

Study plan

Name of study plan: Buildings and Environment

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Buildings and Environment

Type of study: Follow-up master full-time

Required credits: 90

Elective courses credits: 0

Sum of credits in the plan: 90

Note on the plan: valid from 2023/24, in 2023 not opened

Name of the block: Compulsory courses

Minimal number of credits of the block: 50

The role of the block: Z

Code of the group: NY20230100

Name of the group: Buildings and Environment, 1st semester

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 7 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
124TPBU	Thermal Protection of Buildings	Z,ZK	4	1P+2C	Z	z
125APTM	Applied Thermomechanics Daniel Adamovský Daniel Adamovský Daniel Adamovský (Gar.)	ZK	4	2P+1C	Z	z
125MSBU	Modelling and Simulation of Buildings and HVAC Systems Michala Lysczas, Vojtěch Mazanec, Miroslav Urban, Zuzana Veverková, Karel Kabele Karel Kabele Karel Kabele (Gar.)	KZ	4	2P+2C	Z	z
125HVAB	Heating, Ventilation and AirConditioning of Buildings Karel Kabele	Z,ZK	6	3P+3C	Z	z
125TEBU	Technological Equipment of Buildings	ZK	4	2P+1C	Z	z
125BUSY	Buildings Systems Karel Kabele	ZK	4	4P	Z	z

Characteristics of the courses of this group of Study Plan: Code=NY20230100 Name=Buildings and Environment, 1st semester

124TPBU	Thermal Protection of Buildings	Z,ZK	4
Extension of knowledge from basic course of thermal protection of buildings. Input data for calculations, standard and advanced models of thermal and moisture behaviour of constructions, multidimensional heat and moisture transfer. Energy performance of buildings using dynamic simulation in hourly step. Fundamentals of CFD modelling (heat transfer by conduction, radiation and convection in building constructions and buildings).			
125APTM	Applied Thermomechanics	ZK	4
The course contains three basic groups, in which the student is gradually introduced to selected chapters on moist air, vapour thermodynamics and heat sharing. The aim of each chapter is to introduce students to the principles of equipment common in heating, ventilation and cooling systems that they will encounter in practice. The chapter on humid air will discuss typical and lesser used processes occurring in air handling units. The vapor thermodynamics section focuses on the familiar compressor and absorption chillers and heat pumps. The final chapter will explain the processes and principles related to heat exchangers.			
125MSBU	Modelling and Simulation of Buildings and HVAC Systems	KZ	4
The course "Modelling of buildings and HVAC systems" focuses on acquiring basic knowledge and skills in modelling the energy and environmental behaviour of buildings and technical systems. Students will learn the relationships between climatic conditions and the use of buildings and technical systems, zoning and design parameters and geometry for modelling buildings and technical systems for heating and cooling with liquids and air handling systems. They will also learn to use mathematical modelling to optimise the design of buildings and technical systems and CFD visualisation of fluid flow to solve engineering problems of technical building systems. The aim of the course is for students to gain comprehensive knowledge and skills in modelling the energy and environmental behaviour of buildings and technical systems, enabling them to effectively address current energy and sustainability issues in buildings and technical systems.			
125HVAB	Heating, Ventilation and AirConditioning of Buildings	Z,ZK	6
An advanced course in heating, ventilation and air conditioning of buildings focused on the integrated design and operation of technical systems for the production, transformation and distribution of energy in buildings to ensure thermal comfort, air quality and optimum indoor environment with minimal environmental impact. Knowledge at the level of undergraduate basic courses in heating and ventilation is assumed for graduation).			

125TEBU	Technological Equipment of Buildings	ZK	4
The course is focused on buildings with specific operation. These are either facilities for entertainment (theaters), relaxation and rest (swimming pools, saunas, wellness) or facilities for catering (commercial kitchens), or production facilities (mines, clean rooms) or storage facilities. For these buildings, the individual technological systems, methods of execution, and the requirements that are placed on the systems are presented. Emphasis is placed on fire and hygiene safety of the technological systems. The fire safety equipment that occur in these buildings are discussed in detail.			
125BUSY	Buildings Systems	ZK	4

Code of the group: NY20230200

Name of the group: Buildings and Environment, 2nd semester

Requirement credits in the group: In this group you have to gain at least 24 credits

Requirement courses in the group: In this group you have to complete at least 6 courses

Credits in the group: 24

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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
124BPBM	Building Physics and Thermal Performance Measurement	Z,ZK	6	3P+3C	L	z
124BUAC	Building Acoustics	Z,ZK	4	2P+2C	L	z
124INBD	Integrated Building Design	ZK	4	2P+1C	L	z
125ESLA	Energy Sources and HVAC Laboratories <i>Michal Kabrhel Michal Kabrhel Michal Kabrhel (Gar.)</i>	Z,ZK	5	2P+2C	L	z
125TIEN	Energy and Indoor Environment <i>Zuzana Veverková, Karel Kabele, Pavla Dvořáková Zuzana Veverková Karel Kabele (Gar.)</i>	Z,ZK	5	2P+2C	L	z

Characteristics of the courses of this group of Study Plan: Code=NY20230200 Name=Buildings and Environment, 2nd semester

124BPBM	Building Physics and Thermal Performance Measurement	Z,ZK	6
Basic overview of the thermal protection of buildings, building acoustics, daylighting and the measurement of hydro-thermal quantities. Heat transfer, thermal conductivity, thermal resistance and thermal transmittance, multidimensional heat transfer, thermal bridges and thermal joints, diffusion of water vapour and vapour condensation, mould growth, transient heat transfer, risk of overheating, low-energy, passive and zero-energy buildings, sound propagation in outdoor and indoor environment, sound insulation in buildings, calculation of noise levels from sound sources, daylighting in buildings, human eye, visual comfort and health aspects, basic photometric quantities, sunlight, assessment methods, glare and view-out, sun in urban structure, basic and advanced daylighting strategies, shading systems, theory of measurement, measurement of parameters of the internal environment, infrared thermography, measurement of the air permeability, monitoring of the building thermal performance.			
124BUAC	Building Acoustics	Z,ZK	4
Students will gain cross-cutting knowledge in the field of acoustics of buildings. The course is aimed at explanation and practice of basic topics, but also of extension topics that the building physics specialist or acoustician commonly encounters in building practice.			
124INBD	Integrated Building Design	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.			
125ESLA	Energy Sources and HVAC Laboratories	Z,ZK	5
The course deals with energy sources that can be used for building energy systems. It describes the different sources, their properties and methods of use. The practical part of the course takes place in laboratories where measurements related to the evaluation of energy sources and distribution systems are carried out.			
125TIEN	Energy and Indoor Environment	Z,ZK	5
The course introduces the students to the theoretical background of indoor environmental quality (IEQ) aspects related to energy performance of buildings. During several lectures basic components of indoor environment are listed and described. Lectures are complemented by seminars, where the students can experience measurements and evaluation of IEQ.			

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 2

The role of the block: PV

Code of the group: NY20230200_2

Name of the group: Buildings and Environment, facultative subjects, 2nd semester

Requirement credits in the group: In this group you have to gain at least 2 credits

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

Credits in the group: 2

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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
124YMBA	Measurements in Building Acoustics	Z	2	1P+1C	L	PV
125YIEQ	Indoor Environmental Quality Assessment <i>Zuzana Veverková</i>	Z	2	1P+1C	L	PV

Characteristics of the courses of this group of Study Plan: Code=NY20230200_2 Name=Buildings and Environment, facultative subjects, 2nd semester

124YMBA	Measurements in Building Acoustics	Z	2
Within the course, students will acquire theoretical and practical knowledge of selected measurement methods used in the field of architectural acoustics. The experience gained will help them to better understand the topics discussed in the basic acoustics courses and at the same time facilitate their application in building physics practice.			
125YIEQ	Indoor Environmental Quality Assessment	Z	2

Name of the block: Povinná volitelné předměty, doporučení S1

Minimal number of credits of the block: 38

The role of the block: S1

Code of the group: NY20230100_1

Name of the group: Buildings and Environment, 1st semester, project

Requirement credits in the group: In this group you have to gain at least 4 credits

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

Credits in the group: 4

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
124DEP1	Design Project 1	KZ	4	4C	Z	S1
125DEP1	Design Project 1 <i>Daniel Adamovský, Miroslav Urban, Zuzana Veverková, Karel Kabele, Michal Kabrhel, Michal Kabrhel, Michal Kabrhel (Gar.)</i>	KZ	4	4C	Z	S1

Characteristics of the courses of this group of Study Plan: Code=NY20230100_1 Name=Buildings and Environment, 1st semester, project

124DEP1	Design Project 1	KZ	4
Professional project focused on the design of technical equipment of buildings. The student chooses the topic based on his/her knowledge and previous studies, based on the recommendation of the project leader.			
125DEP1	Design Project 1	KZ	4
Professional project focused on the design of technical equipment of buildings. The student chooses the topic based on his/her knowledge and previous studies, based on the recommendation of the project leader.			

Code of the group: NY20230200_1

Name of the group: Buildings and Environment, 2nd semester, project

Requirement credits in the group: In this group you have to gain at least 4 credits

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

Credits in the group: 4

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
124DEP2	Design Project 2	KZ	4	4C	L	S1
125DEP2	Design Project 2 <i>Daniel Adamovský, Miroslav Urban, Zuzana Veverková, Karel Kabele, Michal Kabrhel, Pavla Dvořáková, Hana Kabrhelová, Michal Kabrhel, Michal Kabrhel (Gar.)</i>	KZ	4	4C	L	S1

Characteristics of the courses of this group of Study Plan: Code=NY20230200_1 Name=Buildings and Environment, 2nd semester, project

124DEP2	Design Project 2	KZ	4
Professional project focused on the design of technical equipment of buildings. The student chooses the topic based on his/her knowledge and previous studies, based on the recommendation of the project leader.			
125DEP2	Design Project 2	KZ	4
Professional project focused on the design of technical equipment of buildings. The student chooses the topic based on his/her knowledge and previous studies, based on the recommendation of the project leader.			

Code of the group: NY20230300

Name of the group: Buildings and Environment, Diploma Project

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

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

Credits in the group: 30

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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
124DPP	Diploma Project <i>Pavel Kopecký, Malila Noori, Tomáš Vlach, Tomáš ejka, František Kulhánek</i> Tomáš Vlach František Kulhánek (Gar.)	Z	30	24C	L,Z	S1
125DPP	Diploma Project <i>Karel Kabele</i>	Z	30	24C	Z	S1

Characteristics of the courses of this group of Study Plan: Code=NY20230300 Name=Buildings and Environment, Diploma Project

124DPP	Diploma Project	Z	30
The topics of diploma theses are based on the needs of practice or the scientific research activity of the department, the scope and difficulty corresponds to the student's knowledge acquired during the master's studies. The supervisor of the thesis can designate additional consultants to the student.			
125DPP	Diploma Project	Z	30

List of courses of this pass:

Code	Name of the course	Completion	Credits
124BPBM	Building Physics and Thermal Performance Measurement Basic overview of the thermal protection of buildings, building acoustics, daylighting and the measurement of hygro-thermal quantities. Heat transfer, thermal conductivity, thermal resistance and thermal transmittance, multidimensional heat transfer, thermal bridges and thermal joints, diffusion of water vapour and vapour condensation, mould growth, transient heat transfer, risk of overheating, low-energy, passive and zero-energy buildings, sound propagation in outdoor and indoor environment, sound insulation in buildings, calculation of noise levels from sound sources, daylighting in buildings, human eye, visual comfort and health aspects, basic photometric quantities, sunlight, assessment methods, glare and view-out, sun in urban structure, basic and advanced daylighting strategies, shading systems, theory of measurement, measurement of parameters of the internal environment, infrared thermography, measurement of the air permeability, monitoring of the building thermal performance.	Z,ZK	6
124BUAC	Building Acoustics Students will gain cross-cutting knowledge in the field of acoustics of buildings. The course is aimed at explanation and practice of basic topics, but also of extension topics that the building physics specialist or acoustician commonly encounters in building practice.	Z,ZK	4
124DEP1	Design Project 1 Professional project focused on the design of technical equipment of buildings. The student chooses the topic based on his/her knowledge and previous studies, based on the recommendation of the project leader.	KZ	4
124DEP2	Design Project 2 Professional project focused on the design of technical equipment of buildings. The student chooses the topic based on his/her knowledge and previous studies, based on the recommendation of the project leader.	KZ	4
124DPP	Diploma Project The topics of diploma theses are based on the needs of practice or the scientific research activity of the department, the scope and difficulty corresponds to the student's knowledge acquired during the master's studies. The supervisor of the thesis can designate additional consultants to the student.	Z	30
124INBD	Integrated Building Design 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.	ZK	4
124TPBU	Thermal Protection of Buildings Extension of knowledge from basic course of thermal protection of buildings. Input data for calculations, standard and advanced models of thermal and moisture behaviour of constructions, multidimensional heat and moisture transfer. Energy performance of buildings using dynamic simulation in hourly step. Fundamentals of CFD modelling (heat transfer by conduction, radiation and convection in building constructions and buildings).	Z,ZK	4
124YMBA	Measurements in Building Acoustics Within the course, students will acquire theoretical and practical knowledge of selected measurement methods used in the field of architectural acoustics. The experience gained will help them to better understand the topics discussed in the basic acoustics courses and at the same time facilitate their application in building physics practice.	Z	2
125APTM	Applied Thermomechanics The course contains three basic groups, in which the student is gradually introduced to selected chapters on moist air, vapour thermodynamics and heat sharing. The aim of each chapter is to introduce students to the principles of equipment common in heating, ventilation and cooling systems that they will encounter in practice. The chapter on humid air will discuss typical and lesser used processes occurring in air handling units. The vapor thermodynamics section focuses on the familiar compressor and absorption chillers and heat pumps. The final chapter will explain the processes and principles related to heat exchangers.	ZK	4
125BUSY	Buildings Systems	ZK	4
125DEP1	Design Project 1 Professional project focused on the design of technical equipment of buildings. The student chooses the topic based on his/her knowledge and previous studies, based on the recommendation of the project leader.	KZ	4
125DEP2	Design Project 2 Professional project focused on the design of technical equipment of buildings. The student chooses the topic based on his/her knowledge and previous studies, based on the recommendation of the project leader.	KZ	4
125DPP	Diploma Project	Z	30
125ESLA	Energy Sources and HVAC Laboratories The course deals with energy sources that can be used for building energy systems. It describes the different sources, their properties and methods of use. The practical part of the course takes place in laboratories where measurements related to the evaluation of energy sources and distribution systems are carried out.	Z,ZK	5

125HVAB	Heating, Ventilation and AirConditioning of Buildings	Z,ZK	6
An advanced course in heating, ventilation and air conditioning of buildings focused on the integrated design and operation of technical systems for the production, transformation and distribution of energy in buildings to ensure thermal comfort, air quality and optimum indoor environment with minimal environmental impact. Knowledge at the level of undergraduate basic courses in heating and ventilation is assumed for graduation).			
125MSBU	Modelling and Simulation of Buildings and HVAC Systems	KZ	4
The course "Modelling of buildings and HVAC systems" focuses on acquiring basic knowledge and skills in modelling the energy and environmental behaviour of buildings and technical systems. Students will learn the relationships between climatic conditions and the use of buildings and technical systems, zoning and design parameters and geometry for modelling buildings and technical systems for heating and cooling with liquids and air handling systems. They will also learn to use mathematical modelling to optimise the design of buildings and technical systems and CFD visualisation of fluid flow to solve engineering problems of technical building systems. The aim of the course is for students to gain comprehensive knowledge and skills in modelling the energy and environmental behaviour of buildings and technical systems, enabling them to effectively address current energy and sustainability issues in buildings and technical systems.			
125TEBU	Technological Equipment of Buildings	ZK	4
The course is focused on buildings with specific operation. These are either facilities for entertainment (theaters), relaxation and rest (swimming pools, saunas, wellness) or facilities for catering (commercial kitchens), or production facilities (mines, clean rooms) or storage facilities. For these buildings, the individual technological systems, methods of execution, and the requirements that are placed on the systems are presented. Emphasis is placed on fire and hygiene safety of the technological systems. The fire safety equipment that occur in these buildings are discussed in detail.			
125TIEN	Energy and Indoor Environment	Z,ZK	5
The course introduces the students to the theoretical background of indoor environmental quality (IEQ) aspects related to energy performance of buildings. During several lectures basic components of indoor environment are listed and described. Lectures are complemented by seminars, where the students can experience measurements and evaluation of IEQ.			
125YIEQ	Indoor Environmental Quality Assessment	Z	2

For updated information see <http://bilakniha.cvut.cz/en/FF.html>

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