COURSE DESCRIPTION CARD – SPECIMEN

<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">Heating systems 2</td><td colspan="2">Course code</td><td>FCEE-00078W</td></tr>
<tr><td colspan="2">Course type</td><td>obligatory</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 colspan="2">Semester</td><td>winter</td></tr>
<tr><td>30</td><td></td><td></td><td>30</td><td></td><td></td><td></td><td colspan="2">No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Fluid mechanics, heat transfer, thermodynamics</td></tr>
<tr><td>Course objectives</td><td colspan="9">Advance knowledge about types of heating systems and their elements. Ability to calculate heat losses and power of radiators and pipes selection. Knowledge about radiator types, their advantages and disadvantages. Ability to create a heating system design. Skills to choose dimensions of pipes and sizes of regulation valves.</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture;
Heat losses and hydraulic calculations. Types of radiators. Schemas of heating systems. Advantages and disadvantages of selected HVAC systems. Main elements of heating installations.
Project:
Calculations of heat losses and power of radiators. Selection of radiators. Selection of heating system type and pipe connections and dimension of pipes. Regulation in HVAC systems.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">multimedia presentation (lectures), design of a heating system (project)</td></tr>
<tr><td>Assessment method</td><td colspan="9">e.g.: lecture – exam; project – project completion, presentation and discussion</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 an elementary knowledge of the materials used in central heating (pipes, radiators etc.)</td><td colspan="2"></td></tr>
<tr><td>LO2</td><td colspan="7">Student knows the rules of technical drawing necessary for reading and writing architectural data needed for the heating system design, as well as knows the rules for making a sanitary drawing using CAD</td><td colspan="2"></td></tr>
<tr><td>LO3</td><td colspan="7">Student knows standards, specific rules and law connected with calculations of heat losses, creating a heating system design and</td><td colspan="2"></td></tr>
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	the necessary selection of system elements (radiators, pipes, valves, boilers).	
LO4	Student is able to obtain information from the literature and databases about different types of heaters, radiators, installations etc. Student can compare knowledge from different sources, interpret data, make conclusions, formulate and justify own opinions.	
LO5	Student is able to work individually and in a team during the laboratory course and can estimate the time needed for the study.	
LO6	Student can make the heating installation design, prepare the technical description and explain the scope of the project.	

Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	evaluating the student's reports, exam, design presentation	L, P
LO2	design form	P
LO3	design form and presentation, exam	P, L
LO4	exam, design form and presentation	L, P
LO5	evaluating the student's work	P
LO6	discussion of the student's design	P

Student workload (in hours)		discussion of the student's design	P
Calculation	lecture attendance	15	
	participation in classes,	30	
	preparation for classes,	30	
	working on projects	45	
	implementation of project tasks	20	
	TOTAL:	**140**	

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	**45**	**1,8**
Student workload – practical activities	**125**	**5**

Basic references	1. Krawczyk D.A. (Ed.) Buildings 2020+.Architecture, Constructions and Installations. Publishing House of BUT, Białystok 2019. 2. David E. Watkins- Heating services in buildings : design, installation, commissioning a. maintenance / Chichester : Wiley-Blackwell, 2011. 3. DeVore, Russell B. Practical problems in mathematics for heating and cooling technicians. Clifton Park : Delmar Cengage Learning, 2013	
Supplementary references	Chiras, Daniel D. The solar house : passive heating and cooling.White River Junction : Chelsea Green Publishing Company, 2002.	
Organisational unit conducting the course	Heating, Ventilation, Air Conditioning Department	**Date of issuing the programme**
Author of the programme	Assoc. Prof. Dorota Anna Krawczyk, DSc, PhD, Eng.	**12.2019**

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