



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Construction services [N1Bud1>TWOB]

Course

Field of study

Civil Engineering

Year/Semester

3/5

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

20

Laboratory classes

10

Other

0

Tutorials

0

Projects/seminars

10

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

The student should have basic knowledge of: • Physics (heat, work, energy, heat transfer, air and fluid flow), • Mathematics (algebraic calculations, linear equations), • Fluid mechanics and fundamentals of electricity, • General construction (building materials, basic construction technologies).

Course objective

The aim of the course is to familiarize students with the principles of design, construction, and operation of technical installations in buildings, including heating, water and sewage, gas, electrical, ventilation, and air conditioning systems, as well as the use of renewable energy sources.

Course-related learning outcomes

Knowledge:

1. The student is able to read and interpret technical drawings
2. The student is able to prepare a design concept, select the basic elements of installations and make

an energy performance of the building together with the designed installations

3. The student is able to formulate the requirements and technical assumptions resulting from the technological conditions necessary for the design, building and modernization as well as the operation of buildings and their technical equipment and is able to exploit the installations

Skills:

1. The student has an orderly, theoretically founded general knowledge concerning the basic issues related to the technical equipment of buildings
2. The student has elementary knowledge of designing sanitary system
3. The student has an organized knowledge of development trends in the area of building installations -
4. The student knows the basic solutions of sanitary systems in buildings and their components -
5. The student knows the construction law related to sanitary installations, the requirements of thermal protection of buildings and can make energy assessment of installation systems
6. The student knows the basic calculation methods, design techniques, tools and materials used in solving simple engineering tasks related to the design of building installations
7. The student knows the structure and properties of typical electrical installations
8. The student has basic knowledge related to: determining the design heating load, design radiators and hydraulic calculations
9. The student has an additional knowledge of building energy certification

Social competences:

1. The student understands the need for teamwork in solving theoretical and practical problems -
2. The student is informed of the importance and understands the non-technical effects of engineering activities, including the impact on the environment
3. The student knows the need to systematically deepen and expand their competences He/she can estimate the impact of modification of building structures on the course of thermal phenomena

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

- Written exam/test – assessment of knowledge of theory and standards.
- Individual or group project – assessment of practical design skills.
- Laboratory reports – assessment of practical skills and interpretation of measurement results.
- Class participation – assessment of student engagement.

Programme content

Lecture: Building thermal protection requirements Calculations of the thermal transmittance Method of calculation of the design heat load Tasks and classification of heating systems. Types of radiators (convection and radial), their location and choice method. Hydraulic calculations of the central heating system Characteristics of materials used in installations Hot water prepering Tasks and classification of ventilation systems. Calculation of the amount of ventilation air. Ventilation in residential buildings Types of air conditioning. Operation and construction of air conditioners. The rule of operation of the refrigerating circuit

Tasks and classification of water installations. Calculation of the water demand in the installation. Choice of pipe diameters. Materials used. The required pressure in the water supply. Systems for increasing water pressure in the installation Internal fire installations Basic solutions of sewage installations and their components. Calculation of the amount of domestic and rainwater sewage. Selection of diameters and slopes. Drainage of rainwater from the property Gas installation solutions and its components. Types of low voltage electrical installations. Wires and electrical installation equipment. Rules for connecting buildings to the electricity networks. Electrical junction box and their equipment. Protection against electric shock in low voltage electrical installations. Modern electrical installations - building automation systems.

Electrical installations – legal status

Basic information on electrical installations and electrical equipment used in buildings.

Course topics

- Lectures: Discussion of theory and principles of building installation design.

- Design exercises: Analysis of the compliance of public building projects with technical requirements; design of water supply, electrical, heating, and ventilation systems.
- Laboratories: Pipe joining technologies, thermal and humidity comfort, thermographic measurements, heat pump testing, photovoltaic system performance testing, determination of heat transfer coefficient.

Teaching methods

- Problem-based lectures and multimedia presentations.
- Calculations and design exercises.
- Practical and diagnostic laboratories.
- Discussions and case studies.
- Individual or group project.

Bibliography

- Krygier K., Klinka T., Sewerynik J. — *Heating, Ventilation, Air Conditioning*
o Publisher: WSiP (2007), ISBN-13: 978-83-02-07898-9
- Markiewicz H. — *Electrical Installations*
o Publisher: PWN / WNT, ISBN 978-83-01-20018-3
- Rubik M., Nowicki J., Chmielowski A., Pykacz S., Furtak L. — *Central Heating, Ventilation, Hot and Cold Water, and Gas Installations in Single-Family Buildings*
o Publisher: Instal (2000), ISBN: 83-909-273-8-1
- Standards and documents:
 - o ISO 7730 — *Ergonomics of the thermal environment — Analytical determination and interpretation of thermal comfort (PMV/PPD)*
 - o EN 12831 — *Heating systems in buildings — Method for calculation of the design heat load*
 - o EN 16798 — standards concerning indoor environmental conditions and ventilation requirements

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	40	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,50