THE CARD OF DESCRIPTION THE EDUCATION MODULE

Name of course/module		Code
BUILDING PHYSICS - THERMICS		**AU_P_1.4_008**
Main field of study **ARCHITECTURE AND URBAN PLANNING**	Education profile (general academic, practical) **general academic**	Year/ Semester **II/4**
Specialization **-**	Language of course: **Polish**	Course (core, elective) **core**
Hours: **30** Lectures: **X** Classes: Laboratory classes: Projects / seminars:		Number of points **1**

Level of qualification:	**Form of studies** (full-time studies/part-time studies)	**Education area(s)**	**ECTS division (number and %)**	
I	**Full-time studies and part-time studies**	**Technical Sciences**	**1**	**100%**

Course status in the study program (basic, directional, other) (general academic, from other field of study)

directional

xx

xxx

Responsible for course/lecturer:

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Prerequisites of knowledge, skills, social competences:

1	**Knowledge:**	▪ student has explicit, theoretically based knowledge including the key issues of building physics, ▪ student knows the basic methods, techniques and materials used at solving simple engineering tasks in the scope of building physics, ▪ student has knowledge of development trends in the scope of the energy saving and passive building engineering,
2	**Skills:**	▪ student can acquire information from field specific literature, data bases and other properly selected sources in Polish and English, can integrate the acquired information, interpret the said information, as well as draw conclusions and come up with opinions supported with satisfactory reasons, ▪ student can communicate using different techniques in the professional environment and in other environments, ▪ student can use IT techniques respectively to the performance of tasks typical for engineering activities,
3	**Social competences:**	▪ student understands the need for lifelong learning; can inspire and organize process of learning other people, ▪ student is aware of the importance of non-technical aspects and effects of engineering activities, in this impact upon the environment and liability for environment affecting decisions, ▪ student can work over a set task independently and can cooperate in a team, assuming a number of different roles therein.

Objective of the course:

- acquisition of the latest knowledge in the scope of heating systems, ventilation and air conditioning in housing and industrial facilities,
- learning the calculation method of heat load in buildings and other method of thermal-hydraulic calculations, hydraulic in designed installations,
- learning the principles of devices selection to calculation dimensions in designing heating systems,

ventilation systems and air conditioning systems,

- obtain skills in the scope of assessment creativeness in designing the heating systems, ventilation systems and air conditioning systems,

Learning outcomes

Knowledge:	
1	student knows basic techniques, calculation methods of projected heat demand for heating the premises and buildings
2	student knows calculations method of internal installation, selection of heaters, devices in the heating, ventilation and air conditioning systems
3	student has knowledge of development trends in building engineering and understands the general principles of energy-efficient designing of buildings
Skills:	
1	student can propose modern (based on new trends) solutions of sanitary installations of building and can select the sanitary equipment
2	student can carry out critical analysis of the manner of operation and assess the existing solutions of heating, ventilation and air conditioning systems
Social competences:	
1	student has ability to creation of something new (original)
2	student correctly identifies and solves the problems related to energy-efficient building engineering

Methods of check the learning outcomes:

There is proposed written and oral exam as a method of check the learning outcomes. Student can take the exam of course after obtaining positive grade for calculations, elaboration and defense of project of heating system of housing building. Student performs project under the design classes of building installations.

Course contents

Under the education program student takes part in lectures. During lectures student obtains required information to calculation method occurring during designing the heating, ventilation and air conditioning systems, information about selection method of type and size of devices needed in the system.

There are discussed requirements of thermal protection of buildings, thermal and moisture calculations of building partitions, and in accordance to European norm the calculation method of heat load (heat losses caused by transmission and ventilation) of premises and this is a basis for selection of heaters, control fittings to systems.

There are presented principles of designing the heat distribution network to heating system, there are discussed the properties and types of materials used for building the network, heat source, requirements for boiler rooms using various types of fuels, types of surface heating and the new tendencies in designing buildings – energy-saving building engineering, passive building engineering and also solar systems and local heat sources in the form of fireplaces.

Basic bibliography

1. Koczyk H. , i inni. Ogrzewnictwo praktyczne, projektowanie, montaż, certyfikacja energetyczna, eksploatacja. Wydanie II , Wyd. Systherm Serwis Poznań 2009.
2. Krygier K. , i inni. Ogrzewnictwo. Wentylacja. Klimatyzacja. Wyd. WSiP. Warszawa 1997.
3. Gaziński B. Technika Klimatyzacyjna dla praktyków, komfort cieplny, zasady obliczeń i urządzenia. Wyd. Systherm Serwis Poznań 2005.
4. Mùrmann H. Wentylacja mieszkań. Wentylacja regulowana z odzyskiem ciepła. Wyd. Instalator Polski Warszawa 2001.
5. PN – EN ISO 6946 Komponenty budowlane i elementy budynku. Opór cieplny i współczynnik

przenikania ciepła. Metoda obliczania.

6. PN – EN 12831 Instalacje grzewcze w budynkach. Metody obliczania projektowego obciążenia cieplnego.
7. PN – EN ISO 13790 Cieplne właściwości użytkowe budynków. Obliczenie energii cieplnej do ogrzewania.

Complementary bibliography

1. Nantka M. Ogrzewnictwo i ciepłownictwo. Tom I i II. Wydawnictwo Politechniki Śląskiej Gliwice 2006.
2. Recknagel, Sprenger i inni. Ogrzewanie i klimatyzacja.Poradnik. Wyd. EWFE Gdańsk 2008.
3. Gutkowski K. Chłodnictwo i klimatyzacja. Wyd. N–T Warszawa 2003.

The workload of student

Form of activity	Hours	ECTS
Total workload	37	1
Activities that require individual contact with the teacher	32	1
Activities of practical	-	-

Balance the workload of the average student

Form of activity	Number of hours
participation in lectures	30 h
participation in classes/ laboratory classes (projects)	0 h
preparation for classes/ laboratory classes	0 h
preparation to colloquium/review	0 h
participation in consultation related to realization of learning process	0 h
preparation to the exam	5 h
attendance at exam	2 h

Total workload of student: **1 ECTS credit** **37 h**

As part of this specified student workload

- activities that require direct participation of teachers:

30 h + 7 h = 37 **h** **1 ECTS credit**