireless networks components.	ZK nods of dip became fa t the resu ZK nd protoc elated to	6 gital signals amiliar with lts of signal 6 cols used in deployment
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	on networks being currently operated and developed. Theoretical knowledge about models of service systems can be applied on din systems in real life - not only on the telecommunications one.	nensioning of diffe	rent service
B2M37CIR	Implementation of the digital circuits in Radio	Z,ZK	6
	or student, which want practically designed circuits of the digital signal processing with the signal processors and specialised circuits		
realisation of the mo	dulators and circuit of the numerical conversion of the signal, algoritms coding/decoding, which contains in the communication chair to effective realization with minimal computing power.	n. Dominantly is co	oncentration
B2M37KASA	Compression of images and signals	Z,ZK	6
-	h compression methods and techniques. Main goal is to introduce basic concepts of lossless and lossy compresion of audiovisual info		-
	/ithin the laboratory exercises students will work with implementations of particular algorithms, including objective and subjective me		
B2M37KDKA	Coding in digital communications	Z,ZK	6
	and deepens the topics of the basic communication theory courses in the following main areas. 1) Advanced information theory in co	-	
	mework for understanding the principles of the channel coding in single-user and multi-node/multi-user scenarios. 2) The algebraic co		-
of block and convolu	ional codes. 3) Advanced coding technique focuses on turbo, LDPC, Space-Time codes and Wireless Network Coding. 4) Advanced iterative and multi-user decoding is a fundamental tool for decoding capacity approaching channel codes.		que, namely
B2M37MAM	Microprocessors	Z,ZK	6
	tudents acquainted with the properties of microprocessor systems, make students familiar with on-chip peripherals, connect externa		
	tion of the memory or I/O space address extension. Next, taught the students to make simple program in the assembly language, C ion of this subject student should be able to design and implement simpler microprocessor system including connection of necessa design.		
B2M37SEK	Synchronization and equalization in digital communications	Z,ZK	6
	s of the receiver signal processing (synchronization and equalization) for the parametric channel including variety of the implementation		
	icular forms of the channel phase, frequency and timing parameterization, channels with multipath propagation and MIMO channels		
synchronization and	equalization in the context of the data decoding in the parametric channel. All basic categories of the CSE algorithms are targeted: fee		ack, iterative
	and recursive, including the theoretical background of the parameter estimation theory, and theory of the feed-back and iterative s	-	
B2MPROJ6	Project	Z	6
	n the form of a project. A student will choose a topic from a range of topics related to his or her branch of study, which will be specifi departments. The project will be defended within the framework of a subject. Project list http://www.fel.cvut.cz/en/education/semest		artment or
			6
B3M35DRS	Dynamics and Control Networks ponds to an ever-increasing demand for understanding contemporary networks large-scale complex systems composed of many con	Z,ZK	6 svstems
	a single distributed entity. Herein, we will consider fundamental similarities between diverse areas such as e.g. forecasting the sprea	-	-
	I manipulation of communities through social media, formation controls for unmanned vehicles, energy generation and distribution in p	•	
	sues goes far beyond the boundaries of any single physical, technological or scientific domain. Therefore, we will analyze phenomer	-	-
	conomic and biological networks. For such networked systems, the resulting behavior depends not only on the characteristics of the		
details of their phys	cal or logical interactions, but also on a precise way those components are interconnected the detailed interconnection topology. Fo	or that reason, the	first part of
	es fundamental theoretical and abstract computational network analysis concepts; in particular, the algebraic graph theory, network		
fundamental networ	c algorithms. The second part of the course subsequently views networks as dynamical systems, studies their properties and ways	in which these are	controlled,
	using mainly methods of automatic control theory.		
B3M35ORR	Optimal and Robust Control	Z,ZK	6
B3M35PSR	Real -Time Systems Programming	Z.ZK	•
-	rse is to provide students with basic knowledge about software development for real-time systems, for example in control and embe	, ,	6
is on embedded sys		edded applications.	The focus
such systems And	tems equipped with a real-time operating system (RTOS). Lectures will cover real-time systems theory, which can be used to formal	edded applications. Ily verify timing cor	The focus rectness of
	tems equipped with a real-time operating system (RTOS). Lectures will cover real-time systems theory, which can be used to formal ther set of lectures will introduce methods and techniques used for development of safety-critical systems, whose failure may have a	edded applications. Ily verify timing cor catastrophic conse	The focus rectness of equences.
During labs, student	tems equipped with a real-time operating system (RTOS). Lectures will cover real-time systems theory, which can be used to formal ther set of lectures will introduce methods and techniques used for development of safety-critical systems, whose failure may have s will first solve a few simple tasks to familiarize themselves with basic components of VxWorks RTOS and to benchmark the used O	edded applications. Ily verify timing cor catastrophic conse IS and hardware (>	The focus rectness of equences. (ilinx Zynq).
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