

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Systems in Civil Engineering		Code 1010101151010130123
Field of study Civil Engineering First-cycle Studies	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 5
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: - Laboratory: - Project/seminars: 15		No. of credits 3
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 3 100%
Responsible for subject / lecturer: prof. dr hab. inż. Halina Koczyk email: halina.koczyk@put.poznan.pl tel. (61) 6652532 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Student has basic knowledge of mathematics, physics, building physics and basics of construction, needed for formulating and solving simple problems associated with building installations.
2	Skills	Ability to create and read construction drawings. Computer literacy: ability to operate basic programmes such as CAD, Excel, Word.
3	Social competencies	Awareness of the need to constantly update and complement knowledge and skills.
Assumptions and objectives of the course: Training students in basic issues related to the technical equipment of buildings as well as the required theoretical basis.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. The student has theoretically underpinned, organized general knowledge of issues related to the technical equipment of buildings. - [-]		
2. The student has an elementary knowledge of the design of sanitary installations. - [-]		
3. The student has structured knowledge of developments in the field of building installations. - [-]		
4. The student knows the basic solutions of sanitary installations of buildings and their components - [-]		
5. The student knows the building regulations related to building systems and requirements for thermal protection of buildings as well as energy evaluation of 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 in buildings. - [-]		
8. The student has basic knowledge related to: the appointment of a design heat load of rooms, the selection of radiators and hydraulic calculations. - [-]		
9. The student has extended knowledge of the energy certification for buildings. - [-]		
Skills:		

<p>1. The student is able to read and interpret installation drawings. - [-]</p> <p>2. The student is able to develop the concept of a solution, choose the basic elements of selected installations and conduct the energy evaluation for buildings and designed systems. - [-]</p> <p>3. The student is able to formulate requirements and technical specifications ? grounded on technical basis - necessary for the design, construction, modernization and operation of buildings and their technical equipment. The student is also able to operate installations. - [-]</p>
<p>Social competencies:</p>
<p>1. The student understands the need for teamwork in solving theoretical and practical problems. - [-]</p> <p>2. The student is aware of the importance and understand the consequences of non-technical engineering activities, including the impact on the environment. - [-]</p> <p>3. The student sees the need for extending their competence systematically. - [-]</p>

Assessment methods of study outcomes
<p>Lectures</p> <p>? Final written test</p> <p>? Final test grade additionally includes a grade received in design classes.</p> <p>Class Projects</p> <p>? are credited on the base of a design of selected installations of a small building and an oral defense of the project</p>

Course description
<p>Requirements for thermal protection of buildings, according to building regulations regarding technical conditions. Rules for calculation of heat transfer coefficients and building heat load. Calculation of the energy needs, delivered energy and primary energy for heating, ventilation, domestic hot water - basic computational dependencies in methods of energy certificates.</p> <p>Tasks and classification of the heating systems. Basic central heating solutions and their components. Schemes of solutions for building levels in modern heating systems. Security devices in heating systems. Types of radiators, their location, and ways of selection. Principles of pipe sizing and hydraulic calculations of the heating system. Advantages and limitations in the use of panel heating systems. Thermal and technological requirements for panel heating. Example solutions for panel radiators. Characteristics of the materials used in the installations. Compensation of thermal expansion. Applied insulations and their characteristics. Hot water systems. Classification of ventilation systems. Calculation of ventilation air flow. Examples of ventilation system solutions and their components. Air distribution in a room. Factors causing the air flow in natural ventilation. Ventilation of residential buildings; current normative requirements. Basic errors in the design of natural ventilation. Types of air conditioning systems. Principles of operation and construction of air conditioners (packaged air conditioning systems). Principle of operation of refrigeration system. Cold water supply systems. Basic solutions and components of water supply systems. Water supply connection. The required pressure in the water supply system necessary for the direct feeding of the installation. Calculation of water demand in the system. Selection of pipe diameters. Materials used. Water pressure raising systems. Indoor fire extinguishing installations. Basic solutions of sewage systems and their elements. Calculation of the amount of domestic sewage and rainwater flows. Selection of channel diameters and channel bottom slopes (drops). Stormwater and rainwater drainage. Solutions of gas installations and their components. Principles of distribution of gas pipelines in the building. Installation of gas appliances, ventilation of rooms and fumes exhaust system. Types of electrical installations in buildings, power supply in buildings and building sites. Types of electric current: direct, alternating - single-phase and three-phase current. Conversion of the energy ? load points: engines, heaters, sources of light. Construction of the receiving wiring: components, methods of assembly; the plan and the installation diagram; circuit protection (fuses); chosen calculations. Construction of indoor installations, elements of intelligent installations. Integration of elements of building and electrical installations of a building. Electric shock, lightning and surge protection.</p>

<p>Basic bibliography:</p> <p>1. Koczyk H. (red): Ogrzewnictwo praktyczne - II wydanie uzupełnione projektowanie, montaż, certyfikacja energetyczna, eksploatacja. Systherm Serwis Poznań 2009.</p> <p>2. Koczyk H., Antoniewicz B.: Nowoczesne wyposażenie techniczne domu jednorodzinnego Instalacje sanitarne i grzewcze. Państwowe Wydawnictwo Rolnicze i Leśne. 2004.</p> <p>3. Sroczan E.: Nowoczesne wyposażenie techniczne domu jednorodzinnego Instalacje elektryczne. Państwowe Wydawnictwo Rolnicze i Leśne. 2004</p> <p>4. Chudzicki J., Sosnowski S.: Instalacje kanalizacyjne. Projektowanie, wykonanie, eksploatacja. Wydawnictwo Seidel Przywecki Sp. z o.o. Warszawa 2009.</p> <p>5. Bąkowski K.: Sieci i instalacje gazowe. WNT Warszawa 2002.</p> <p>6. Chudzicki J., Sosnowski S.: Instalacje wodociągowe. Projektowanie, wykonanie, eksploatacja. Wydawnictwo Seidel Przywecki Sp. z o.o. Warszawa 2009</p>

<p>Additional bibliography:</p> <p>1. Klemm P. (red.): Budownictwo ogólne tom II. Wydawnictwo Arkady 2005</p> <p>2. Mizielńska K., Olszak J.: Gazowe i olejowe źródła ciepła małej mocy. Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa 2005 r</p> <p>3. Recknagel, Schramek, Sprenger, Honmann: Kompendium wiedzy OGRZEWNICTWO, KLIMATYZACJA, CIEPŁA WODA, CHŁODNICTWO 08/09 OMNI SCALA, Wrocław, 2008</p>
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Result of average student's workload

Activity		Time (working hours)
1. Participation in lectures		30
2. Participation in projects		15
3. Preparation to attend and pass the colloquium		16
4. Participation in the consultation		3
5. Project realisation		20
Student's workload		
Source of workload	hours	ECTS
Total workload	75	3
Contact hours	48	2
Practical activities	27	1