COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Faculty of Civil Engineering and Environmental Sciences</td></tr>
<tr><td>Field of study</td><td colspan="6"></td><td colspan="2">Degree level and programme type</td><td></td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td colspan="2">Study profile</td><td>Academic profile</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Material science of HVAC installations</td><td colspan="2">Course code</td><td>IS-FCEE-00264W/S</td></tr>
<tr><td colspan="2">Course type</td><td>Erasmus</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>Winter/Summer</td></tr>
<tr><td>15</td><td></td><td></td><td></td><td>15</td><td></td><td></td><td>No. of ECTS credits</td><td>4</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Physics, Technical Drawing</td></tr>
<tr><td>Course objectives</td><td colspan="9">Familiarizing students with materials used in thermal power engineering and heating, cooling, ventilation, air-conditioning, fire protection installations, networks and gas installations. The knowledge obtained is necessary for the proper design, construction and operation of devices and installations in the thermal power industry and cooling technology, as well as in the area of clean energy technologies</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: Ferrous alloys and other metals and their alloys, plastics; Thermal treatment; pipe manufacturing technology; types of pipelines, permanent and detachable pipeline connections and the scope of application in heating, cooling, ventilation, air-conditioning and fire protection systems; shut-off, control and measurement fittings, devices used in thermal power engineering and sanitary technology, heating, ventilation, cooling.
Specialist workshop: types of pipelines, permanent and detachable connections of pipelines; shut-off, control and measurement fittings, devices used in thermal power engineering and sanitary technology.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">informative lecture, problem lecture, subject exercises, project method</td></tr>
<tr><td>Assessment method</td><td colspan="9">lecture - written test;
specialization workshop – written test, presentation and discussion of selected installation elements</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="7">Learning outcomes</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="7">Student has detailed knowledge of the fields of study</td><td colspan="2">K_W03</td></tr>
<tr><td>LO2</td><td colspan="7">Student knows and uses computer tools to support the calculation and design of equipment and systems in environmental engineering</td><td colspan="2">K_W13</td></tr>
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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
LO5	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
LO6	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**
LO1	written test	lecture
LO2	discussion	specialization workshop
LO3	completion and presentation of the exercises	specialization workshop
LO4	completion and presentation of the exercises	specialization workshop
LO5	completion and presentation of the exercises	specialization workshop
LO6	completion and presentation of the exercises	specialization workshop

Student workload (in hours)		**No. of hours**
Calculation	lecture attendance	15
	participation in classes, specialization workshop	15
	preparation for classes, specialization workshop	15
	work on projects, reports, etc.	50
	participation in student-teacher sessions related to the class / specialization workshop	5
	implementation of exercises	2
	preparation for and participation in exams/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	1. Adamski M., Materiałoznawstwo instalacyjne : ćwiczenia laboratoryjne, Białystok, Wydaw. Politechniki Białostockiej, 2006 2. Przybyłowicz K., Metaloznawstwo, Warszawa, WNT 2007

	3. Przybyłowicz K., Przybyłowicz J., Materiałoznawstwo w pytaniach i odpowiedziach, Warszawa: Wydawnictwa Naukowo-Techniczne, 2007 4. Materiałoznawstwo: laboratorium, praca zbiorowa red. Bylica A., Rzeszów, Wydaw. Uniwersytetu Rzeszowskiego, 2005 5. Dobrzański L. A., Niemetalowe materiały inżynierskie, Gliwice, Wydaw. Polit. Śląskiej 2008	
Supplementary references	1. Ciszewski A., Radomski T., Szummer A., Materiałoznawstwo, Warszawa, OW PW, 2009 2. Fischer U. i in., Poradnik mechanika, tł. z niem., Warszawa, Wydaw. REA, 2009 3. Ashby N., Johnson K., Materials and design : the art and science of material selection in product design, Amsterdam, Elsevier/Butterworth Heinemann, 2009 4. Krzemień E., Materiałoznawstwo, Gliwice, Politechnika Śląska, 2001 5. Pacyna J. i in., Metaloznawstwo: wybrane zagadnienia, Kraków, AGH 2005	
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