Faculty of Civil and Environmental Engineering					
Study programme:	**Environmental Engineering**	Degree level: full-time/part-time programme:	**Master's degree**	**full-time**	
Specialization	**heating engineering and ventilation**	Diploma path:	**-**		
Module name:	District heating substations, heat distribution networks and thermal control rooms.				
Module type:	**obligatory**	Semester: **2**	ECTS **7**	Module ID:	**ŚC2059**
No. of hrs in semester:	L - 45 C - 0 LC- 0 P- 60 SW- 0 S- 0				
Prerequisites:	*Complete with prerequisites or "-"*	The basis of heating engineering. Automatic control in environmental engineering. The basis of ventilation and air conditioning.			
Teaching methods:	*lecture, project*	*Assessment:*	*Evaluation must be relevant to the intended learning outcomes*		
		lecture - written test, project - completion, presentation and discussion of the project;			
Aims and objectives:	*Description of assumed knowledge, skills and social competence the student should have acquired after the completion of the module:* Familiarize students with a detailed classification of district heating substations and the rules of their dimensioning. Teach students the construction, operation and selection of technological devices used in district heating substations. Familiar with the requirements of the interiors of district heating substations. Familiarize students with a detailed classification of heating and operation essence of insulated district heating networks laid in the ground. Learning design principles and methods of compensation of thermal expansion of pre-insulated district heating networks. Familiarize students with the design and technical solutions and elements of pre-insulated pipes. Learning design of alarm systems used in pre-insulated district heating networks.				
Module content:	*Complete with module content:* Detailed classification of district heating substations. Principles of dimensioning district heating substations. Construction, operation and selection of technological devices used in district heating substations. Requirements for the interiors of district heating substations. The detailed classification of district heating networks. The essence of pre-insulated district heating networks operation laid directly in the ground. Principles of design district heating networks. Types and construction of pre-insulated pipes and components. Techniques for compensation of thermal expansion of pre-insulated district heating networks. Alarm systems used in pre-insulated district heating systems.				
Learning outcomes	*Write min. 4, max. 8 learning outcomes in the following order: knowledge - skills - competences. Each learning outcome must be verifiable.*			*Relevance to the programme learning outcomes*	
LO1	lists the main elements and classifies district heating substations and heat distribution networks			K_W04	
LO2	has detailed knowledge of the construction, operation and selection of district heating substations and components of heat distribution networks and alarm systems used in pre-insulated heat distribution networks			K_W05, K_W06,K_W08	

LO3	know and apply the appropriate computer tools for calculation and design of district heating substations and pre-insulated heat distribution networks	K_W13	
LO4	able to obtain information from literature, databases, and other sources	K_U01,K_U16	
LO5	can, according to preset specifications, design district heating substation and pre-insulated district heating network	K_U20,K_U22	
LO6	able to think and act in a creative and enterprising	K_K06	
student workload	lecture attendance	15x3h =	45
	participation in project	15x14h =	60
	preparation for project	15x1h =	15
	participation in student-teacher sessions related to the lecture and project	15x2h =	30
	work on project		30
	preparation for and participation in tests +presence		10
	preparation for and participation in project discussion +presence		10
		TOTAL:	200
quantitative indicators	Student workload - activities that require direct teacher participation 45h+60h+30h = 135h	135	ECTS
			4,5
	Student workload - practical skills activities 60h+15h+30h+30h+10h+10h=155h	155	5,2
basic references:	*1. Szkarowski A., Łatowski L. Heat engineering. Warsaw University of Technology Publishing House, Warsaw, 2006 r., 2. Żarski K. District heating substations for district heating. AQUARIUS, Toruń, 1997 r., 3. Collective work. Practical heating engineering. II edition. SYSTHERM, Poznań, 2009r..*		
supplementary references:	*1. Nantka M. Heating engineering and heat engineering.. Tom I. Silesian University of Technology Publishing House, Gliwice, 2010 r., 2. Collective work. Technical conditions for the design, construction, acceptance and use of pre-insulated heating pipes and components. COBRTI "Instal", Warsaw, 1996 r.*		

learning outcomes	*methods of assessing learning outcomes*	type of class (if more than one) where the outcomes are assessed
LO1	written test on lecture content	L
LO2	written test on lecture content + design dokumentation	L, P
LO3	design dokumentation	P
LO4	design dokumentation + monitoring of project work in class	P
LO5	design dokumentation	P
LO6	monitoring of project work in class	P

Department:	Department of HVAC Engineering	Group instructors:	doc. dr inż. Andrzej Stempniak dr inż. Joanna Piotrowska-Woroniak
Date:	19.10.2015	Coordinator:	doc. dr inż. Andrzej Stempniak

L - lecture C - class LC - laboratory class P-project