



### MODULE SPECIFICATION

Module code	
Module title in Polish	<b>Instalacje co i wentylacji</b>
Module title in English	<b>Central Heating and Ventilation Systems</b>
Module running from the academic year	2016/2017

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

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

### 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 6
Semester in the academic year in which the module is taught	summer 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 familiarise students with the devices applied in central heating installations, warm water for use and ventilation (as well as the applied technologies of joining pipes and ducts with assembling fittings).
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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 the fundamentals of generating heat, including the characteristics and properties of fuels and the structure of fume disposal installations.	l	IS_W08 IS_W10	T1A_W03 T1A_W04 T1A_W05 T1A_W06 T1A_W07
W_02	A student knows the structure, types, and method of operation as regards the devices for preparing warm water for use, devices protecting central heating and warm water for use installations, and the devices applied in ventilating systems.	l	IS_W10	T1A_W04 T1A_W05 T1A_W06 T1A_W07
W_03	A student knows the types, material properties, and methods of joining pipes, ventilation ducts as well as the structure of the elements of fittings.	l	IS_W10	T1A_W04 T1A_W05 T1A_W06 T1A_W07
U_01	A student can determine the appropriateness of applying various types of fuels for heating and warm water for use purposes.	l	IS_U01	T1A_U08 T1A_U09
U_02	A student can select some elements of central heating, warm water for use, and ventilation systems.	l	IS_U19	T1A_U03 T1A_U05 T1A_U07 T1A_U08 T1A_U09 T1A_U10 T1A_U11 T1A_U13 T1A_U14 T1A_U15 T1A_U16
K_01	A student can formulate conclusions and describe the results of the obtained work.	l	IS_K07	T1A_K07

#### Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1.	The fundamentals of generating heat: fuels, air supply, and fume disposal installations.	W_01 U_01 K_01
2.	Devices for preparing warm water for use.	W_02 U_02
3.	Pipes, fittings, ventilation ducts: the types of pipes and ducts, the technology of joining and assembly.	W_03 U_02
4.	Devices protecting central heating and warm water for use installations.	W_02 U_02
5.	Devices in ventilation systems.	W_02 U_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
W_03	A test
U_01	A test
U_02	A test
K_01	A test

### D. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	Study time/ credits
1	Contact hours: participation in lectures	15
2	Contact hours: participation in classes	
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	5
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	3
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	2
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>1. Heat recovery systems &amp; CHP: Combined heat and power, Oxford: Pergamon Press, 1987-1955</li><li>2. Brumbaugh, James E., Audel HVAC fundamentals. Vol. 1, Heating systems, furnaces, and boilers, Indianapolis: Wiley Publishing, cop. 2004, all new 4th ed.</li><li>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.</li><li>4. Naterer, Greg F., Heat transfer in single and multiphase systems, Boca Raton : CRC Press, cop. 2003.</li><li>5. Babiarz, Bożena, Heating system designing, Rzeszów: Oficyna Wydawnicza Politechniki Rzeszowskiej, 2015</li><li>6. Day, Anthony R., Heating systems, plant and control / A. R. Day, M. S. Ratcliffe, K. J. Shepherd, Oxford ; Malden: Blackwell Science, 2003</li><li>7. Ward, Ray, Domestic central heating wiring systems and controls, Oxford ; Burlington: Newnes, 2007</li><li>8. Michael J. Moran, Introduction to thermal systems engineering: thermodynamics, fluid mechanics, and heat transfer, New York : John Wiley &amp; Sons, Inc., 2003</li><li>9. Roger W. Haines, Douglas C. Hittle, Control systems for heating, ventilating, and air conditioning, New York : Springer, cop. 2003</li><li>10. Edwards, Rodger, Handbook of domestic ventilation, Amsterdam [etc.]: Elsevier Butterworth-Heinemann, 2005</li><li>11. Mat Santamouris and Peter Wouters, Building ventilation: the state of the art, London; Sterling: Earthscan, cop. 2006</li><li>12. Jan F. Kreider, Handbook of heating ventilation, and air conditioning, Boca Raton: CRC Press, 2001</li></ol>
Module website	