

Thermodynamic analysis of energy processes

Faculty of	Mechanical and Power Engineering
Name in English	Thermodynamic analysis of energy processes
Name in Polish	Termodynamiczna analiza procesów energetycznych
Main field of study	Power Engineering
Specialization	-
Level of studies	II level
Form of studies	full-time
Kind of subject	optional-specialization
Subject code	W09ENG-SM2348
Group of courses	NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15			
Number of hours of total student workload (CNPS)	25	25			
Form of crediting	Zaliczenie	Zaliczenie			
For group of courses mark final course with (X)					
Number of ECTS points	1	1			
including number of ECTS points for practical (P) classes		1			
including number of ECTS points for direct teacher-student contact (BU) classes	0,68	0,68			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1.	Competence in the basics of thermodynamics, heat and mass transfer.
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SUBJECT OBJECTIVES

C1	to familiarize students with the tools to optimize energy processes
C2	to acquaint students with the methods of calculating exergy and entropy

SUBJECT LEARNING OUTCOMES

relating to knowledge:	
PEU_W01	familiar with the methods of optimizing energy processes and devices
PEU_W02	knows the principles of the exergy and entropy analysis of energy processes
relating to skills:	
PEU_U01	can perform the entropy and exergy balance of different systems
PEU_U02	can perform the basic optimization of energy devices and processes

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec1	Energy analysis of processes and devices.	2
Lec2	Entropy generation. Entropy balance of the system.	2
Lec3	The concept of exergy as a work potential. Exergy destruction.	2

Lec4	Exergy balance of the system.	2
Lec5	Thermodynamic analysis of processes and devices in terms of II Law.	5
Lec6	The final test	2
Total hours		15

classes		Number of hours
Cl1	Energy balance and performance of different systems.	1
Cl2	Entropy balance.	2
Cl3	Exergy. Irreversibility. Second-law efficiency.	2
Cl4	Exergy analysis of closed systems	2
Cl5	Exergy analysis of control volumes	2
Cl6	Second-law analysis of complex systems.	4
Cl7	The final test	2
Total hours		

TEACHING TOOLS USED	
N1	Traditional lecture with multimedia presentation
N2	Solving problems on the whiteboard during classes.
N3	Computational programs
N4	Thermodynamic property calculators
N5	Consultation hours

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F– forming (during semester), C– concluding (at semester end))	Educational effect number	Way of evaluating educational effect achievement
C1	PEU_W01, PEU_W02	Test (Lecture)
C2	PEU_U01, PEU_U02	Test (Classes)

PRIMARY AND SECONDARY LITERATURE

Primary literature	
1	Yunus Cengel, Michael Boles, Thermodynamics: An Engineering Approach, 8 th Edition, 2020
2	Yunus Cengel, Heat Transfer: A Practical Approach, 2 nd Edition, 2002
3	Ibrahim Dincer, Marc A. Rosen, Exergy, 3 rd edition 2020
Secondary literature	
1	Truls Gundersen, Introduction to Exergy and Energy Quality, Energy and Process Engineering, 2009
2	Jan Szargut, Egzergia: Poradnik obliczania i stosowania, Gliwice, 2007 (in Polish)
3	Wojciech Stanek, Analiza egzergetyczna w teorii i praktyce, Gliwice 20016 (in Polish)

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

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