

## ADVANCED BUILDING SERVICES SYSTEMS

<b>General information</b>	
<i>Subject</i>	Advanced Building Services Systems
<i>Faculty</i>	Faculty of Civil Engineering, Architecture and Environmental Engineering
<i>Course of study</i>	Architecture
<i>Profile</i>	General academic
<i>Type of study</i>	II level with the degree of M.Sc. Eng. Arch.
<i>Starting semester</i>	Summer semester

<b>Information about the subject</b>	
<i>Semester</i>	1
<i>Number of ECTS points</i>	2
<i>Subject type</i>	obligatory
<i>Language of instruction</i>	English
<i>Syllabus prepared by</i>	Piotr Ziembicki PhD Eng.

<b>Type of class</b>					
<i>Course type</i>	<i>Number of classes per semester (full time studies)</i>	<i>Number of classes per week (full time studies)</i>	<i>Number of classes per semester (part time studies)</i>	<i>Number of classes per week (part time studies)</i>	<i>Credit type</i>
Lecture	15	1	-	-	Credit with a grade
Exercise	15	1	-	-	Credit with a grade

<b>Subject objective</b>
<p>1. The objective in terms of knowledge is to familiarize the student with the basic solutions and energy efficiency of heating installations, hot and cold domestic water, ventilation and air conditioning.</p> <p>2. The objective in terms of skills is to provide the students with basic skills at selecting solutions and performing basic calculations for hot and cold water and HVAC installations in buildings.</p> <p>3. The objective in terms of personal and social competences is to make the students aware of the role of modern, highly effective technical solutions for hot and cold water and HVAC installations in improving the energy efficiency of buildings and their equipment.</p>

<b>Initial requirements</b>
Informal: Basic knowledge of technical thermodynamics and fluid mechanics.

<b>Subject scope</b>
<p>Lecture: Sanitary installations in buildings. Requirements, division, construction and components of hot water installations. Domestic hot water heating systems. Requirements for thermal protection of buildings and methods for calculating heat demand. Heating systems in buildings. Central heating installations. Elements of heating installations. Heat sources. Regulatory automation. Air quality. Basics of air exchange and treatment. Division and general characteristics of ventilation and air conditioning systems. Natural ventilation. Mechanical ventilation and air conditioning systems. Energy recovery and regulatory automation.</p> <p>Exercise: Performance of basic balance calculations and selection and installation of heaters and other elements of heating installations. Calculation of heat source power. Calculations and selection of surface heating systems.</p>

**Educational methods**

Explanation methods: lectures - conventional, problematic, conversational, informative, lectures.  
 Research methods: calculation exercises, team work.

**Education results and verification methods**

<i>Description</i>	<i>Symbol</i>	<i>Verification method</i>	<i>Type of class</i>
The student has a basic knowledge of heating installations, domestic hot and cold water, ventilation and air conditioning, their energy consumption and methods of reducing it while maintaining normative and operational requirements.	K_W02 K_W03 K_W04	– test, etc.	lecture
The student can calculate a simple heat balance for a building and for a simple heating system in a closed two-pipe system, choose its basic components according to the criterion of minimum energy consumption using components available on the market.	K_U06 K_U10	– laboratory reports	Exercise
The student is aware of the need for continuous education due to technological progress in the field of effective HVAC systems. The student is aware of the importance of and understands the non-technical aspects and effects of an environmental engineer's activities, their impact on the environment and related responsibility for decisions.	K_K01 K_K07	– laboratory reports	lecture exercise

**Requirements to obtain a credit**

Lecture – the condition for a credit is a positive grade for the entire course. Minimum 3 problem tasks. Scores: 0-50%/ unsatisfactory; 51-60%/ satisfactory; 61-70%/ satisfactory plus; 71-80%/ good; 81-90%/ good plus; 91-100%/ very good.

Exercises – the condition for a credit is a positive grade for the exercises and reports.

The final grade is the weighted average of all educational components (including the number of classes in particular components).

**Student's work**

<i>Student's work</i>	<i>Full time study (h)</i>
Interaction with the teacher (classes; consultations; exam, etc.)	35
Student's individual work (preparation for the classes, test exam; literature research preparation of: written paper, project, presentation, report, speech; etc.)	15
<i>Total</i>	50
<i>ECTS points</i>	<i>Full time study</i>
Work with a teacher	2
Work without a teacher	0
<i>Total</i>	2

**Basic literature**

- H. Koczyk i in., *Ogrzewnictwo praktyczne. Projektowanie, montaż, certyfikacja energetyczna, eksploatacja*, Wydawnictwo SYSTHERM, 2008
- A. Pelech, *Wentylacja i klimatyzacja*, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław

2008

3. M. B. Nantka, *Instalacje grzewcze i wentylacyjne*, Politechnika Śląska, Gliwice 2000

**Complementary literature**

1. K. M. Gutkowski, *Chłodnictwo i klimatyzacja*, WNT, 2013

2. H. Foit, *Indywidualne konwencjonalne źródła ciepła*, Wydawnictwo Politechniki Śląskiej, Gliwice 2010

**Notes**

