

COURSE DESCRIPTION CARD – SPECIMEN

Faculty of Mechanical Engineering									
Field of study	Mechanical Engineering							Degree level and programme type	Bachelor's degree
Specialization/ diploma path								Study profile	
Course name	Thermodynamics							Course code	IS-00267W
								Course type	
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	winter
	30	15	15					No. of ECTS credits	5
Entry requirements	Mathematics I, Engineering Mechanics								
Course objectives	Getting by students understanding with in depth explanation of engineering thermodynamics, possessing skills for application of thermodynamic methods for analysis of practical problems, practical demonstration of measurement devices and methods for basic thermodynamic parameters and properties, measurements of energy balance for typical thermal machines.								
Course content	<p>Lecture: Basic principles (thermodynamic systems and thermodynamic quantities classification, function of state and function of process); Internal energy; Heat, specific heat, absolute (volumetric) and technical work of thermodynamic processes; Enthalpy; Perfect gases laws; Gas mixtures and real gases; First law of thermodynamics for open and closed systems; Thermodynamic processes for perfect gases; Thermodynamic cycles principles; Gas cycles; Entropy; Second law of thermodynamics; Exergy; Thermodynamics of wet vapour; Thermodynamics of humid air; Elementary issues of heat transfer; Basic principles of combustion processes</p> <p>Classes: Perfect gases calculation problems; Application of first law of thermodynamics for open and closed systems; Calculation problems of thermal processes for perfect gases; Simple analyses of gas cycles; Application of second law of thermodynamics; Using properties charts for simple calculation and parameters identification (for steam).</p> <p>Laboratory: Temperature measurements; pressure measurements; flow rate measurements; vapour refrigeration cycle identification of thermal performance and thermal parameters; heat exchangers – thermal balance and heat rate.</p>								
Teaching methods	Regular lectures: regular lectures with presentations Regular classes: blackboard classes, work in groups, discussion, homework assignments Self- study under supervision: tutorial sessions with worked examples, discussion,								

	problem solving, homework assignments. Laboratory: experimentations in groups under supervision of a teacher, lab reports preparing, problems solving.		
Assessment method	Lecture - written and oral exam; classes – calculation of simple problems evaluation; laboratory classes – pre-lab tests, lab reports evaluation		
Symbol of learning outcome	Learning outcomes		Reference to the learning outcomes for the field of study
LO1	Student describes with understanding basic concepts of engineering thermodynamics,		M1_W06
LO2	Student performs basic calculations of thermodynamic problems		M1_W06, M1_U20
LO3	Student is able to do the elementary measurements of thermodynamic quantities		M1_W06, M1_U20
LO4	Student apply first and second law of thermodynamics in analysis of simple open and closed engineering systems		M1_W06, M1_U11
LO5			
LO6			
Symbol of learning outcome	Methods of assessing the learning outcomes		Type of tuition during which the outcome is assessed
LO1	written exam		L
LO2	written exam, in-class tests, pre-lab tests, lab reports grading		L, C, LC
LO3	written exam, in-class tests, pre-lab tests, lab reports grading		L, C, LC
LO4	written exam, in-class tests, pre-lab tests, lab reports grading		L, C, LC
LO5			
LO6			
Student workload (in hours)			No. of hours
Calculation	lecture attendance or self-study		30
	participation in classes or self study		15
	participation in laboratory classes		5 ÷ 15
	preparation for classes and laboratory classes		20 ÷ 30
	working on reports		5 ÷ 10
	participation in student-teacher sessions related to the classes		40 ÷ 50
	preparation for and participation in exams/tests		10
	TOTAL:		155
Quantitative indicators			HOURS
Student workload – activities that require direct teacher participation			45-60
Student workload – practical activities			55-80
Basic references	1. Çengel Y.A., Boles M.A., Thermodynamics. An Engineering Approach, McGraw-Hill Book, 2015. 2. Moran M.J., Shapiro H.N., Boettner D.D., Bailey M., Fundamentals of Engineering Thermodynamics Wiley, 2011. 3. Balmer R.T., Modern Engineering Thermodynamics - Textbook with Tables Booklet,		

	Elsevier, 2011. 4. Rajput R.K., A Textbook of Engineering Thermodynamics, Firewall Media, 2010. 5. Klein S., Nellis G., Thermodynamics, Cambridge University Press, 2012.	
Supplementary references	1. Rudramoorthy R. Thermal engineering, McGraw-Hill, 2003. 2. Puri I., Kalyan A., Advanced Thermodynamics Engineering, CRC Press, 2011. 3. van Ness H.C., Understanding Thermodynamics, Dover.	
Organisational unit conducting the course	Department of Machinery Design and Thermal Engineering, Bialystok University of Technology	Date of issuing the programme
Author of the programme	Dariusz Butrymowicz	2019-03-21

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work,

S – seminar

Please notice!

Depending on number of students enrolled for the subject hours of tuition are as follows (for each 30 hours given in course description card):

1 – 2 students - 5 hours of tuition hours;

3 – 4 students - 8 hours of tuition;

5 – 6 students - 11 hours of tuition;

7 – 8 students - 15 hours of tuition;

9 and more students - hours of tuition given by a teacher as regular classes.