STUDY MODULE DESCRIPTION FORM

Name of the module/subject **District Heating and Gas Distribution**		Code **1010101251010130285**
Field of study **Environmental Engineering First-cycle Studies**	Profile of study (general academic, practical) **general academic**	Year /Semester **3 / 5**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **15** Classes: **-** Laboratory: **-** Project/seminars: **15**		No. of credits **2**
Status of the course in the study program (Basic, major, other) **other**	(university-wide, from another field) **university-wide**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **2 100%** **2 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Fundamentals of combustion processes. Incompressible fluid flows in pipes, pressure loss, pump selection.Pressure, pressure units. Fundamentals of heat exchange. Strength of materials. Control systems.
2	**Skills**	Calculation of simple and complex hydraulic networks. Calculation of heat transfer through flat and curved walls. Selection of control for hydraulic networks .
3	**Social competencies**	Ability to work in team. Awareness of the need to continually update and supplement one's knowledge and skills.

Assumptions and objectives of the course:

To teach students basic information about municipal and industrial heat distribution systems, including: heat source, pipe line system, heat transfer unit. To teach students basic information about construction, operation and design of low and medium pressure natural gas distribution systems. Continuation of the course from previous term.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Student knows pronciples of operation of municipal and industrial heat distribution systems, based on conventional heat sources - [K_W04, K_W05]

2. Student has the knowledge about construction, design and operation of: medium size boiler house (water and steam) and relevant pipe lines and heat transfer units - [K_W05,K_W06,K_W07]

3. Student has the knowledge about design and operation of district heating systems including: heat source, pipe lines, heat transfer units - [K_W05,K_W06,K_W07]

4. Student has a basic knowledge about cogeneration systems - [K_W04, K_W06]

5. Student has the knowledge about construction, design, operation and control of low and medium pressure natural gas distribution systems - [K_W05,K_W06,K_W07]

Skills:

1. Student can to calculate heat demand for medium size residential and industrial systems - [K_U13, K_U14]

2. Student knows how to design medium size boiler house (water and steam) including control and safety systems - [K_U01, K_U04, K_U07, K_U13, K_U14]

3. Student knows how to design and analyze heat distribution system, including: heat source, pipe lines, district heating substation, basic control equipment - [K_U01,K_U03, K_U07,K_U13, K_U14]

4. Student knows how to design gas connection and low and medium pressure gas distribution system - [K_U04, K_U07, K_U13, K_U14]

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Social competencies:
1. Student is aware of the purpose of municipal and industrial heat distribution systems - [K_K02, K_K]
2. Student understands the significance of team work in resolving theoretical and practical problems - [K_K03]

Assessment methods of study outcomes
Lecture: Written exam after 6th term Seminars (design classes): evaluation of work progress during contact hours, presentation of finished design
Course description
Natural gas distribution systems: gas compressor stations, reduction and metering stations, pipelines, gas storage, connections, other considerations. Example problems for design exercises (in small teams): substation in district heating system, substation in industrial heating system, connection to a building in gas distribution system.
Basic bibliography:
1. Szkarłowski A., Łatowski L.: Ciepłownictwo, WNT 2006 2. Foit H., Indywidualne węzły cieplne, Wyd. Politechniki Śląskiej, Gliwice 2010 3. Bąkowski K.: Sieci gazowe, WNT, Warszawa, 1999 4. Łaciak M., Bezpieczeństwo eksploatacji urządzeń instalacji sieci gazowych, Rarbonus, 2010 5. Ciepłownictwo, eksploatacja, projektowanie, inwestycje; praca zbiorowa; (zeszyty tematyczne); Unia Ciepłownicza 1995.
Additional bibliography:

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Participation in seminars (design exercises)	15
3. Additional consultations	10
4. Preparation of individual project (work at home)	25
5. Preparation for final tests	15

Student's workload

Source of workload	hours	ECTS
Total workload	50	2
Contact hours	30	1
Practical activities	25	1

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