

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

SUPERVISOR DECLARING/CONDUCTING COURSE: dr hab. inż. Piotr Kolasiński
DEPARTMENT: Faculty of Mechanical and Power Engineering
SCIENTIFIC DISCIPLINE: environmental engineering, mining and energy

COURSE CARD

Course name in Polish: Termodynamika i wymiana ciepła - zagadnienia wybrane

Course name in English: Selected problems of thermodynamics and heat transfer

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~~
- 6) ~~RESEARCH SKILLS~~

Subject code: IGQ100230W

* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	15			
Grading	Exam	Exam	Oral presentation	Exam, inspection, evaluation classes

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competences in the field of physics, mathematical analysis, differential equations.

COURSE OBJECTIVES

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

PROGRAM CONTENTS

Form of classes		Number of hours
Lec1- Lec6	The second law of thermodynamics. Entropy. T-s chart. Irreversible processes, exergy. Samy-Shargut's rules. Thermal properties of the substance. Real gases. Steam. Steam tables. Calculation programs. Transformations and phase equilibria. Solutions and mixtures. Selected issues of fluid flow. Elements of thermal machines. Cogeneration and multigeneration systems.	11

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Lec7- Lec8	Heat exchange. Steady-state heat conduction and heat transfer. Convection, heat radiation, complex heat transfer.	4
	Total hours	15

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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