COURSE DESCRIPTION CARD - SYLLABUS

Course name
Turbomachinery [N1Energ2>MPrz]

Course

Field of study
Power Engineering

Year/Semester
4/8

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
20

Laboratory classes
10

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge of thermodynamics, fluid mechanics. Ability to effectively self-educate in a field related to the chosen field of study. Student is aware of the importance of the necessity to expand his/her competencies, willingness to work together as part of a team. Awareness of the need to expand competence in the field of engineering work.

Course objective

Learning about the operation of flow machines such as pumps, blowers, fans, compressors and turbines. Learning about the mathematical description of steady-state and transient thermal processes. Analysis of equations of conservation. Introduction to numerical computational methods, discretization methods. Acquisition of the ability to develop the assumptions necessary for the design or modernization of systems in the area of thermal power generation. .

Course-related learning outcomes

Knowledge:
Has advanced, established and in-depth knowledge of thermodynamics, fluid mechanics and dynamics of rotating systems. [K1_W01]

Knows the dangers of working with flow machines, pressurized systems and the associated work safety rules [K1_W24].

Skills:
Can independently design simple flow problems including axial palisade kinematics of compressors and turbines, basic parameters of radial machines, determine mass fluxes, powers, efficiencies, compressions and other characteristic parameters as well as analyze characteristics and allowable operating parameters of turbomachinery [K1_U18].

Social competences:
Is aware of the importance and understands the non-technical aspects and consequences of the activities of a power engineer, including its impact on the environment and the associated responsibility for decisions; is ready to fulfill social obligations, co-organize activities for the benefit of the social environment and initiate action for the public interest [K1_K04].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired in the lecture is verified by a final exam consisting of 6 to 9 questions variously scored according to their difficulty. Passing threshold: 50% of the points.
Successful completion of laboratory classes is based on the report of design work, numerical analysis and measurements carried out during the laboratories.

Programme content

Analytical models of compressors and rotor turbines, thermodynamics of gas processes in these machines, calculation of their specific work, efficiency, and characteristic coefficients, flow analysis in working channels, and selection of compressors for installations based on their characteristics.

Course topics

Analytical models of compressors and turbines. Thermodynamics of transformations in compressors and turbines, calculation of unit work, efficiency, characteristic coefficients, flow phenomena in working and stationary channels. Characteristics of compressors (their reading, creation) - Selection of compressor machines for the installation.

Teaching methods

Lecture: whiteboard with multimedia presentation.
Laboratory: Group meetings, solving design tasks, selection of geometric parameters and numerical analysis of designed geometries.

Bibliography

Basic:
1. E. Tuliszka, Sprężarki, dmuchawy i wentylatory, WNT Warszawa, 1976
2. Prosnak W. J., Równania klasycznej mechaniki płynów
3. S. Perycz - Turbiny parowe i gazowe, Wyd. Pol. Gdańskiej,1982
4. Puzyrewski R., Podstawy Mechaniki Płynów
5. T. Chmielniak - Technologie energetyczne, Wyd. Pol. Śląskiej,2004
6. S. Wiśniewski, Termodynamika Techniczna

Additional:
1. Prosnak W. J., Mechanika Płynów, Tom I
2. Prosnak W. J., Mechanika Płynów, Tom II

Breakdown of average student's workload

	Hours	ECTS
Total workload	102	4,00
Classes requiring direct contact with the teacher	32	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	70	2,50