DOCTORAL SCHOOL OF WROCŁAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE: prof. dr hab. inż. Zbigniew Gnutek
DEPARTMENT: Faculty of Mechanical and Power Engineering W9
SCIENTIFIC DISCIPLINE: Environmental Engineering, Mining and Energy

COURSE CARD

Course name in Polish: Termodynamika- zagadnienia wybrane
Course name in English: Selected problems of thermodynamics
Course language Polish / ~~English*~~
The course is intended for all PhD students: YES / NO
1) BASIC COURSE
~~2) SPECIALIST COURSE~~
~~3) SEMINAR~~
~~4) HUMANISTIC COURSE~~
~~5) LANGUAGE~~

Subject code: IGQ000002W

* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	30			
Grading	Exam	Exam	Oral presentation	Exam, inspection, evaluation classes
Number of ECTS points	**0**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Competences in the field of thermodynamics, mathematical analysis, differential equations..

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COURSE OBJECTIVES

C1 – to provide an extended knowledge of the phenomena and processes in classical thermodynamics

PROGRAM CONTENTS

Form of classes – lecture (Lec)		Number of hours
Lec1	Modern thermodynamic theories. Methodology of research.	2
Lec2	The system of primary thermodynamic concepts. Thermodynamic parameters and functions.	2
Lec3	Work and heat. Zeroth law of thermodynamics.	2
Lec4	The first law of thermodynamics for an extended concept of work. Processes and transformations. Cycles.	2

Lec5	The second law of thermodynamics. Entropy. T-s chart.	2
Lec6	Irreversible processes, exergy. Samy-Shargut's rules.	2
Lec7	Thermodynamics of systems with a variable amount of substance.	2
Lec8	Thermal properties of the substance. Real gases. Steam. Steam tables. Calculation programs.	2
Lec9	Transformations and phase equilibria. Solutions and mixtures.	2
Lec10	Selected issues of fluid flow.	2
Lec11	Basics of low temperature technology. Superficiality and superconductivity.	2
Lec12	Thermodynamics of non-equilibrium processes.	2
Lec13	Elements of thermal machines.	2
Lec14	Cogeneration and multigeneration systems.	2
Lec15	Heat recovery and storage.	2
	Total hours:	**30**

TEACHING TOOLS USED
N1. Lecture N2. Consultations

ACHIEVED SUBJECT LEARNING OUTCOMES		
Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	P8S_WG	- has well-established knowledge of basic subjects: mathematics, physics, chemistry or other - has advanced knowledge of a basic nature for the field related to the area of scientific research, including the latest research methods and verification of achieved results

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Szargut J., *Termodynamika techniczna,* Wyd. V, wyd. PŚl., Gliwice 2010
[2] Cengel Y. A., Boles M. A., *Thermodynamics An Engineering Approach,* Wyd. V, Mc Graw Hill Higher Education, Boston 2006
[3] Wiśniewski S., *Termodynamika techniczna,* Wyd. II, WNT, Warszawa 1987
[4] Szargut J., *Egzergia. Poradnik obliczenia i stosowanie.*, Wyd. PŚl., Gliwice 2007

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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