MODULE SPECIFICATION

Module code	
Module title in Polish	Termodynamika techniczna
Module title in English	Engineering Thermodynamics
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; Water Supply, Treatment of Wastewater and Solid Waste
Organisational unit responsible for module delivery	Department of Piped Utility Systems
Module co-ordinator	Łukasz Orman, PhD hab., Eng.
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 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	3

* 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 aim of the module is to learn English technical vocabulary as regards thermodynamics as well as basic laws of thermodynamics in terms of their utilisation to solve simple engineering problems.

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 notions as regards thermodynamics, the forms of energy and difference between and open and closed system.	l	IŚ_W01 IŚ_W08	T1A_W01 T1A_W02 T1A_W03 T1A_W04
W_02	A student knows the zeroth law of thermodynamics, the properties of simple substances and the equations of the gas state.	l	IŚ_W01 IŚ_W08	T1A_W01 T1A_W02 T1A_W03 T1A_W04
W_03	A student knows the principles of determining energy balances and the operation of thermal engines.	l	IŚ_W01 IŚ_W08	T1A_W01 T1A_W02 T1A_W03 T1A_W04
U_01	A student can calculate basic values as regards thermodynamics and make simple energy balances.	l	IŚ_U19	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 calculations on the basis of the equations of the gas state.	l	IŚ_U19	T1A_U03 T1A_U05 T1A_U07 T1A_U08 T1A_U09 T1A_U10 T1A_U11 T1A_U13 T1A_U14 T1A_U15 T1A_U16
U_03	A student can read (with comprehension) in technical English as regards thermodynamics.	l	IŚ_U06	T1A_U01 T1A_U02 T1A_U03 T1A_U04 T1A_U05 T1A_U06
K_01	A student can formulate conclusions and describe the results of the obtained work.	l	IŚ_K07	T1A_K01

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1.	Introductory issues (basic concepts, i.e. thermodynamics in relations to energy; open and	W_01 U_01

	close systems; the forms of energy and temperature).	U_03
2.	The zeroth law of thermodynamics.	W_02 U_03
3.	The properties of simple substances: transitions with a phase change, thermodynamic tables, and the equations of the gas state.	W_02 U_02 U_03
4.	Energy balance with controlled mass and volume.	W_03 U_01 U_03 K_01
5.	Thermal engines.	W_03 U_03

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
U_03	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	**20**
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	**35**
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**	**55** *(total)*
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**2.2**
22	**Total study time**	**75**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**3**
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. Cengel Y.A., Turner R. H., Fundamentals of Thermal-Fluid Sciences, McGraw-Hill Higher Education, 2001. 2. Cengel Y.A., Boles M.A., Thermodynamics: An Engineering Approach, New York: McGraw-Hill Publishing Company, 1989. 3. Howell J.R., Fundamentals of engineering thermodynamics, New York: McGraw-Hill Book Company, 1987. 4. Moran M.J., Shapiro H.N.: Fundamentals of engineering thermodynamics, Hoboken, NJ: John Wiley & Sons, cop. 2008. 5. Wong, Kau-Fui Vincent, Thermodynamics for engineers, Boca Raton: CRC Press, cop. 2000. 6. Jou D., Casas-Vazquez J., Criado-Sancho M., Thermodynamics of fluids under flow, Berlin: Springer, cop. 2001. 7. Earl Logan, jr., Thermodynamics: processes and applications, New York: Marcel Dekker, Inc., 1999. 8. Kalyan Annamalai, Ishwar K. Puri., Advanced thermodynamics engineering, Boca Raton: CRC Press, 2002. 9. Pierre Perrot, A to Z of thermodynamics, New York: Oxford University Press, 1998. 10. Wiśniewski S., Staniszewski B., Szymanik R.; Thermodynamics of nonequilibrium processes, transl. from the polish by Eugene Lepa., Warszawa: PWN - Polish Scientific Publishers; Dordrecht; Boston: D. Reidel Publishing Company, cop. 1976. 11. Bejan A., Advanced engineering thermodynamics, Hoboken: John Wiley & Sons, cop. 2006. 12. Mahmoud Massoud, Engineering thermofluids: thermodynamics, fluid mechanics and heat transfer, Berlin: Springer, cop. 2005.
Module website	