Study plan

Name of study plan: Inteligentní budovy - platný od roku 2012

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: Intelligent Buildings Type of study: Follow-up master full-time

Required credits: 116
Elective courses credits: 4
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: 84

The role of the block: P

Code of the group: MIBBME

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

Requirement credits in the group:

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

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
BEZM	Safety in Electrical Engineering for a master's degree Vladimír K la, Radek Havlí ek, Ivana Nová, Josef ernohous, Pavel Mlejnek Radek Havlí ek, Vladimír K la (Gar.)	Z	0	2BP+2BC	Z	Р

Characteristics of the courses of this group of Study Plan: Code=MIBBME Name=Safety of the master's studies

BEZM	Z	0				
The course provides for students of all programs periodic training guidelines for health and occupational safety and gives knowledge of electrical hazard of given branch of study.						
Ctudonto ropolivo indiar	senseble qualification according to the gurrent Directive of the Doop					

Code of the group: MIBDIP1

Name of the group: Diploma Thesis

Requirement credits in the group: In this group you have to gain at least 26 credits (at most 52)

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

Credits in the group: 26 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
A5M99DIP	Diploma Thesis Petr Kašpar	Z	26	0P+20C	L	Р
ADIP26	Diploma Thesis	Z	26	36s	L	Р

Characteristics of the courses of this group of Study Plan: Code=MIBDIP1 Name=Diploma Thesis

A5M99DIP	Diploma Thesis	Z	26			
ADIP26	Diploma Thesis	Z	26			
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: MIBP

Name of the group: Compulsory subjects of the programm

Requirement credits in the group: In this group you have to gain 46 credits Requirement courses in the group: In this group you have to complete 11 courses

Credits in the group: 46

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
125ESB	Buildings Ecology Systems Stanislav Frolík Stanislav Frolík (Gar.)	KZ	4	2P	L	Р
125EABI	Energy Audit of Building Hana Kabrhelová	KZ	4	2P	L	Р
2161110	Air Conditioning and Industrial Ventilation	Z,ZK	4	2P+1C	*	Р
124KPKP	Building Structures - Final Review Ctislav Fiala Ctislav Fiala (Gar.)	ZK	4	3P	Z	Р
124OSIB	Lighting and Acoustics Jaroslav Vychytil, Lenka Maierová Jaroslav Vychytil Jaroslav Vychytil (Gar.)	KZ	4	2P	Z	Р
2161108	Transport Phenomena Martin Barták Martin Barták Martin Barták (Gar.)	Z,ZK	4	2P+1C	*	Р
2161109	Automatic control in environmental engineering of building Ji í Bašta, Jind ich Bohá Ji í Bašta Ji í Bašta (Gar.)	Z,ZK	4	2P+1C	*	Р
A5M14RPI	Distribution of Electric Energy and Drives Ji í Lettl, Pavel Mindl, Jan Bauer Ji í Lettl Ji í Lettl (Gar.)	Z,ZK	5	2P+1L	Z	Р
2161102	Radiant and Industrial Heating Ji í Bašta, Jind ich Bohá Ji í Bašta Ji í Bašta (Gar.)	Z,ZK	4	2P+1C	*	Р
A5M38SZS	Sensors and Networks Pavel Ripka, Antonín Platil Antonín Platil Pavel Ripka (Gar.)	Z,ZK	4	2P+1L	L	Р
124ST1	Thermal Engineering in Construction 1 Jan Tywoniak Jan Tywoniak (Gar.)	ZK	5	2P	Z	Р
2161567	Ventilation and Air Conditioning Vladimír Zmrhal, Miloš Lain Vladimír Zmrhal Vladimír Zmrhal (Gar.)	Z,ZK	4	2P+1C	2	Р

Characteristics of the courses of this group of Study Plan: Code=MIBP Name=Compulsory subjects of the programm

125ESB	Buildings Ecology Systems	KZ	4
Principles of environm	entally friendly water management. Disposal of sewage water and use of rain water. Measurement of water consumption, sys	tem design, pumpin	ig devices, water
saving and special ins	tallations.		
125EABI	Energy Audit of Building	KZ	4
Advanced course for it	ntroduction into energy auditing. Lectures topics: Energy audit and energy performance of buildings, legislation. EPDB - energy	y performance direc	tive for buildings.
Methodology of calcul	ating energy performance of buildings. Energy audit - procedure and parts. Sankey energy flow diagram. Analysis of initial cor	ndition, description o	of initial condition
object survey and sur	ey of project documentation. Determining source efficiency, distribution and emission of heat. Steps towards reduction of ene	ergy consumption - b	ouilding, heating,
lighting, ventilating sys	stems, technologies. Application of measures on a specific object. Synergic impact of energy saving measures. Economical ev	aluation, evaluation	from the aspect
•	iion. Evaluation - emission Individual object survey. Energy audit of industrial objects.Methods of buildings evaluation. Semina	r is focused on the r	ealistic buildings
resulting to presenting	case study report about energy audit of existing building.		
2161110	Air Conditioning and Industrial Ventilation	Z,ZK	4
Main functional eleme	nts of ventilation and air conditioning systems. Air conditioning systems. Ventilation systems for residential and technologica	I rooms.	
124KPKP	Building Structures - Final Review	ZK	4
Basics of building stru	ctures. Functional requirements, structural systems, spatial effect of the structural system. Vertical load-bearing structures, floo	r structures, overha	nging structures.
Envelopes of buildings	s, windows, partitions, floors, suspended ceilings. Stairs, roof construction – timber roof trusses, roof envelopes. Foundation	structures, structura	al solution of the
substructure, waterpro	ofing of the substructure. Structural systems of single and multi-storey buildings, structural systems of long-span structures.		
124OSIB	Lighting and Acoustics	KZ	4
The course introduces	students to the basics of building lighting technology and building acoustics and deepens further knowledge.		•
2161108	Transport Phenomena	Z,ZK	4
Basics of transport ph	enomena for the study programme Intelligent Buildings. Momentum, heat and mass transport in built environment.		
2161109	Automatic control in environmental engineering of building	Z,ZK	4
Application of basic ap	proaches to automatic control of HVAC systems and equipments. Automatic control sequences of air conditioning and sour	ces of heat.	
A5M14RPI	Distribution of Electric Energy and Drives	Z,ZK	5
2161102	Radiant and Industrial Heating	Z,ZK	4
Student will be inform	ed about the basics of radiant and other industrial heating systems	,	
A5M38SZS	Sensors and Networks	Z,ZK	4
Applications of sensor	s in buildings	,	
124ST1	Thermal Engineering in Construction 1	ZK	5
The subject discusses	the basic chapters of building physics - part hygrothermal performance of buildings in an overview manner with the aim of pro	oviding basic inform	ation to students
coming from non-cons	struction bachelor's fields and at the same time supplementing knowledge and linking it with contexts for students coming from	m civil engineering.	
2161567	Ventilation and Air Conditioning	Z,ZK	4
		1 '	
Main knowledge for de	esign, control and evaluation of ventilation and air conditioning systems. Design according to demands for treatment of therm	nal and humidity sta	te and quality of

Code of the group: MIBPRO1 Name of the group: Project 1

Requirement credits in the group: In this group you have to gain 6 credits

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

Credits in the group: 6 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
2163033	Design IB I. Martin Barták, Ji í Bašta, Jind ich Bohá , Vladimír Zmrhal, Miloš Lain, Ji í Hemerka, Miroslav Ku era, Tomáš Matuška, Roman Vav i ka, Ji í Bašta Ji í Bašta (Gar.)	Z	6	0P+4C	*	Р
125PIB1	Project 1 Stanislav Frolík, Zuzana Veverková, Ilona Koubková, Michal Kabrhel, Karel Kabele, Bohumír Garlík, Daniel Adamovský, Miroslav Urban, Pavla Hofbauer Pechová, Stanislav Frolík Michal Kabrhel (Gar.)	Z	6	4C	L	Р
A5M99PR1	Project 1 Petr Kašpar Petr Kašpar (Gar.)	Z	6	0P+4C	L	Р

Characteristics of	of the courses of this group of Study Plan: Code=MIBPRO1 Name=Project 1		
2163033	Design IB I.	Z	6
Design of heating sys	ems, heat distributors and systems for using recoverable source of energy. Design of ventilation and air conditioning systems, inc	cluding gas cleani	ng and reduction
of noise.			
125PIB1	Project 1	Z	6
Project 1 is the subject	t of the interfaculty course Intelligent Buildings. Its content is focused on the issue of intelligent buildings in order to link the know	vledge from the B	achelor's degree
to other disciplines. In	the project, the student demonstrates the ability to independently develop a project in the field of intelligent buildings using a t	horough analysis	of the current
state of the art from the	e literature.		
A5M99PR1	Project 1	Z	6
The topic of the thesis	is chosen by the student and selected from the list of topics. "Project 1" is followed by "Project 2" with a higher difficulty. The a	ssignment of the	project is subject
to the approval of the	faculty guarantor or tutor. The work will be publicly presented.		

Code of the group: MIBPRO2 Name of the group: Project 2

Requirement credits in the group: In this group you have to gain 6 credits

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

Credits in the group: 6 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
2163034	Project IB II. Ji i Bašta Ji i Bašta (Gar.)	Z	6	0P+4C	*	Р
125PIB2	Project 2 Michal Kabrhel Michal Kabrhel (Gar.)	Z	6	4C	Z	Р
A5M99PR2	Project 2 Petr Kašnar Petr Kašnar (Gar.)	Z	6	0P+4C	Z	Р

Characteristics of the courses of this group of Study Plan: Code=MIBPRO2 Name=Project 2

2163034	Project IB II.	Z	6				
Project and experimental solution of environmental devices. Optimization investment and operating costs, economic appraisal of ecologic investment.							
125PIB2	Project 2	Z	6				
Project 2 is the subject of the interfaculty discipline Intelligent Buildings. In the project, the student demonstrates the ability to independently develop a more advanced project in the							
field of intelligent buildir	gs.						
A5M99PR2	Project 2	Z	6				
The topic of the thesis is chosen by the student and selected from the list of topics. Project 2 mostly follows the topic of "Project 1" with a higher difficulty. The assignment of the project							
is subject to the approval of the faculty guarantor or tutor. The work will be publicly presented.							

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 32

The role of the block: PV

Code of the group: MIBPVP

Name of the group: Compulsory optionally subjects

Requirement credits in the group: In this group you have to gain at least 32 credits (at most 116)

Requirement courses in the group: In this group you have to complete at least 8 courses (at most 29)

Credits in the group: 32 Note on the group:

Code	members) Titors authors and quaranters (gar.)	Completion	Credits	Scope	Semester	ROIE		
A5M02AKA	Tutors, authors and guarantors (gar.) Acoustic Applications	KZ	4	2P+2L	L	PV		
2162035	Ond ej Ji i ek Ond ej Ji i ek Ond ej Ji i ek (Gar.) Alternative Energy Sources	KZ	4	2P+1C	*	PV		
Tomáš Matuška Tomáš Matuška Tomáš Matuška (Gar.)		KZ	4	2P+2L	L	PV		
SM17BUP	Jan Vrba, Ladislav Oppl Jan Vrba Jan Vrba (Gar.) Refrigeration Technique and Heat Pumps for Intelligent					PV		
152060	Buildings	KZ	4	3P+1C	*	PV		
A5M16EUE	Economics of Energy Use Ji í Beranovský Ji í Beranovský Ji í Beranovský (Gar.)	KZ	4	3P+1C	Z	PV		
5M15ES1	Electrical Light 1 Petr Žák, Petr Žák	KZ	4	2P+1S	Z	PV		
A5M38BEM	Electromagnetic compatibility	KZ	4	1P+1L	Z	PV		
A5M34EZS	Electronic security systems Miroslav Husák, Jan Novák, Tomáš Teplý Miroslav Husák Miroslav Husák (Gar.)	KZ	4	3P+1L	Z	PV		
A5M34ELE	Electronics Alexandr Laposa Alexandr Laposa Alexandr Laposa (Gar.)	KZ	4	3P+1L	L	PV		
2162700	Experimental Methods 1 Miroslav Ku era Miroslav Ku era (Gar.)	KZ	4	0P+4L	*	PV		
A5M16FIP	Corporate finance Old ich Starý, Ji í Vaší ek, Blanka Ku erková Ji í Vaší ek Old ich Starý (Gar.)	KZ	4	3P+1C	L	PV		
\5M13FVS	Photovoltaic Systems Pavel Hrzina, Ladislava erná, Vít zslav Benda Ladislava erná Pavel Hrzina (Gar.)	KZ	4	2P+2L	Z	PV		
A5M33IZS	Information and Knowledge-Based Systems	Z,ZK	4	2P+1C	L	PV		
24INBB	Integrated Design of Buildings Petr Hájek, Antonín Lupíšek Antonín Lupíšek Petr Hájek (Gar.)	Z,ZK	4	2P+1C	Z	PV		
SM38MEB	Measurements in the Buildings Petr Kašpar Petr Kašpar (Gar.)	KZ	4	2P+1L	Z	PV		
A5M35MAS			4	2P+2C	Z	PV		
25MEC	Circulation of Buildian France Borfornson		4	1P+1C	Z	PV		
A5M13NZZ	2N77 Independent sources			KZ	4	3P+1L	Z	PV
25OZEB	Renewable Energy Sources Michal Kabrhel, Hana Kabrhelová Michal Kabrhel Michal Kabrhel (Gar.)	ZK	4	2P	L	PV		
25PBZB	Fire Services Ilona Koubková, Bohumír Garlík, Pavla Hofbauer Pechová Ilona Koubková Ilona Koubková (Gar.)	KZ	4	2P	L	PV		
A5M38SPD	Collection and data transfer Pavel Mejnek	KZ	4	3P+1L	L	PV		
162064	Noise and Vibration Control Miroslav Ku era, Richard Nový Miroslav Ku era Miroslav Ku era (Gar.)	KZ	4	2P+1C	*	PV		
25SYB	Building Systems Jan Tywoniak, Karel Kabele Karel Kabele (Gar.)	ZK	4	4P	Z	PV		
25TECE	Technological Units Ilona Koubková Ilona Koubková (Gar.)	KZ	4	2P	Z	PV		
B5M99SCT	Technology for Smart Cities Lukáš Ferkl Lukáš Ferkl (Gar.)	Z,ZK	4	2P+1C	Z	PV		
2162114	Heating Ji í Bašta	KZ	4	2P+1C	*	PV		
162115	Ventilation and Air Conditioning Vladimír Zmrhal	KZ	4	2P+1C	*	PV		
5M14ZSE	Fundamentals of Power Electrical Engineering	KZ	4	2+1L	L	PV		
152038	Energy Sources and Conversions	KZ	4	3P+1C	*	PV		
haracteristics of th	ne courses of this group of Study Plan: Code=MIBPVP Name=Co	ompulsory or	ntionally	subjects	:			
	Acoustic Applications	paiddi y O	O . I dilly		KZ	4		
ecture summarize applica	ations in physical acoustics, room and building acoustics, environmental acoustics, noise	e and vibration co	ntrol, physio					
Itrasound.	Margatina Frances			ı	V7			
	Alternative Energy Sources Iternative energy sources use in buildings. Solar energy. Heat pumps. Biomass utilizatior	1.			KZ	4		
	Dielegieel Figure of Floorings and Field				1/7			

Completion Credits | Scope | Semester

ΚZ

ΚZ

Role

Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their

Code

A5M17BUP

2152060

Biological Effects of Electromagnetic Field

Refrigeration Technique and Heat Pumps for Intelligent Buildings

by living Organism. Applications of ${\sf EF}$ in Medicine. Hygienic Standards.

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Biophysical Aspects of Electromagnetic Fields (EF) coupling of Various Biological Systems (BS). Interaction of EF with BS - overview. Mechanism of Interaction and Biological Effects. Experimental Results and Hypotheses of Biological Effects of Static and Stationary Electrical, Magnetic and Nonstationary Fields. Mathematical Solution of Interaction. EF generated

A5M16EUE	Economics of Energy Use	KZ	4
	1	1 1	-
-	rgy management of company, buildings or energy systems. Energy need and consumption, energy balance. Energy characte gy audit and feasibility study, optimization of energy management of energy systems. Prices and tariffs, economy and financi		e, secondary
A5M15ES1		KZ	4
	Electrical Light 1		
A5M38BEM	Electromagnetic compatibility	KZ	4
A5M34EZS	Electronic security systems	KZ	4
A5M34ELE	Electronics	KZ	4
2162700	Experimental Methods 1	KZ	4
Introduction study of	experimental technique in environmental engineering		
A5M16FIP	Corporate finance	KZ	4
Principles of finance,	present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment	decision and net pres	ent value, IRR
comparison time perio	d, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finar	nce, cash flow manage	ement.Dividen
policy.			
A5M13FVS	Photovoltaic Systems	KZ	4
= -	exploitation using photovoltaic systems. Photovoltaic phenomena, solar cells and their characteristics, solar modules (constru		-
	(including energy conservation). Photovoltaic system applications, optimisation of operating conditions. Basic economical and		present trends
A5M33IZS	Information and Knowledge-Based Systems	Z,ZK	4
•	he student with a necessary overview of information technologies with attention paid to reqiremnts of intelligent building info	•	
student learns the ba	sic methods and techniques applicable to knowledge based systems aimed at automated solving of decision-making problem	ns. The attention is pa	aid namely to
-	epresentation and its modeling so that the students are able to communicate effectively with IT and knowledge engineering or	experts. The students	will also learn
the basics of network	ing protocols used in intelligent buildings.		
124INBB	Integrated Design of Buildings	Z,ZK	4
The main objective o	the subject Integrated Building Design is to get an complex overview of the principles of integrated buildings design, life cycle	assessment of buildi	ngs, evaluatior
of building performar	ce, green/sustainable certification systems and understand environmental, social and economic aspects of the built environm	nent.	
A5M38MEB	Measurements in the Buildings	KZ	4
The students will lea	n about principles of measurement of basic physical quantities in the building. As the majority of the physical quantities are c	onverted to the electr	ical signals, a
	nent of the electrical quantities is also presented. The subject is not intended for students who have already studied the subject	ects Electrical measu	rement and
Sensors and transdu	ers on CTU FEE.		
A5M35MAS	Modeling and simulation	KZ	4
125MEC	Simulation of Building Energy Performance	KZ	4
	at explaining the issues of modelling and simulation of energy behaviour of buildings. Students will be introduced to an overvi	iew of tools and meth	odologies for
solving these problem	s and learn how to use the simulation software DesignBuilder. In addition, they will be introduced to climate data, materials, co	nstruction and other f	actors affecting
building behaviour. T	e aim of the course is to provide students with basic knowledge and practical experience in modelling and simulating buildin	g energy behaviour.	
A5M13NZZ	Independent sources	KZ	4
Electrochemical sour	ce's of the electric power - overview. Electrochemical sources (accumulators), applications. Uninteruptible power sources in IE	3. Other sources of th	e electrical
energy. Perspective s	purces of electrical enegy, storage of energy.		
125OZEB	Renewable Energy Sources	ZK	4
The course deals wit	n renewable energy sources and building energy systems. The different types of energy-solar, wind, biomass, geothermal and	1	
characteristics of the		d hydro-are discusse	d in detail. The
renewable energy so	energies and the most appropriate methods of use are described. Attention is paid to understanding the correct way to desig	=	
		=	
	urces.	n facilities and syster	
125PBZB		n facilities and system	ms that use
125PBZB Fire water,hydrant sy	Fire Services	n facilities and system	ms that use
125PBZB Fire water,hydrant sy	Fire Services Fire Services Fire services Fire services Fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting	n facilities and system	ms that use
125PBZB Fire water,hydrant sy technological equipm A5M38SPD	Fire Services Fire Services stems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting ent. Electric fire alarm. Fire control equipment. Backup power source. Collection and data transfer	n facilities and system KZ g buildings against fir	4 e spread from
125PBZB Fire water,hydrant sy technological equipm A5M38SPD 2162064	Fire Services Fire Services stems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting ent. Electric fire alarm. Fire control equipment. Backup power source. Collection and data transfer Noise and Vibration Control	n facilities and systen KZ g buildings against fin	ms that use 4 e spread from
125PBZB Fire water,hydrant sy technological equipm A5M38SPD 2162064 Student will be inform	Fire Services Fire Services stems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting ent. Electric fire alarm. Fire control equipment. Backup power source. Collection and data transfer Noise and Vibration Control ed about the basic acoustic dimensions, which are important for evaluation of noise.	KZ g buildings against fin	4 e spread from 4
125PBZB Fire water,hydrant sy technological equipm A5M38SPD 2162064 Student will be inform 125SYB	Fire Services Fire Services stems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting ent. Electric fire alarm. Fire control equipment. Backup power source. Collection and data transfer Noise and Vibration Control ed about the basic acoustic dimensions, which are important for evaluation of noise. Building Systems	KZ g buildings against fir KZ KZ KZ ZK	4 e spread from 4 4
125PBZB Fire water,hydrant sy technological equipm A5M38SPD 2162064 Student will be inform 125SYB Multi-criteria analysis	Fire Services Fire Services stems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting ent. Electric fire alarm. Fire control equipment. Backup power source. Collection and data transfer Noise and Vibration Control ed about the basic acoustic dimensions, which are important for evaluation of noise. Building Systems of the requirements for the indoor environment and the function of the systems in different types of buildings and plants and other states.	KZ g buildings against fir KZ KZ g buildings against fir KZ KZ KZ	4 e spread from 4 4 or the design o
125PBZB Fire water,hydrant sy technological equipm A5M38SPD 2162064 Student will be inform 125SYB Multi-criteria analysis energy and ecological	Fire Services tems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting ent. Electric fire alarm. Fire control equipment. Backup power source. Collection and data transfer Noise and Vibration Control ed about the basic acoustic dimensions, which are important for evaluation of noise. Building Systems of the requirements for the indoor environment and the function of the systems in different types of buildings and plants and to building systems. Relationships between building technical equipment and the building. Integrated view of conceptual solution	KZ g buildings against fir KZ KZ KZ KZ KZ CONTINUES AGAINST FIRE KZ KZ KZ CONTINUES AGAINST FIRE KZ	4 e spread from 4 4 or the design of types in terms
125PBZB Fire water,hydrant sy technological equipm A5M38SPD 2162064 Student will be inform 125SYB Multi-criteria analysis energy and ecologica of indoor systems an	Fire Services tems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting ent. Electric fire alarm. Fire control equipment. Backup power source. Collection and data transfer Noise and Vibration Control ed about the basic acoustic dimensions, which are important for evaluation of noise. Building Systems of the requirements for the indoor environment and the function of the systems in different types of buildings and plants and to building systems. Relationships between building technical equipment and the building. Integrated view of conceptual solution of building design. E.g. office buildings, residential buildings, halls, shopping centres, cultural centres, industrial buildings, spoil	KZ g buildings against fir KZ KZ KZ KZ KZ Optimization criteria forms in different buildings family h	4 e spread from 4 4 or the design of types in termsouses, passive
125PBZB Fire water,hydrant sy technological equipm A5M38SPD 2162064 Student will be inform 125SYB Multi-criteria analysis energy and ecologica of indoor systems an	Fire Services tems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting ent. Electric fire alarm. Fire control equipment. Backup power source. Collection and data transfer Noise and Vibration Control ed about the basic acoustic dimensions, which are important for evaluation of noise. Building Systems of the requirements for the indoor environment and the function of the systems in different types of buildings and plants and to building systems. Relationships between building technical equipment and the building. Integrated view of conceptual solution of the systems. E.g. office buildings, residential buildings, halls, shopping centres, cultural centres, industrial buildings, spot be introduced to the requirements for the indoor environment, the characteristic elements of energy and environmental building.	KZ g buildings against fir KZ KZ KZ KZ KZ Optimization criteria forms in different buildings family h	4 e spread from 4 4 or the design of types in terms ouses, passive
125PBZB Fire water,hydrant sy technological equipm A5M38SPD 2162064 Student will be inform 125SYB Multi-criteria analysis energy and ecologica of indoor systems an etc. The audience wil design for the buildin	Fire Services tems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting ent. Electric fire alarm. Fire control equipment. Backup power source. Collection and data transfer Noise and Vibration Control ed about the basic acoustic dimensions, which are important for evaluation of noise. Building Systems of the requirements for the indoor environment and the function of the systems in different types of buildings and plants and a building systems. Relationships between building technical equipment and the building. Integrated view of conceptual solution building design. E.g. office buildings, residential buildings, halls, shopping centres, cultural centres, industrial buildings, type.	KZ g buildings against fir KZ KZ KZ KZ VA VA VA VA VA VA VA VA VA V	4 e spread from 4 d or the design of types in termsouses, passive to the structural
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Name of the block: Elective courses Minimal number of credits of the block: 0

Energy Sources and Conversions

The role of the block: V

2152038

Code of the group: MIBVOLPRE Name of the group: Elective subjects Requirement credits in the group: ΚZ

4

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
124INBB	Integrated Design of Buildings	Z,ZK	4
The main objective	of the subject Integrated Building Design is to get an complex overview of the principles of integrated buildings design, life cycle assess	sment of buildings	, evaluation
of	puilding performance, green/sustainable certification systems and understand environmental, social and economic aspects of the built	environment.	
124KPKP	Building Structures - Final Review	ZK	4
Basics of building s	tructures. Functional requirements, structural systems, spatial effect of the structural system. Vertical load-bearing structures, floor structures.	tures, overhanging	structures.
-	ings, windows, partitions, floors, suspended ceilings. Stairs, roof construction – timber roof trusses, roof envelopes. Foundation struction		ution of the
	ubstructure, waterproofing of the substructure. Structural systems of single and multi-storey buildings, structural systems of long-spar		
124OSIB	Lighting and Acoustics	KZ	4
	The course introduces students to the basics of building lighting technology and building acoustics and deepens further knowle		
124ST1	Thermal Engineering in Construction 1	ZK	5
-	ses the basic chapters of building physics - part hygrothermal performance of buildings in an overview manner with the aim of providing		
	m non-construction bachelor's fields and at the same time supplementing knowledge and linking it with contexts for students coming f		
125EABI	Energy Audit of Building	KZ	4
	or introduction into energy auditing. Lectures topics: Energy audit and energy performance of buildings, legislation. EPDB - energy perfo		-
	culating energy performance of buildings. Energy audit - procedure and parts. Sankey energy flow diagram. Analysis of initial condition, survey of project documentation. Determining source efficiency, distribution and emission of heat. Steps towards reduction of energy co	· ·	
	systems, technologies. Application of measures on a specific object. Synergic impact of energy saving measures. Economical evaluation		-
0 0, 0	tection. Evaluation - emission Individual object survey. Energy audit of industrial objects.Methods of buildings evaluation. Seminar is foc	•	•
	resulting to presenting case study report about energy audit of existing building.		
125ESB	Buildings Ecology Systems	KZ	4
	nmentally friendly water management. Disposal of sewage water and use of rain water. Measurement of water consumption, system de		vices, water
	saving and special installations.		
125MEC	Simulation of Building Energy Performance	KZ	4
The course is aim	ed at explaining the issues of modelling and simulation of energy behaviour of buildings. Students will be introduced to an overview of	tools and method	ologies for
solving these probl	ems and learn how to use the simulation software DesignBuilder. In addition, they will be introduced to climate data, materials, construct	tion and other facto	ors affecting
building be	haviour. The aim of the course is to provide students with basic knowledge and practical experience in modelling and simulating build	ing energy behavio	our.
125OZEB	Renewable Energy Sources	ZK	4
The course deals	with renewable energy sources and building energy systems. The different types of energy-solar, wind, biomass, geothermal and hydr	o-are discussed in	detail. The
characteristics of	the energies and the most appropriate methods of use are described. Attention is paid to understanding the correct way to design fact	cilities and systems	s that use
	renewable energy sources.		
125PBZB	Fire Services	KZ	4
Fire water, hydrant	systems, fire pipe, fire station. Fixed fire-fighting water with water mist, foam, and halon. Special fire-fighting equipment. Protecting build	lings against fire s	pread from
	technological equipment. Electric fire alarm. Fire control equipment. Backup power source.		
125PIB1	Project 1		
	· · · · · · · · · · · · · · · · · · ·	Z	6
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to other discipline 125PIB2 Project 2 is the su 125SYB Multi-criteria analy energy and ecolog of indoor systems etc. The audience v 125TECE 2152038 2152060 2161102 2161108	ject of the interfaculty course Intelligent Buildings. Its content is focused on the issue of intelligent buildings in order to link the knowled is. In the project, the student demonstrates the ability to independently develop a project in the field of intelligent buildings using a thorestate of the art from the literature. Project 2 beject of the interfaculty discipline Intelligent Buildings. In the project, the student demonstrates the ability to independently develop a refield of intelligent buildings. Building Systems sis of the requirements for the indoor environment and the function of the systems in different types of buildings and plants and optimized building systems. Relationships between building technical equipment and the building. Integrated view of conceptual solutions in dand building design. E.g. office buildings, residential buildings, halls, shopping centres, cultural centres, industrial buildings, sports building to the requirements for the indoor environment, the characteristic elements of energy and environmental building systems are summed to the requirements for the indoor environment, the characteristic elements of energy and environmental building systems. Technological Units Saunas, fireplaces, kitchen technology, elevators, heat pumps, technology, swimming pools, heat source and technological systems. Refrigeration Technique and Heat Pumps for Intelligent Buildings Radiant and Industrial Heating Student will be informed about the basics of radiant and other industrial heating systems Transport Phenomena	ge from the Bachel rough analysis of the rou	or's degree the current 6 original forms of the current of the cu

2161110	Air Conditioning and Industrial Ventilation	Z,ZK	4
	functional elements of ventilation and air conditioning systems. Air conditioning systems. Ventilation systems for residential and technical systems.		1
2161567	Ventilation and Air Conditioning	Z,ZK	4
Main knowledge for	r design, control and evaluation of ventilation and air conditioning systems. Design according to demands for treatment of thermal an	d humidity state a	nd quality of
	air in residential and technological rooms.		
2162035	Alternative Energy Sources	KZ	4
	Principles and basics of alternative energy sources use in buildings. Solar energy. Heat pumps. Biomass utilization.		•
2162064	Noise and Vibration Control	KZ	4
	Student will be informed about the basic acoustic dimensions, which are important for evaluation of noise.		1
2162114	Heating	KZ	4
2102114	Supplemented knowledge from heating of residential and industrial buildings. Designing of convective and radiant heating syst		-
2162115		KZ	4
	Ventilation and Air Conditioning		1
	entilation and air conditioning. Source materials for design of systems. Natural ventilation, forced ventilation, air conditioning systems - c		
2162700	Experimental Methods 1	KZ	4
	Introduction study of experimental technique in environmental engineering		
2163033	Design IB I.	Z	6
Design of heating s	ystems, heat distributors and systems for using recoverable source of energy. Design of ventilation and air conditioning systems, includ	ing gas cleaning a	nd reduction
	of noise.		
2163034	Project IB II.	Z	6
	oject and experimental solution of environmental devices. Optimization investment and operating costs, economic appraisal of ecolog	ic investment.	-
A5M02AKA	Acoustic Applications	KZ	4
	ze applications in physical acoustics, room and building acoustics, environmental acoustics, noise and vibration control, physiologica		
Lociale Saminan	ultrasound.	i acoustics, diagric	31103, 4114
A E M 4 O E V C		V7	1
A5M13FVS	Photovoltaic Systems	KZ	4
	d its exploitation using photovoltaic systems. Photovoltaic phenomena, solar cells and their characteristics, solar modules (construction)		
	ns (including energy conservation). Photovoltaic system applications, optimisation of operating conditions. Basic economical and ecolor		
A5M13NZZ	Independent sources	KZ	4
Electrochemical s	sources of the electric power - overview. Electrochemical sources (accumulators), applications. Uninteruptible power sources in IB. Of	ther sources of the	e electrical
	energy. Perspective sources of electrical enegy, storage of energy.		
A5M14RPI	Distribution of Electric Energy and Drives	Z,ZK	5
A5M14ZSE	Fundamentals of Power Electrical Engineering	KZ	4
A5M15ES1	Electrical Light 1	KZ	4
	· · · · · · · · · · · · · · · · · · ·	KZ	4
A5M16EUE	Economics of Energy Use		1
Organization and	energy management of company, buildings or energy systems. Energy need and consumption, energy balance. Energy characteriza		
operav	sources. Energy guidit and faccibility attudy antimization of anargy management of anargy systems. Drives and tariffs, accommunal		occorraciy
	sources. Energy audit and feasibility study, optimization of energy management of energy systems. Prices and tariffs, economy and	financial analysis.	1
A5M16FIP	Corporate finance	financial analysis.	4
A5M16FIP Principles of finance	Corporate finance e, present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment decision	financial analysis. KZ on and net presen	4 t value, IRR,
A5M16FIP Principles of finance	Corporate finance e, present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment decision, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, ca	financial analysis. KZ on and net presen	4 t value, IRR,
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A5M16FIP Principles of finance comparison time pe A5M17BUP	Corporate finance e, present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment decision, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, capolicy. Biological Effects of Electromagnetic Field	financial analysis. KZ on and net presen ash flow managem KZ	4 t value, IRR, ent.Dividend
A5M16FIP Principles of finance comparison time pe A5M17BUP Biophysical Aspects	Corporate finance e, present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment decision, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, capolicy. Biological Effects of Electromagnetic Field s of Electromagnetic Fields (EF) coupling of Various Biological Systems (BS). Interaction of EF with BS - overview. Mechanism of Interaction of EF with BS - overview.	financial analysis. KZ on and net presen ash flow managem KZ eraction and Biolog	4 t value, IRR, ent.Dividend 4 gical Effects.
A5M16FIP Principles of finance comparison time pe A5M17BUP Biophysical Aspects	Corporate finance e, present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment decision, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, capolicy. Biological Effects of Electromagnetic Field s of Electromagnetic Fields (EF) coupling of Various Biological Systems (BS). Interaction of EF with BS - overview. Mechanism of Interaction of EF with BS - overview. Mechanism of Interaction of EF with BS - overview.	financial analysis. KZ on and net presen ash flow managem KZ eraction and Biolog	4 t value, IRR, ent.Dividend 4 gical Effects.
A5M16FIP Principles of finance comparison time pe A5M17BUP Biophysical Aspects	Corporate finance e, present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment decision, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, capolicy. Biological Effects of Electromagnetic Field s of Electromagnetic Fields (EF) coupling of Various Biological Systems (BS). Interaction of EF with BS - overview. Mechanism of Interaction of EF with BS - overview.	financial analysis. KZ on and net presen ash flow managem KZ eraction and Biolog	4 t value, IRR, ent.Dividend 4 pical Effects.
A5M16FIP Principles of finance comparison time pe A5M17BUP Biophysical Aspects	Corporate finance e, present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment decision, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, capolicy. Biological Effects of Electromagnetic Field s of Electromagnetic Fields (EF) coupling of Various Biological Systems (BS). Interaction of EF with BS - overview. Mechanism of Interaction of EF with BS - overview. Mechanism of Interaction of EF with BS - overview.	financial analysis. KZ on and net presen ash flow managem KZ eraction and Biolog	4 t value, IRR, ent.Dividend 4 gical Effects.
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A5M16FIP Principles of finance comparison time per A5M17BUP Biophysical Aspect Experimental Results A5M33IZS The course provide student learns the	Corporate finance e, present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment decision, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, capolicy. Biological Effects of Electromagnetic Field s of Electromagnetic Fields (EF) coupling of Various Biological Systems (BS). Interaction of EF with BS - overview. Mechanism of Interaction and Hypotheses of Biological Effects of Static and Stationary Electrical, Magnetic and Nonstationary Fields. Mathematical Solution by living Organism. Applications of EF in Medicine. Hygienic Standards. Information and Knowledge-Based Systems des the student with a necessary overview of information technologies with attention paid to reqiremnts of intelligent building information methods and techniques applicable to knowledge based systems aimed at automated solving of decision-making problems. The	financial analysis. KZ on and net present ash flow management of the control of	4 t value, IRR, ent.Dividend 4 gical Effects. F generated 4 ner on, the
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A5M16FIP Principles of finance comparison time per A5M17BUP Biophysical Aspect: Experimental Results A5M33IZS The course proving student learns the data and knowledger A5M34ELE	Corporate finance e, present value and alternative cost of capital, financial calculus, long-term finance, valuation of bonds and stocks, investment decision, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, capolicy. Biological Effects of Electromagnetic Field s of Electromagnetic Fields (EF) coupling of Various Biological Systems (BS). Interaction of EF with BS - overview. Mechanism of Interaction and Hypotheses of Biological Effects of Static and Stationary Electrical, Magnetic and Nonstationary Fields. Mathematical Solution by living Organism. Applications of EF in Medicine. Hygienic Standards. Information and Knowledge-Based Systems des the student with a necessary overview of information technologies with attention paid to reqiremnts of intelligent building information enterpresentation and its modeling so that the students are able to communicate effectively with IT and knowledge engineering experit the basics of networking protocols used in intelligent buildings. Electronics	financial analysis. KZ on and net present ash flow management of the series of the s	4 t value, IRR, ent.Dividend 4 gical Effects. F generated 4 ner on, the d namely to ill also learn
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B5M99SCT	Technology for Smart Cities	Z,ZK	4		
BEZM	Safety in Electrical Engineering for a master's degree	Z	0		
The course provides for students of all programs periodic training guidelines for health and occupational safety and gives knowledge of electrical hazard of given branch of study.					

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