COURSE DESCRIPTION CARD - SYLLABUS

Course name
Thermal-flow systems [N1Energ2>UCP]

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
10

Laboratory classes
10

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of thermodynamics, fluid mechanics, vector and differential calculus of many variables

Course objective

The aim of the course is to provide students with knowledge of flow machinery: definitions, concepts and thermodynamic-flow problems. Students gain knowledge and skills in the field of construction, design methods and ways of operating fluid flow machines.

Course-related learning outcomes

Knowledge:
1. The student has expanded knowledge of thermodynamics and fluid mechanics to the extent necessary to understand the principle of operation and calculations of thermodynamic and flow processes occurring in flow machines
2. Knows modern CAE methods and theoretical foundations of engineering calculations with numerical methods
3. The student has general knowledge about the types of tests and methods of testing fluid flow machines using modern measurement techniques and data acquisition.

Skills:
1. The student is able to obtain information from literature and other sources, in Polish and foreign languages, is able to integrate the information obtained, interpret and draw conclusions from them as well as create opinions.
2. The student is able to use the acquired knowledge in the field of thermodynamics and fluid mechanics to simulate processes occurring in compression machines, as well as build dedicated computational models
3. Student is able to plan and design research on phenomena in flow machines (for example determining its map)

Social competences:
1. The student understands the need and knows the possibilities of continuous training, knows the need to acquire new knowledge for professional development
2. Is aware of the responsibility for their own work and readiness to comply with the principles of teamwork and taking responsibility for their professional role in jointly carried out tasks
3. Is aware of the social role of a technical university graduate, and in particular understands the need to formulate and convey to the public (including through the mass media), information and opinions on the achievements of the energy sector and other aspects of the activity of the energy-engineer; endeavors to provide such information and opinions in a generally understandable way

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam for lecture content
Aerodynamic design of the flow machine - project report

Programme content

Analysis of basic flow phenomena in turbomachines and one-dimensional and numerical methods for designing these machines. Methods for assessing the efficiency of turbomachines, flow phenomena analysis based on numerical studies, and selection of machines for hydraulic installations, considering operation in series and parallel configurations.

Course topics

Analysis of basic flow phenomena occurring in flow machines. One-dimensional and numerical methods of designing flow machinery, physical interpretation of work and flow indicators. Knowledge and physical interpretation of the definition of fluid machinery efficiency and methods of lifting them. Qualitative and quantitative assessment of flow phenomena occurring in flow machines on the basis of numerical analyzes of real liquid flow and research methods. Ways to choose flow machines working in series and parallel? analysis of flow characteristics and work of flow machines. Selection of flow machinery for hydraulic installations.

Teaching methods

Lecture and auditorium exercises, presentation of how to solve project issues, consultation of final projects

Bibliography

Basic:
Tadeusz J. Chmielniak - „Maszyny Przepływowe”

Additional:
S. L. Dixon - Fluid Mechanics, Thermodynamics of Turbomachinery

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00