COURSE DESCRIPTION CARD - SYLLABUS

Course name
Turbomachinery [S2ZE1E>ME]

Course

Field of study
Green Energy

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
15

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

4,00

Coordinators

dr inż. Bartosz Ziegler
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Lecturers

Prerequisites

Knowledge: Knowledge of the basic concepts and dependencies of the mechanics of a rigid body and fluids. Knowledge of thermodynamics, in particular basic transformations and relationships for ideal gases Skills: Logical thinking and inference, the ability to translate physical models into design dependencies and relations between parameters. Social competences: Logical thinking and reasoning.

Course objective

To develop an understanding of the principle of operation, the interrelationships between flow and operational parameters, as well as design and aerodynamic constraints in the context of fluid-flow machines, with particular emphasis on axial compressors and turbines.

Course-related learning outcomes

Knowledge:
1. Has detailed knowledge of the principle of operation and dynamics of rotating flow machines, in particular gas and steam turbines.
2. Has an ordered and theoretically founded knowledge of the influence of individual parameters of the thermodynamic cycle and design parameters of the machine on its operational parameters and

components of efficiency
3. Has a basic knowledge of the impact of machine design parameters and the way of its operation on the life cycle of the device

Skills:
1. Can obtain information from literature, the Internet, databases and other sources, especially English. He can integrate the obtained information with the possessed knowledge, interpret and draw conclusions from it
2. Can create a quantitative description of the principle of operation and components of physical processes of the flow energy machine
3. Can use formulas, tables of technical charts and create them based on known models of physical changes

Social competences:
1. Can properly define the priorities for the implementation of tasks defined by himself or others, on the basis of the available knowledge
2. Understands the need for a critical assessment of knowledge and continuous learning
3. Is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for decisions made

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Performing laboratory exercises and submitting a report from the exercise
Written examination
lecture final exam

Programme content

Physical basics of generating energy transformations in rotating flow and thermal machines; The course of gas dynamic parameters along the flow channel of the turbine engine; Quasi-real thermodynamic cycle of a turbine engine; Design of compressors and turbines, characteristics of the materials used, construction and material limitations
Calculation of the work of the cycle of the turbine engine, steam power plant, ORC cycle; Calculation of gas-dynamic parameters in turbine machines, preliminary design of the compressor / turbine stage or the thermodynamic cycle of the machine

Course topics

none

Teaching methods

Blackboard based lecture, laboratory with practical measurements and examples of calculations, auditory tutorials

Bibliography

Basic:
S. A. Korpela, Principles of Turbomachinery, Wiley

Additional:
M. T. Schobeiri, Turbomachinery Flow Physics and Dynamic Performance, Springer

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50