Recomended pass through the study plan

Name of the pass: Intelligent Buildings - valid from 2020

Faculty/Institute/Others: Faculty of Electrical Engineering
Department:
Pass through the study plan: Inteligentní budovy - platný od roku 2020
Branch of study guranteed by the department: Welcome page
Guarantor of the study branch:
Program of study: Intelligent Buildings
Type of study: Follow-up master full-time
Note on the pass:

Coding of roles of courses and groups of courses:
P - compulsory courses of the program, PO - compulsory courses of the branch, Z - compulsory courses, S - compulsory elective courses, PV - compulsory elective courses, F - elective specialized courses, V - elective courses, T - physical training courses

Coding of ways of completion of courses (KZ/Z/ZK) and coding of semesters (Z/L):
KZ - graded assesment, Z - assesment, ZK - examination, L - summer semester, Z - winter semester

Number of semester: 1

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
124OSIB	**Acoustics and Lighting** *Jaroslav Vychytil, Lenka Maierová **Jaroslav Vychytil** Jaroslav Vychytil (Gar.)*	KZ	4	2P	Z	P
BEZM	**Safety in Electrical Engineering for a master´s degree** *Vladimír Kůla, Radek Havlíček, Ivana Nová, Josef Černohous **Radek Havlíček** Vladimír Kůla (Gar.)*	Z	0	2BP+2BC	Z	P
124KPKP	**Building Structures** *Ctislav Fiala **Ctislav Fiala** Ctislav Fiala (Gar.)*	ZK	4	3P	Z	P
2161108	**Transport Phenomena** *Martin Barták **Martin Barták** Martin Barták (Gar.)*	Z,ZK	4	2P+1C	*	P
A5M14RPI	**Distribution of Electric Energy and Drives** *Jiří Lettl, Pavel Mindl, Jan Bauer **Jiří Lettl** Jiří Lettl (Gar.)*	Z,ZK	5	2P+1L	Z	P
124ST1	**Thermal Engineering in Construction** *Jan Tywoniak **Jan Tywoniak** Jan Tywoniak (Gar.)*	ZK	5	2P	Z	P
2020_MIBPV	**Povinně volitelné předměty programu** *2162035,2151154,..... (see the list of groups below)*	Min. cours. 8 Max. cours. 23	Min/Max 32/92			PV

Number of semester: 2

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***	KZ	4	2P	L	P
125EABU	**Energy Audit of Building** ***Karel Kabele***	KZ	4	2P+1C	L	P
2161109	**Automatic control in environmental engineering of building** ***Jiří Bašta***	Z,ZK	4	2P+1C	*	P
A5M38SZS	**Sensors and Networks**	Z,ZK	4	2P+1L	L	P
2161567	**Ventilation and Air Conditioning** ***Vladimír Zmrhal***	Z,ZK	4	2P+1C	2	P
2020_MIBPRO1	**Projekt 1** *2163033,125PIB1,..... (see the list of groups below)*	Min. cours. 1 Max. cours. 1	Min/Max 6/6			P
2020_MIBPV	**Povinně volitelné předměty programu** *2162035,2151154,..... (see the list of groups below)*	Min. cours. 8 Max. cours.	Min/Max 32/92			PV

		23				

Number of semester: 3

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
2161102	**Radiant and Industrial Heating** *Jiří Bašta, Roman Vavřička **Jiří Bašta** Jiří Bašta (Gar.)*	Z,ZK	4	2P+1C	*	P
B5M99SCT	**Technology for Smart Cities** *Lukáš Ferkl **Lukáš Ferkl** Lukáš Ferkl (Gar.)*	Z,ZK	4	2P+1C	Z	P
2020_MIBPRO2	**Projekt 2** *2163034,125PIB2,..... (see the list of groups below)*	Min. cours. 1 Max. cours. 1	Min/Max 6/6			P
2020_MIBPV	**Povinně volitelné předměty programu** *2162035,2151154,..... (see the list of groups below)*	Min. cours. 8 Max. cours. 23	Min/Max 32/92			PV

Number of semester: 4

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
ADIP26	**Diploma Thesis**	Z	26	36s	L	P
2020_MIBPV	**Povinně volitelné předměty programu** *2162035,2151154,..... (see the list of groups below)*	Min. cours. 8 Max. cours. 23	Min/Max 32/92			PV

List of groups of courses of this pass with the complete content of members of individual groups

Kód	Name of the group of courses and codes of members of this group (for specification see here or below the list of courses)	Completion	Credits	Scope	Semester	Role
2020_MIBPRO1	**Projekt 1**	**Min. cours. 1 Max. cours. 1**	**Min/Max** 6/6			**P**
2163033	Design IB I.	125PIB1	Project 1	A5M99PR1	Project 1	
2020_MIBPRO2	**Projekt 2**	**Min. cours. 1 Max. cours. 1**	**Min/Max** 6/6			**P**
2163034	Project IB II.	125PIB2	Project 2	A5M99PR2	Project 2	
2020_MIBPV	**Povinně volitelné předměty programu**	**Min. cours. 8 Max. cours. 23**	**Min/Max** 32/92			**PV**
2162035	Alternative Energy Sources	2151154	Refrigertion and heat pumps	A5M16EUE	Economics of Energy Use	
A5M15ES1	Electrical Light 1	A5M34EZS	Electronic security systems	A5M34ELE	Electronics	
125EIBB	Electroengineering and intellige ...	2162700	Experimental Methods 1	A5M16FIP	Corporate finance	
A5M13FVS	Photovoltaic Systems	124INBB	Integrated Design of Buildings	A5M38MEB	Measurements in the Buildings	
125MEC	Simulation of Building Energy Pe ...	A5M13NZZ	Independent sources	125OZEB	Renewable Energy Sources	
125PBZB	Fire Services	2162019	Industrial Heating, Ventilation, ...	A5M38SBD	Collection and Data Transfer	

2162064	Noise and Vibration Control	125SYB	Building Systems	125TECE	Technological Units
2162113	Heating	2162066	Heat Supply		

List of courses of this pass:

Code	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 assessment of buildings, evaluation of building performance, green/sustainable certification systems and understand environmental, social and economic aspects of the built environment.			
124KPKP	Building Structures	ZK	4
Basics of building structures. Functional requirements, structural systems, spatial effect of the structural system. Vertical load-bearing structures, floor structures, overhanging structures. Envelopes of buildings, windows, partitions, floors, suspended ceilings. Stairs, roof construction – timber roof trusses, roof envelopes. Foundation structures, structural solution of the substructure, waterproofing of the substructure. Structural systems of single and multi-storey buildings, structural systems of long-span structures.			
124OSIB	Acoustics and Lighting	KZ	4
The course introduces students to the basics of building lighting technology and building acoustics and deepens further knowledge.			
124ST1	Thermal Engineering in Construction	ZK	5
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 students coming from non-construction bachelor's fields and at the same time supplementing knowledge and linking it with contexts for students coming from civil engineering.			
125EABU	Energy Audit of Building	KZ	4
Advanced course for introduction into energy auditing. Lectures topics: Energy audit and energy performance of buildings, legislation. EPDB - energy performance directive for buildings. Methodology of calculating energy performance of buildings. Energy audit - procedure and parts. Sankey energy flow diagram. Analysis of initial condition, description of initial condition object survey and survey of project documentation. Determining source efficiency, distribution and emission of heat. Steps towards reduction of energy consumption - building, heating, lighting, ventilating systems, technologies. Application of measures on a specific object. Synergic impact of energy saving measures. Economical evaluation, evaluation from the aspect of environment protection. Evaluation - emission Individual object survey. Energy audit of industrial objects.Methods of buildings evaluation. Seminar is focused on the realistic buildings resulting to presenting case study report about energy audit of existing building.			
125EIBB	Electroengineering and intelligent buildings	KZ	4
The information society, intelligent systems, new technologies significantly influence various HVAC system applications. The fundamental idea is to save energy, materials and ensure optimal indoor and outdoor environmental parameters. The influence of electromagnetic environment, electromagnetic compatibility, application of intelligent devices in buildings requires a system approach to solve the whole complex of HVAC and intelligent wiring.			
125ESB	Buildings Ecology Systems	KZ	4
Principles of environmentally friendly water management. Disposal of sewage water and use of rain water. Measurement of water consumption, system design, pumping devices, water saving and special installations.			
125MEC	Simulation of Building Energy Performance	KZ	4
The course is aimed at explaining the issues of modelling and simulation of energy behaviour of buildings. Students will be introduced to an overview of tools and methodologies for solving these problems and learn how to use the simulation software DesignBuilder. In addition, they will be introduced to climate data, materials, construction and other factors affecting building behaviour. The aim of the course is to provide students with basic knowledge and practical experience in modelling and simulating building energy behaviour.			
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 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 correct way to design facilities and systems 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 buildings against fire spread from technological equipment.Electric fire alarm. Fire control equipment. Backup power source.			
125PIB1	Project 1	Z	6
Project 1 is the subject of the interfaculty course Intelligent Buildings. Its content is focused on the issue of intelligent buildings in order to link the knowledge from the Bachelor'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 the literature.			
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 buildings.			
125SYB	Building Systems	ZK	4
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.			
125TECE	Technological Units	KZ	4
Saunas, fireplaces, kitchen technology, elevators, heat pumps, technology, swimming pools, heat source and technological systems.			
2151154	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 unit's parameters to other working conditions. • Improvement of the Rankin cycle's parameters. • Classification of multistage cycles, cascade cycles. • Refrigerants: 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			
2161102	Radiant and Industrial Heating	Z,ZK	4
Student will be informed about the basics of radiant and other industrial heating systems			

2161108	Transport Phenomena	Z,ZK	4
	Basics of transport phenomena 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 approaches to automatic control of HVAC systems and equipments. Automatic control sequences of air conditioning and sources of heat.		
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	KZ	4
	Design and functional properties of ventilation systems for technological premises. Heat and mass transfer, aerodynamics calculation. Energy demands of systems.		
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.		
2162066	Heat Supply	KZ	4
	District heating with heat generators in heat-only and combined heat&power mode. Heat generators. Heating networks. Renewable energy sources in district heating.		
2162113	Heating	KZ	4
	Knowledge improvement from the field of heating of residential and industrial buildings. Designing of convective and radiant heating systems.		
2162700	Experimental Methods 1	KZ	4
	Introduction study of experimental technique in environmental engineering		
2163033	Design IB I.	Z	6
	Design of heating systems, heat distributors and systems for using recoverable source of energy. Design of ventilation and air conditioning systems, including gas cleaning and reduction of noise.		
2163034	Project IB II.	Z	6
	Project and experimental solution of environmental devices. Optimization investment and operating costs, economic appraisal of ecologic investment.		
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 enegy, 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	Z,ZK	4
	Applications of sensors in buildings		
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 assignment of the project is subject to the approval of the faculty guarantor or tutor. The work will be publicly presented.		
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.		
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.		
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. Students receive indispensable qualification according to the current Directive of the Dean.		

For updated information see http://bilakniha.cvut.cz/en/f3.html
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