

COURSE DESCRIPTION CARD

Faculty of Civil Engineering and Environmental Sciences									
Field of study								Degree level and programme type	
Specialization/ diploma path								Study profile	Academic profile
Course name	HVAC units and installations in reliability theory							Course code	IS-FCEE-00265W/S
								Course type	Erasmus
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	Winter/Summer
	15			15				No. of ECTS credits	4
Entry requirements	Fluid Mechanics, Thermal Technique, Heat Transfer Theory								
Course objectives	Familiarizing students with the theory of reliability. Application of the reliability theory to assess the operational reliability of heating nets, gas and central heating installations.								
Course content	<p>Lecture: Basic concepts of reliability theory. Operational reliability indicators. Reliability structures. Failure rate analysis of heating and gas networks, steel pipelines as a result of pitting corrosion, pumps and valves as a result of cavitation. Possibilities to increase the operational reliability of heating and air-conditioning systems.</p> <p>Project: Preparation of calculations and assessment of the reliability state on calculation examples for selected HVAC installations and devices, gas or renewable energy sources.</p>								
Teaching methods	lecture, project								
Assessment method	lecture - written test; project - completion, presentation and discussion of the project								
Symbol of learning outcome	Learning outcomes								Reference to the learning outcomes for the field of study
LO1	Student has detailed knowledge of the fields of study								K_W03
LO2	Student knows and uses computer tools to support the calculation and design of equipment and systems in environmental engineering								K_W13
LO3	The student knows the standards, guidelines, principles of environmental engineering design objects and their components, and their consideration in engineering practice								K_W14
LO4	Student is able to work individually and in a team, is able to estimate the necessary time of the task, can lead a small team to ensure execution of tasks in a given period								K_U02

L05	Students can prepare and give a presentation on the implementation of the project or research task, and lead a discussion about the showed presentation	K_U04	
L06	Student is able to use the guidelines, standards and principles of design in order to select the appropriate processes and components to designed technological device or system as well as the unusual processes with the conceptually new methods	K_U22	
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed	
L01	written exam;	L	
L02	discussion	P	
L03	completion and presentation of the project	P	
L04	completion and presentation of the project	P	
L05	completion and presentation of the project	P	
L06	completion and presentation of the project	P	
Student workload (in hours)		No. of hours	
Calculation	lecture attendance	15	
	participation in classes, projects	15	
	preparation for classes, projects	15	
	work on projects, reports, etc.	50	
	participation in student-teacher sessions related to the class / project	5	
	implementation of project tasks	2	
	preparation for and participation in partial and final tests	3	
	TOTAL:	105	
Quantitative indicators		HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation		40	1,6
Student workload – practical activities		115	4
Basic references	<ol style="list-style-type: none"> 1. The universal generating function in reliability analysis and optimization / Gregory Levitin. London : Springer-Verlag, 2005. call number 199602 of the Bialystok University of Technology library 2. https://journalofkonbin.com/resources/html/cms/MAINPAGE 3. www.journal.itwl.pl/index.php/spis-rocznikow?id=92 4. www.journal.itwl.pl/index.php/spis-rocznikow?id=87 5. www.journal.itwl.pl/index.php/spis-rocznikow?id=88 6. www.journal.itwl.pl/index.php/spis-rocznikow?id=86 7. 7ème Congrès international pluridisciplinaire Qualité et Sécurité de Fonctionnement Mardi, mercredi et jeudi 20, 21 et 22 mars 2007 / ed. M. Bennouna a. A. El Hami. Tangier : [B.w.], 2007 call number 198470 of the Bialystok University of Technology library 8. Distribution reliability and power quality [Dokument online] / Thomas Allen Short. New York : CRC Press, 2006. http://ebookcentral-proquest-com.bazy.pb.edu.pl/lib/bialostocka/detail.action?docID=263136&query= 		

Supplementary references	1. Safety and Reliability: Methodology and Applications contains the proceedings of the 24th European Safety and Reliability Conference (ESREL 2014, Wroclaw, Poland, 14-18 September 2014), and discusses theories and methods and their applications in the areas of risk, safety and reliability. The abstracts book (408 pages) + full paper CD-ROM (2496 pages) call number 251139 of the Bialystok University of Technology library 2. Reliability of structures / Andrzej S. Nowak, Kevin R. Collins. Boca Raton : CRC Press : Taylor & Francis, 2013 call number 244542 of the Bialystok University of Technology library 3. Human reliability, error, and human factors in engineering maintenance : with reference to aviation and power generation / B.S. Dhillon. Boca Raton : CRC Press, 2009 call number 216943 of the Bialystok University of Technology library	
Organisational unit conducting the course	Department of HVAC Engineering	Date of issuing the programme
Author of the programme	Assoc. Prof. Mariusz Adamski, DSc, PhD, Eng.	23.03.2023

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