## Study plan

## Name of study plan: Inteligentní budovy

Faculty/Institute/Others:

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: 120 Elective courses credits: 0 Sum of credits in the plan: 120

Note on the plan: tento studijní plán platí od nástupu 2020

Name of the block: Compulsory courses Minimal number of credits of the block: 88

The role of the block: Z

Code of the group: NX202001

Name of the group: Inteligentní budovy, 1. semestr

Requirement credits in the group: In this group you have to gain at least 14 credits

Requirement courses in the group: In this group you have to complete at least 3 courses

Credits in the group: 14 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
124ST1	Thermal Engineering in Construction Jan Tywoniak Jan Tywoniak (Gar.)	ZK	5	2P	Z	Z
124OSIB	Acoustics and Lighting Jaroslav Vychytil, Lenka Maierová Jaroslav Vychytil Jaroslav Vychytil (Gar.)	KZ	4	2P	Z	Z
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	Z

Characteristics of the courses of this group of Study Plan: Code=NX202001 Name=Inteligentní budovy, 1. semestr

124ST1	Thermal Engineering in Construction	ZK	5			
The subject discusses t	The subject discusses the basic chapters of building physics - part hygrothermal performance of buildings in an overview manner with the aim of providing basic information to study					
coming from non-consti	ruction bachelor's fields and at the same time supplementing knowledge and linking it with contexts for students coming from	civil engineering.				
124OSIB	Acoustics and Lighting	KZ	4			
The course introduces :	students to the basics of building lighting technology and building acoustics and deepens further knowledge.					
A5M14RPI	Distribution of Electric Energy and Drives	Z,ZK	5			

Code of the group: NX202002

Name of the group: Inteligentní budovy, 2. semestr

Requirement credits in the group: In this group you have to gain at least 26 credits

Requirement courses in the group: In this group you have to complete at least 4 courses

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
125PIB1	Project 1  Zuzana Veverková, Ilona Koubková, Michal Kabrhel, Karel Kabele, Stanislav Frolík, Bohumír Garlík, Daniel Adamovský, Miroslav Urban, Pavla Hofbauer Pechová, Stanislav Frolík Michal Kabrhel (Gar.)	Z	6	4C	L	Z
125EABU	Energy Audit of Building Michal Kabrhel, Karel Kabele, Miroslav Urban Karel Kabele Karel Kabele (Gar.)	KZ	4	2P+1C	L	Z

125ESB	Buildings Ecology Systems Stanislav Frolík Stanislav Frolík (Gar.)	KZ	4	2P	L	Z
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	*	Z
2161567	Ventilation and Air Conditioning Vladimír Zmrhal, Petr Zelenský Vladimír Zmrhal Vladimír Zmrhal (Gar.)	Z,ZK	4	2P+1C	2	Z
A5M38SZS	Sensors and Networks Payel Rinka, Antonin Platil, Payel Rinka (Gar.)	Z,ZK	4	2P+1L	L	Z

Characteristics	of the courses of this group of Study Plan: Code=NX202002 Name=Inteligentní budovy, 2. se	emestr	
125PIB1	Project 1	Z	6
Project 1 is the subje	ct of the interfaculty course Intelligent Buildings. Its content is focused on the issue of intelligent buildings in order to link the kno	wledge 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	thorough analysis	of the current
state of the art from t	ne literature.		
125EABU	Energy Audit of Building	KZ	4
Advanced course for	ntroduction into energy auditing. Lectures topics: Energy audit and energy performance of buildings, legislation. EPDB - energy	performance direc	tive for buildings
Methodology of calcu	lating energy performance of buildings. Energy audit - procedure and parts. Sankey energy flow diagram. Analysis of initial conc	dition, description	of initial condition
object survey and su	vey of project documentation. Determining source efficiency, distribution and emission of heat. Steps towards reduction of ener	gy consumption -	building, heating
lighting, ventilating sy	stems, technologies. Application of measures on a specific object. Synergic impact of energy saving measures. Economical eva	aluation, evaluation	n from the aspec
of environment prote	tion. Evaluation - emission Individual object survey. Energy audit of industrial objects.Methods of buildings evaluation. Seminar	is focused on the	realistic building
resulting to presenting	g case study report about energy audit of existing building.		
125ESB	Buildings Ecology Systems	KZ	4
Principles of environ	nentally friendly water management. Disposal of sewage water and use of rain water. Measurement of water consumption, syste	em design, pumpir	ng devices, wate
saving and special in	stallations.		
2161109	Automatic control in environmental engineering of building	Z,ZK	4
Application of basic a	pproaches to automatic control of HVAC systems and equipments. Automatic control sequences of air conditioning and source	es of heat.	
2161567	Ventilation and Air Conditioning	Z,ZK	4
Main knowledge for o	esign, control and evaluation of ventilation and air conditioning systems. Design according to demands for treatment of therma	al and humidity sta	ate and quality o
air in residential and	echnological rooms.		
A5M38SZS	Sensors and Networks	Z,ZK	4
Applications of sensor	rs in buildinas	•	•

Code of the group: NX202003

Name of the group: Inteligentní budovy, 3. semestr

Requirement credits in the group: In this group you have to gain at least 22 credits

Requirement courses in the group: In this group you have to complete at least 5 courses

Credits in the group: 22

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
125PIB2	Project 2 Michal Kabrhel Michal Kabrhel (Gar.)	Z	6	4C	Z	Z
2161102	Radiant and Industrial Heating Jií Bašta, Roman Vav i ka <b>Jií Bašta</b> Jií Bašta (Gar.)	Z,ZK	4	2P+1C	*	Z
B5M99SCT	Technology for Smart Cities  Lukáš Ferkl Lukáš Ferkl Lukáš Ferkl (Gar.)	Z,ZK	4	2P+1C	Z	Z
125TECE	Technological Units Ilona Koubková, Hana Kabrhelová Ilona Koubková Ilona Koubková (Gar.)	KZ	4	2P	Z	Z
125SYB	Building Systems Jan Tywoniak, Karel Kabele Karel Kabele (Gar.)	ZK	4	4P	Z	Z

Characteristics of the courses of this group of Study Plan: Code=NX202003 Name=Inteligentní budovy, 3. semestr

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 advance	d project in the
field of intelligent buildir	ngs.		
2161102	Radiant and Industrial Heating	Z,ZK	4
Student will be informed	d about the basics of radiant and other industrial heating systems		•
B5M99SCT	Technology for Smart Cities	Z,ZK	4
125TECE	Technological Units	KZ	4
Saunas, fireplaces, kitc	hen technology, elevators, heat pumps, technology, swimming pools, heat source and technological systems.		
125SYB	Building Systems	ZK	4
A 4 10 10 10 11 11 11 11 11 11 11 11 11 11			

Multi-criteria analysis of the requirements for the indoor environment and the function of the systems in different types of buildings and plants and optimization criteria for the design of energy and ecological building systems. Relationships between building technical equipment and the building. Integrated view of conceptual solutions in different building types in terms of indoor systems and building design. E.g. office buildings, residential buildings, halls, shopping centres, cultural centres, industrial buildings, sports buildings, family houses, passive etc. The audience will be introduced to the requirements for the indoor environment, the characteristic elements of energy and environmental building systems in relation to the structural design for the building type.

Code of the group: NX202004

Name of the group: Inteligentní budovy, 4. semestr

Requirement credits in the group: In this group you have to gain at least 26 credits

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
125DPIB	Diploma Thesis Michal Kabrhel Michal Kabrhel (Gar.)	Z	26	20C	L	Z

Characteristics of the courses of this group of Study Plan: Code=NX202004 Name=Inteligentní budovy, 4. semestr

125DPIB Diploma Thesis

| Z | 26

Thesis of students studying the Master's degree programme Intelligent Buildings. Independent final thesis usually in the form of a complex project, theoretical work or a combination of the previous forms.

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: NX2020\_1

Name of the group: Inteligentní budovy, povinn volitelné p edm ty

Requirement credits in the group: In this group you have to gain at least 32 credits

Requirement courses in the group: In this group you have to complete at least 8 courses

Credits in the group: 32 Note on the group:

Note on the g	•					
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
124KPKP	Building Structures Ctislav Fiala Ctislav Fiala (Gar.)	ZK	4	3P	Z	PV
125OZEB	Renewable Energy Sources Michal Kabrhel Michal Kabrhel (Gar.)	ZK	4	2P	Z	PV
124INBB	Integrated Design of Buildings Jan R ži ka, Tereza Pavl , Martin Volf, Petr Hájek, Antonín Lupíšek <b>Petr Hájek</b> Petr Hájek (Gar.)	Z,ZK	4	2P+1C	Z	PV
125EIBB	Electroengineering and intelligent buildings Bohumír Garlík, Hana Kabrhelová Bohumír Garlík Bohumír Garlík (Gar.)	KZ	4	2P	Z	PV
2161108	Transport Phenomena Martin Barták Martin Barták (Gar.)	Z,ZK	4	2P+1C	*	PV
2162113	<b>Heating</b> Ji í Bašta, Jind ich Bohá , Roman Vav i ka <b>Ji í Bašta</b> Ji í Bašta (Gar.)	KZ	4	2P+2C	1	PV
A5M15ES1	Electrical Light 1 Petr Žák, Petr Žák Petr Žák Petr Žák (Gar.)	KZ	4	2P+1S	Z	PV
A5M38MEB	Measurements in the Buildings Petr Kašpar Petr Kašpar Petr Kašpar (Gar.)	KZ	4	2P+1L	Z	PV
2162035	Alternative Energy Sources Tomáš Matuška Tomáš Matuška (Gar.)	KZ	4	2P+1C	*	PV
2151154	Refrigertion and heat pumps	KZ	4	3P+1C		PV
2162019	Industrial Heating, Ventilation, Airconditioning Vladimír Zmrhal, Miloš Lain Vladimír Zmrhal Vladimír Zmrhal (Gar.)	KZ	4	2P+1C	2	PV
A5M34ELE	Electronics Alexandr Laposa, Adam Bou a Alexandr Laposa Alexandr Laposa (Gar.)	KZ	4	3P+1L	L	PV
A5M38SBD	Collection and Data Transfer Pavel Mlejnek Pavel Mlejnek Pavel Mlejnek (Gar.)	KZ	4	2P+1L	L	PV
125PBZB	Fire Services Ilona Koubková, Bohumír Garlík, Daniel Adamovský, Pavla Hofbauer Pechová Ilona Koubková Ilona Koubková (Gar.)	KZ	4	2P	L	PV
125MEC	Simulation of Building Energy Performance Karel Kabele, Miroslav Urban Karel Kabele Karel Kabele (Gar.)	KZ	4	1P+1C	Z	PV
2162700	Experimental Methods 1 Miroslav Ku era Miroslav Ku era (Gar.)	KZ	4	0P+4L	*	PV
2162064	Noise and Vibration Control Miroslav Ku era, Richard Nový Miroslav Ku era Miroslav Ku era (Gar.)	KZ	4	2P+1C	*	PV
2162066	Heat Supply Tomáš Matuška Tomáš Matuška (Gar.)	KZ	4	2P+1C	3	PV

A5M34EZS	Electronic security systems Miroslav Husák, Jan Novák, Tomáš Teplý, Václav Prajzler Václav Prajzler Václav Prajzler (Gar.)	KZ	4	3P+1L	Z	PV
A5M13NZZ	Independent sources Pavel Hrzina, Václav Papež Pavel Hrzina Pavel Hrzina (Gar.)	KZ	4	3P+1L	Z	PV
A5M13FVS	Photovoltaic Systems Pavel Hrzina, Ladislava erná, Vít zslav Benda Ladislava erná Pavel Hrzina (Gar.)	KZ	4	2P+2L	L	PV
A5M16EUE	Economics of Energy Use Ji í Beranovský, Július Bemš <b>Ji í Beranovský</b> Július Bemš (Gar.)	KZ	4	3P+1C	Z	PV
A5M16FIP	Corporate finance Old ich Starý, Ji í Vaší ek, Blanka Ku erková <b>Ji í Vaší ek</b> Old ich Starý (Gar.)	KZ	4	3P+1C	L	PV

Sealos of building structures, Functional requirements, structural systems, spatial effect of the structural systems, positions, increasing and tructures, containing a structural systems, spatial effect of the structural systems of long seals increased in structures, structural systems, increased seals with renerable energy sources and building energy systems of long-sean structures. Structural systems of long-sean structures.  ZK 4  The course deals with renerable energy sources and building energy systems, The different types of energy-solar, winch, biomass, geothermal and hydro-are discussed in detail. The characteristics of the energies and the most appropriate membrads of use are described. Attention is paid to understanding the corror way to design facilities and systems that use trenewable energy sources.  125EIBB Integrated Design of Buildings  126EIBB Electroengineering and intelligent buildings.  126EIBB Electroengineering and intelligent buildings.  126EIBB Electroengineering and intelligent buildings.  127EIBB Electroengineering	Characteristics of	the courses of this group of Study Plan: Code=NX2020_1 Name=Inteligentní budovy, povir	n volitelné	p edm ty
Basics of huisting structures. Functional requirements, structural systems, spatial effect of the structural systems, ventical load-bearing structures. Environments with the substructures, structural solution of the substructure, structural solution of the substructure. Structural solution of the substructure, structural solution of the substructure. Structural solution of the substructure, structural solution of the substructure. Structural solution of the substructure. Structural solution of the substructure. Structural solution of the substructure solution of solutions of so	124KPKP	Building Structures	ZK	4
substructure, waterproofing of the substructure. Structural systems of long-gain and multi-storry buildings, structural systems of long-gain structures.  IEGOZEB Renewable Energy Sources and building energy systems. The different types of energy-solar, wind, bornaus, geothermal and hydro-are discussed in detail. The characteristics of the energies and the most aproprishin embrods of use are described. Attention is paid to understanding the control way to design fluidings and systems that use renewable energy sources, and building energy systems, and understand energy sources, and buildings design, life cycle assessment of buildings, evaluation of buildings objective of the subject Integrated Design is to gat an complex overview of the principles of integrated buildings design, life cycle assessment of buildings, evaluation of buildings objectives, general certification systems, and understand environmental, social and economic aspected of the build environmental parameters. The influence of electromagnetic environmental parameters, make inchanging and intelligent buildings.  IEGOSTION STATES AND ADMINISTRATION OF THE CONTROLL OF THE	Basics of building structu		tructures, overhar	iging structures.
1250/ZEB Renewable Energy Sources The course details with remeable energy sources and building energy systems. The different types of energy-souls, wind, biomass, geothermal and hysto-red desades the technical extension is paid to understanding the correct way to design facilities and systems that use renewable energy sources.  124INIBB Integrated Design of Buildings The main objective of the subject integrated Building Design is beget an complex overview of the principles of integrated buildings design, life cycle assessment of buildings, evaluation of building performance, green/substandable certification systems and understand environments, social and encoronic sepects of the build evolutionment of buildings design, life cycle assessment of buildings, evaluation of building performance, green/substandable certification systems and understand environments, social and encoronic sepects of the build evolutionment of buildings design, life cycle assessment of buildings, evaluation of buildings design, life cycle assessment of buildings, evaluation of buildings design, life cycle assessment of buildings, evaluation of buildings design, life cycle assessment of buildings, evaluation of buildings design, life cycle assessment of buildings, evaluation of buildings design, life cycle assessment of buildings, evaluation of buildings design, life cycle assessment of buildings, evaluation of buildings design, life cycle assessment of buildings, evaluation of buildings design, life cycle assessment of buildings, evaluation of buildings design, life cycle assessment of life and buildings design, life cycle assessment of life and buildings design, life cycle assessment of life and life assessment of the subject is an interest to explain a life assessment of life	Envelopes of buildings,	windows, partitions, floors, suspended ceilings. Stairs, roof construction timber roof trusses, roof envelopes. Foundation struc	tures, structural s	olution of the
The course deals with "renerable energy sources and building energy systems. The different types of energy-solar, wind, biomass, genithermal and flystro-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 facilities and systems that use renewable energy sources.  12.12.6.11.8.11.8.11.8.11.8.11.8.11.8.11	substructure, waterproof	fing of the substructure. Structural systems of single and multi-storey buildings, structural systems of long-span structures.		
The course deals with rememble energy sources and building energy systems. The different types of energy-soler, wind, bismass, genthermal and hydro-are discussed in detail. The characteristics of the energies and the most appropriate methods of use are described. Attention is paid to understanding the control way to design facilities and systems that use remewable energy sources.  124(HINBB   Integrated Design of Buildings   124(HINBB   124(HINBB	125OZEB	Renewable Energy Sources	ZK	4
thearestratistics of the energies and the most appropriate methods of use are described. Attention is paid to understanding the correct way to design facilities and systems that use interevable energy sources.  124.INIBB Integrated Design of Buildings The main objective of the subject integrated Building Design is to get an complex overview of the principles of integrated buildings design, life cycle assessment of buildings evaluation of building performance, green/sustainable cartification systems and understand environmental, social and economic aspects of the build environments of the study of the principles of principles of integrated buildings design, life cycle assessment of buildings performance, green/sustainable cartification systems and understand environmental, social and economic aspects of the build environment of buildings performance, green/sustainable cartification systems and understand environmental, social and economic aspects of the buildings metal transport performance and understand performance and understanding applications. The fundamental idea is to save energy, materials and ensure a system application is social to the environment of the study programme Intelligent Buildings. Momentum, heat and mass transport in built environment.  12561138   Transport Phenomena is the study programme Intelligent Buildings. Momentum, heat and mass transport in built environment.  1262131   Heating   Electrical Light 1   KZ   4    4.8M38MEB   Measurements in the Buildings   Microbial Systems and transport performance is the study programme Intelligent Buildings. Momentum, heat and mass transport in built environment.  12621313   Meaning   Electrical Elight 1   KZ   4    4.8M38MEB   Measurements in the Buildings   Microbial Systems and transport performance is a considerable of the electrical quantities is also presented. The subject is not intended for students who have already studied the subjects Electrical measurement and sensors and transformance on or CTU FEE.  1262035   Alternative Energy Sources		•	l l	d in detail. The
rememble energy sources.  Integrated Design of Buildings  the reain objective of the subject integrated Building Design is to get an complex overview of the principles of integrated buildings design, the cycle assessment of buildings of buildings design, the cycle assessment of buildings of buildings design, the cycle assessment of buildings of buildings.  Integration of buildings of buildings design is to get an complex overview of the principles of integrated buildings design, the cycle assessment of buildings. The buildings of bu				
124INBB Integrated Design of Buildings The main objective the subject Hispande Building begins to be dear complex overview of the principles of integrated buildings design, life cycle assessment of buildings, evaluation of building proformance, green/usualizable conflictation systems and understand amrirormental, social and economic aspects of the built environment.  126E1BB Electroengineering and intelligent buildings Electroengineering and Electroengineering and intelligent buildings Electroengineering Ele			,	
The main objective of the subject Integrated Building Design is to get an complex overview of the principles of integrated buildings design, its cycle assessment of buildings of the buildings o			7 7K	4
th cultiding performance, green/sustainable conflication systems and understand environmental, social and oconomic aspects of the built environment.  IZSEIBB Electroengineering and intelligent buildings  Interview of the property of the p				-
125EIBB   Elpectroengineering and intelligent buildings   Electroengineering and intelligent buildings   Electroengineering and intelligent buildings   Electroengineering   El	•			go, oraaa.o
The information society, inelligent systems, new technologies significantly influence various HVAC system applications. The fundamental idea is to save energy, materials and ensure primarilation and uniform control of the property of the property of the physical quantities are converted to the electrical light of the subject is an influence of electronage till environment, electromagnetic compatibility, application of intelligent devices in buildings requires a system approach to solve the whole complex of HVAC and intelligent wiring.  2 (2 4 4)  2 (2 14)  2 (2 13 1	<u> </u>			
spitama prizosato a salveta evenironmental parameters. The influence of electromagnetic environment, electromagnetic compatibility, application of intelligent devices in buildings requires a system approach to aske the whole complex of HVAC and intelligent wirring.  2.161108   Transport Phenomena Bassics of transport phenomena for the study programme Intelligent Buildings. Momentum, heat and maiss transport in built environment.  2.162113   Heating   H	,		l l	
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2,2K   4			igeni devices in bi	iliuliigs requires
Basics of transport phenomena for the study programme Intelligent Bulldings. Momentum, heat and mass transport in built environment.  2162113			7 71/	
2162113			Z,ZK	4
Knowledge improvement from the field of heating of residential and industrial buildings. Designing of convective and radiant heating systems.  KZ 4  ASM38MEB   Measurements in the Buildings   KZ 4  ASM38MEB   Measurements in the Buildings   KZ 4  ASM38MEB   Measurements in the Buildings   KZ 4  ASM38MEB   Measurement of the selectrical quantities is a labor presented. The subject is not intended for students with learn about principles of measurement of the selectrical quantities is a labor presented. The subject is not intended for students who have already studied the subjects Electrical measurement and sensors and transducers on CTU FEE.  1262035   Alternative Energy Sources  Principles and basics of alternative energy sources use in buildings. Solar energy. Heat pumps. Biomass utilization.  KZ 4  12751154   Refrigertion and heat pumps  The subject is an introduction to the reinfigeration technology and the heat pumps with the following thematic areas: Fundamentals of thermodynamics. Classification of cycles. Single-stage vapour cycle: basic form, basic processes. Converting of units parameters to other working conditions. Improvement of the Rankin cycles parameters. Classification of multistage cycles, aceade cycles. Refrigerants: classification, nomenchature, legislations. Sorgition cycles: classification, thermodynamic fundaments of multicorponent systems, absorption cycles LiBr-H2D  basic form, basic processes. Converting of units parameters to other working conditions. Improvement of the Rankin cycles parameters. Classification of multistage cycles, basic form, basic processes. Heat pumps, healing and hot tap water. Heat sources for HP  1262019   Industrial Heating, Ventilation, Airconditioning  Design and functional properties of ventilation systems for technological permisses. Heat and mass transfer, aerodynamics calculation. Energy demands of systems.  24030438ELE   Electronics  241525PGZ   Fire Services  Fire water. Hydrant systems, fire pipe, fire station. Fixed fire flighting water with water mist			1	
ASM15ES1   Electrical Light 1   KZ	· ·		KZ	4
AGM38MEB Measurements in the Buildings The students will learn about principles of measurement of basic physical quantities in the building. As the majority of the physical quantities are converted to the electrical signals, an overview of measurement of the electrical evaluation is also presented. The subject is not intended for students who have already studied the subjects. Electrical measurement and sensors and transducers on CTU FEE.  ICL 4  Perinciples and basics of alternative Energy Sources    KZ 4    Frinciples and basics of alternative energy sources use in buildings. Solar energy, Heat pumps. Biomass utilization.    ICL 4   Refrigertion and heat pumps   KZ 4   The subject is an introduction to the refrigeration technology and the heat pumps with the following thematic areas: Fundamentals of thermodynamics. Classification of cycles. Single-stage vapour cycle basic form, basic processes. Converting of units parameters to other evolving conditions. Improvement of the Rankin cycles parameters. Classification of multistage cycles, basic form, basic processes. Heat pumps. Peating and hot tap water. Heat sources for HP    Industrial Heating, Ventual Heating				
The students will learn about principles of measurement of basic physical quantities in the building. As the majority of the physical quantities are converted to the electrical signals, an overview of measurement of the electrical quantities is also presented. The subject is not intended for students who have already studied the subjects Electrical measurement and Serview of measurement of the electrical quantities is also presented. The subject is not intended for students who have already studied the subjects Electrical measurement and Persons and transducers on CTU FEE.  2162035   Alternative Energy Sources   KZ   4   Principles and basics of alternative energy sources use in buildings. Solar energy, Heat pumps. Biomass utilization.  2151154   Refrigertion and heat pumps   Refrigeration and heat pumps   Refrigeration of cycles. Single-stage expour cycle-basic form, basic processes. Converting of units parameters to other working conditions. Improvement of the Rankin cycles parameters. Classification of cycles. Single-stage expour cycle-basic form, basic processes. Heat pumps: heating and hot tap water. Heat sources for HP   Refrigeration of multistage cycles, scascade cycles. Refrigeration: classification, nomenclature, legislation. Sorption cycles: classification, thermodynamic fundaments of multicomponent systems, absorption cycles LIBr-H20 basic form, basic processes. Heat pumps: heating and hot tap water. Heat sources for HP   Refrigeration of Publication of Publication and functional properties of ventilation systems for technological premises. Heat and mass transfer, aerodynamics calculation. Energy demands of systems.  ASM34ELE Electronics   KZ   4    ASM34SBD   Collection and Data Transfer   KZ   4    ASM34SBD   Collection and Data Transfer   KZ   4    The course is aimed at explaining the issues of modelling and simulation explored properties of ventilation of Building Energy Performance   KZ   4    The course is aimed at explaining the issues of modelling and simulation of Publication of Building E	A5M15ES1	Electrical Light 1	KZ	4
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Organization and energy management of company, buildings or energy systems. Energy need and consumption, energy balance. Energy characterization of aggregate, secondary	A5M16EUE	Economics of Energy Use	KZ	4
		•	ا ation of aggregat	e, secondary
	energy sources. Energy	audit and feasibility study, optimization of energy management of energy systems. Prices and tariffs, economy and financial a	analysis.	

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 present value, IRR, comparison time period, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, cash flow management. Dividend policy.

## 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 asse	ssment of buildings	s, evaluation
of b	building performance, green/sustainable certification systems and understand environmental, social and economic aspects of the building performance, green/sustainable certification systems and understand environmental, social and economic aspects of the building performance.	ilt environment.	
124KPKP	Building Structures	ZK	4
-	structures. Functional requirements, structural systems, spatial effect of the structural system. Vertical load-bearing structures, floor stru		-
	dings, windows, partitions, floors, suspended ceilings. Stairs, roof construction timber roof trusses, roof envelopes. Foundation struct		ition of the
	substructure, waterproofing of the substructure. Structural systems of single and multi-storey buildings, structural systems of long-spa	an structures.	
124OSIB	Acoustics and Lighting  The course introduces students to the basics of building lighting technology and building acoustics and deepens further knowl	KZ   edge.	4
124ST1	Thermal Engineering in Construction	ZK	5
The subject discuss	ses the basic chapters of building physics - part hygrothermal performance of buildings in an overview manner with the aim of providing	ng basic information	to student
coming fro	m non-construction bachelor's fields and at the same time supplementing knowledge and linking it with contexts for students coming	from civil engineer	ing.
125DPIB	Diploma Thesis	Z	26
Thesis of students	s studying the Master's degree programme Intelligent Buildings. Independent final thesis usually in the form of a complex project, the of the previous forms.	oretical work or a co	ombination
125EABU	Energy Audit of Building	KZ	4
	or introduction into energy auditing. Lectures topics: Energy audit and energy performance of buildings, legislation. EPDB - energy perf	ormance directive f	or buildings
Methodology of cal	culating energy performance of buildings. Energy audit - procedure and parts. Sankey energy flow diagram. Analysis of initial condition	n, description of init	ial condition
	survey of project documentation. Determining source efficiency, distribution and emission of heat. Steps towards reduction of energy c		-
0 0	systems, technologies. Application of measures on a specific object. Synergic impact of energy saving measures. Economical evaluate		•
of environment pro	tection. Evaluation - emission Individual object survey. Energy audit of industrial objects. Methods of buildings evaluation. Seminar is fo	cused on the realis	tic building
	resulting to presenting case study report about energy audit of existing building.		_
125EIBB	Electroengineering and intelligent buildings	KZ	. 4
	ciety, intelligent systems, new technologies significantly influence various HVAC system applications. The fundamental idea is to savi		
optimal indoor and	outdoor environmental parameters. The influence of electromagnetic environment, electromagnetic compatibility, application of intellige	ent devices in buildir	ngs require
405500	a system approach to solve the whole complex of HVAC and intelligent wiring.	1/7	
125ESB	Buildings Ecology Systems	KZ	4
Principles of enviro	onmentally friendly water management. Disposal of sewage water and use of rain water. Measurement of water consumption, system of saving and special installations.	design, pumping de	vices, wate
125MEC	Simulation of Building Energy Performance		
IZOIVILO	Simulation of Building Energy Fenormance	KZ	4
The course is aim	ned at explaining the issues of modelling and simulation of energy behaviour of buildings. Students will be introduced to an overview of	of tools and method	lologies for
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cascade cycles. Ref	rigerants: classification, nomenclature, legislation. Sorption cycles: classification, thermodynamic fundaments of multicomponent system - basic form, basic processes. Heat pumps: heating and hot tap water. Heat sources for HP	ns, absorption cycl	es LiBr-H20
2161102	Radiant and Industrial Heating Student will be informed about the basics of radiant and other industrial heating systems	Z,ZK	4
2161108	Transport Phenomena  Basics of transport phenomena for the study programme Intelligent Buildings. Momentum, heat and mass transport in built environment.		4
	Automatic control in environmental engineering of building tion of basic approaches to automatic control of HVAC systems and equipments. Automatic control sequences of air conditioning and	Z,ZK d sources of heat.	4
2161567   Ventilation and Air Conditioning   Z,ZK   4  Main knowledge for design, control and evaluation of ventilation and air conditioning systems. Design according to demands for treatment of thermal and humidity state and quality of air in residential and technological rooms.			
2162019	Industrial Heating, Ventilation, Airconditioning d functional properties of ventilation systems for technological premises. Heat and mass transfer, aerodynamics calculation. Energy of	KZ demands of system	4
2162035	Alternative Energy Sources  Principles and basics of alternative energy sources use in buildings. Solar energy. Heat pumps. Biomass utilization.	KZ	4
2162064	Noise and Vibration Control  Student will be informed about the basic acoustic dimensions, which are important for evaluation of noise.	KZ	4
2162066	Heat Supply g with heat generators in heat-only and combined heat&power mode. Heat generators. Heating networks. Renewable energy so	KZ	4
2162113	Heating  Knowledge improvement from the field of heating of residential and industrial buildings. Designing of convective and radiant heating	KZ	4
2162700	Experimental Methods 1  Introduction study of experimental technique in environmental engineering	KZ	4
A5M13FVS   Photovoltaic Systems   KZ   4   Solar energy and its exploitation using photovoltaic systems. Photovoltaic phenomena, solar cells and their characteristics, solar modules (construction, technology, parameters). Photovoltaic systems (including energy conservation). Photovoltaic system applications, optimisation of operating conditions. Basic economical and ecological aspects, present trends.			
A5M13NZZ Independent sources KZ 4 Electrochemical sources of the electric power - overview. Electrochemical sources (accumulators), applications. Uninteruptible power sources in IB. Other sources of the electrical energy. Perspective sources of electrical energy, storage of energy.			
A5M14RPI	Distribution of Electric Energy and Drives	Z,ZK	5
A5M15ES1	Electrical Light 1	KZ	4
A5M16EUE   Economics of Energy Use   KZ   4   Organization and energy management of company, buildings or energy systems. Energy need and consumption, energy balance. Energy characterization of aggregate, secondary energy sources. Energy audit and feasibility study, optimization of energy management of energy systems. Prices and tariffs, economy and financial analysis.			
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 present value, IRR, comparison time period, annual equivalent value, inflation and return, capital asset pricing model, portfolio, sensitivity analysis and risk, short term finance, cash flow management. Dividend policy.			
A5M34ELE	Electronics	KZ	4
A5M34EZS	Electronic security systems	KZ	4
A5M38MEB Measurements in the Buildings KZ 4 The students will learn about principles of measurement of basic physical quantities in the building. As the majority of the physical quantities are converted to the electrical signals, an overview of measurement of the electrical quantities is also presented. The subject is not intended for students who have already studied the subjects Electrical measurement and Sensors and transducers on CTU FEE.			
A5M38SBD	Collection and Data Transfer	KZ	4
A5M38SZS	Sensors and Networks Applications of sensors in buildings	Z,ZK	4
B5M99SCT	Technology for Smart Cities	Z,ZK	4

For updated information see <a href="http://bilakniha.cvut.cz/en/FF.html">http://bilakniha.cvut.cz/en/FF.html</a> Generated: day 2025-09-04, time 13:25.