



### MODULE SPECIFICATION

Module code	
Module title in Polish	Układy grzewcze i wentylacyjne
Module title in English	Heating and Ventilation Modules
Module running from the academic year	2016/2017

### A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	Environmental Engineering
Level of qualification	first cycle (first cycle, second cycle)
Programme type	academic (academic/practical)
Mode of study	full-time (full-time/part-time)
Specialism	Sanitary Pipelines and Systems
Organisational unit responsible for module delivery	Department of Piped Utility Systems
Module co-ordinator	Tadeusz Orzechowski, PhD hab., Eng., Professor of the University
Approved by:	Prof. Andrzej Kulickowski, PhD hab., Eng.

### B. MODULE OVERVIEW

Module type	programme-specific module (core/programme-specific/elective HES*)
Module status	optional module (compulsory/optional)
Language of module delivery	<b>Polish/ English</b>
Semester in the programme of study in which the module is taught	semester 7
Semester in the academic year in which the module is taught	winter semester (winter semester/summer semester)
Pre-requisites	None (module code/module title, where appropriate)
Examination required	No (Yes/No)
ECTS credits	1

\* elective HES – elective modules in the Humanities and Economic and Social Sciences

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per semester	15				



### C. LEARNING OUTCOMES AND ASSESSMENT METHODS

<b>Module aims</b>	The aim of the module is to learn basic heating and ventilation devices, the principles of operation as regards them, selection criteria of devices being the components of a simple heating and ventilation system.
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Module outcome code	Module learning outcomes	Mode of instruction (l/c/lab/p/ others)	Corresponding programme outcome code	Corresponding discipline-specific outcome code
W_01	A student knows basic techniques of heating and ventilation technique as well as the methods of realising these installations in buildings.	l	IS_W10	T1A_W04 T1A_W05 T1A_W06 T1A_W07
W_02	A student knows the devices and materials applied in heating and ventilation installations.	l	IS_W10	T1A_W04 T1A_W05 T1A_W06 T1A_W07
U_01	A student can select the elements of heating and ventilation systems.	l	IS_U04	T1A_U03 T1A_U08 T1A_U09
U_02	A student can prepare a project concept of a heating and ventilation installation.	l	IS_U04	T1A_U03 T1A_U08 T1A_U09
K_01	A student can formulate conclusions, describe the results of the obtained work; a student also understands the significance of technological progress.	l	IS_K07 IS_K09	T1A_K02 T1A_K07
K_02	A student acts according to the principles of professional ethics.	l	IS_K08	T1A_K05

#### Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1.	Basic processes of heating and ventilation technology.	W_01 U_02
2.	Devices in heating and ventilation installations.	W_02 U_01 U_02
3.	The materials concerning pipes, ducts, thermal insulation and other applied in heating and ventilation installations (their characteristics and properties).	W_02 U_01
4.	The methods of realising heating and ventilation installations (taking the specificity of a building structure into consideration).	W_01 U_02 K_01 K_02

#### Assessment methods

Module outcome code	Assessment methods <i>(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)</i>
W_01	A test
W_02	A test
U_01	A test



U_02	A test
K_01	A test
K_02	A test

### D. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	Study time/ credits
1	Contact hours: participation in lectures	<b>15</b>
2	Contact hours: participation in classes	
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	<b>5</b>
5	Contact hours: participation in project-based classes	
6	Contact hours: meetings with a project module leader	
7	Contact hours: attendance at an examination	
8		
9	<b>Number of contact hours</b>	<b>20</b> <i>(total)</i>
10	<b>Number of ECTS credits for contact hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>0.8</b>
11	Private study hours: background reading for lectures	<b>3</b>
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	<b>2</b>
14	Private study hours: preparation for laboratories	
15	Private study hours: writing reports	
16	Private study hours: preparation for a final test in laboratories	
17	Private study hours: preparation of a project/a design specification	
18	Private study hours: preparation for an examination	
19		
20	<b>Number of private study hours</b>	<b>5</b> <i>(total)</i>
21	<b>Number of ECTS credits for private study hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>0.2</b>
22	<b>Total study time</b>	<b>25</b>
23	<b>Total ECTS credits for the module</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>1</b>
24	<b>Number of practice-based hours</b> <i>Total practice-based hours</i>	
25	<b>Number of ECTS credits for practice-based hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	

### E. READING LIST

References	<ol style="list-style-type: none"> <li>Heat recovery systems &amp; CHP: Combined heat and power, Oxford: Pergamon Press, 1987-1955</li> <li>Brumbaugh, James E., Audel HVAC fundamentals. Vol. 1, Heating systems, furnaces, and boilers, Indianapolis: Wiley Publishing, cop. 2004, all new 4th ed.</li> </ol>
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3. Brumbaugh, James E., Audel HVAC fundamentals. Vol. 2, Heating system components, gas and oil burners, and automatic controls, Indianapolis: Wiley Publishing, cop. 2004, all new 4th ed.
4. Naterer, Greg F., Heat transfer in single and multiphase systems, Boca Raton : CRC Press, cop. 2003.
5. Babiarz, Bożena, Heating system designing, Rzeszów: Oficyna Wydawnicza Politechniki Rzeszowskiej, 2015
6. Day, Anthony R., Heating systems, plant and control / A. R. Day, M. S. Ratcliffe, K. J. Shepherd, Oxford ; Malden: Blackwell Science, 2003
7. Ward, Ray, Domestic central heating wiring systems and controls, Oxford ; Burlington: Newnes, 2007
8. Michael J. Moran, Introduction to thermal systems engineering: thermodynamics, fluid mechanics, and heat transfer, New York : John Wiley & Sons, Inc., 2003
9. Roger W. Haines, Douglas C. Hittle, Control systems for heating, ventilating, and air conditioning, New York : Springer, cop. 2003
10. Edwards, Rodger, Handbook of domestic ventilation, Amsterdam [etc.]: Elsevier Butterworth-Heinemann, 2005
11. Mat Santamouris and Peter Wouters, Building ventilation: the state of the art, London; Sterling: Earthscan, cop. 2006
12. Jan F. Kreider, Handbook of heating ventilation, and air conditioning, Boca Raton: CRC Press, 2001

Module website