MODULE SPECIFICATION

Module code	
Module title in Polish	Gospodarka cieplna
Module title in English	Heat Management
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 Kuliczkowski, 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	**Polish/ English**
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

Module aims	The aims of the module include: learning the principle of operation, types, and characteristics of particular types of fans and compressors applied in ventilation and air conditioning systems (as well as their structure).

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 characteristics of energy systems and devices realising fuel combustion.	l	IŚ_W10	T1A_W04 T1A_W05 T1A_W06 T1A_W07
W_02	A student knows the methodology of energy balance in heat engineering and the elements of centralised heat supply systems.	l	IŚ_W08	T1A_W03 T1A_W04
W_03	A student knows general principles of regulating heat network and district network substation; a student is also acquainted with the fundamentals of the combined heat and power.	l	IŚ_W10	T1A_W04 T1A_W05 T1A_W06 T1A_W07
U_01	A student can select devices applied in heat engineering.	l	IŚ_U03 IŚ_U19	T1A_U02 T1A_U03 T1A_U05 T1A_U07 T1A_U08 T1A_U09 T1A_U10 T1A_U11 T1A_U13 T1A_U14 T1A_U15 T1A_U16
U_02	A student can make basic calculations connected with energy systems and their realisation.	l	IŚ_U03 IŚ_U19	T1A_U02 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	IŚ_K07	T1A_K07

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1.	The characteristics of energy systems.	W_01 U_02
2.	Devices realising fuel combustion.	W_01 U_01
3.	Energy balances in heat engineering.	W_02 U_02

		K_01
4.	The elements of the centralised heat supply systems.	W_02 U_01
5.	General principles of regulating heat networks and district heating substations.	W_03 U_02
6.	Combined heat and power.	W_03 U_01

Assessment methods

Module outcome code	Assessment methods *(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)*
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	**Number of contact hours**	**20** *(total)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**0.8**
11	Private study hours: background reading for lectures	**3**
12	Private study hours: preparation for classes	**2**
13	Private study hours: preparation for tests	
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	**Number of private study hours**	**5** *(total)*

21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**0.2**
22	**Total study time**	**25**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**1**
24	**Number of practice-based hours** *Total practice-based hours*	
25	**Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)*	

E. READING LIST

References	1. Janna W.S.: Engineering heat transfer, Boca Raton: CRC Press, cop. 2000 2. Deshmukh Y.V.: Industrial heating: principles, techniques, materials, applications, and design, Boca Raton: Taylor & Francis, cop. 2005 3. Çengel Y.A.: Heat transfer: a practical approach, Boston: McGraw-Hill, cop. 2003 4. Bartok W., Sarofim A.F.: Fossil fuel combustion, New York: John Wiley & Sons, 1991 5. Heat Recovery System & CHP: Combined Heat & Power, Oxford: Pergamon Press, 1987-1995 6. Wiltshire R.: Advanced District Heating and Cooling (DHC) Systems, Woodhead Publishing, 2015 **7.** Morris A.E., Geiger, G.H. Fine A.: Handbook on Material and Energy Balance Calculations in Material Processing, John Wiley & Sons, 2012
Module website	