COURSE DESCRIPTION CARD - SYLLABUS

Course name
Heat transfer and fluid-flow machines

Course

Field of study
Construction and Exploitation of Means of Transport

Year/Semester
3/6

Area of study (specialization)
Internal Combustion Engines

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
18	18	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
dr inż. Robert Kłosowiak

email: robert.klosowiak@put.poznan.pl

Instytut Energetyki Cieplnej

Responsible for the course/lecturer:
dr inż. Damian Joachimiak

email: damian.joachimiak@put.poznan.pl

Instytut Energetyki Cieplnej

Prerequisites

Basic knowledge of the basics of heat transfer processes in heat-flow machines and equipment

Student has a basic knowledge of the basics of thermodynamics, fluid mechanics

Student has a basic knowledge on fluid machinery relation to other fields of knowledge.

Is aware of the need to expand their competences, readiness to cooperate within a team. Awareness of the need to expand their competences in the field of engineer work.

Course objective

Introduction to basic heat transfer processes and energy conservation equations. Getting to know the methods of describing various heat flow processes implementing the assumed processes of thermal and mechanical energy conversion

The goal of the study is to pass on knowledge from fluid-flow machines, definitions, problems of thermal and fluid flow. Students gain insight on designing, building and exploiting flow machinery

Course-related learning outcomes

Knowledge

Student has knowledge in mathematics, including algebra, analysis, theory of differential equations, probabilistics, analytical geometry necessary to: describe the operation of discrete mechanical systems, understand computer graphics methods, describe the operation of electrical and mechatronic systems

Student has basic knowledge of fluid dynamics necessary for design of fluid flow machines

Student has basic knowledge of thermodynamics necessary for design of fluid flow machines

Skills

Is able to obtain information from literature, databases and other sources; is able to integrate the information obtained, interpret it, as well as to infer and formulate and justify opinions.

Capable of gaining knowledge from modern literature sources

Student is capable of performing technical calculation from fluid-flow and thermodynamics in fluid-flow machinery

Social competences

Understands the need and knows the possibilities of continuous training, raising professional, personal and social competences (e.g. through second and third cycle studies, postgraduate studies, courses); and is ready to critically assess knowledge, recognizes its importance in solving cognitive and practical problems.

Is aware of the responsibility for own work and readiness to comply with the principles of team work and to bear the responsibility of the professional role in jointly implemented tasks.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

- Knowledge acquired as part of the lecture is verified by a final exam consisting of 6 to 9 questions with various points depending on their level of difficulty. Passing threshold: 50% of points. Final issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system.

- Skills acquired as part of the laboratory classes are verified on the basis of short input colloquia and reports from classes. Passing threshold: 50% of points. Issues are first discussed on the blackboard and then implemented in groups - practical exercises.

Programme content

Heat conduction - differential equation, boundary conditions. Thermal properties of materials. Conduction in the ribs. Conduction in transient conditions. Dimensional analysis and similarity

conditions. Introduction to numerical methods. Basics of heat convection processes. Fundamentals of thermal radiation. Heat exchangers.

Fluid-flow machines used in thermal energy, steam, gas thermal circuits: analysis of basic flow and thermodynamic phenomena in fluid-flow machines; 1d design methods for fluid flow machines; basic parameters of flow machines; assesing fluid-flow machines efficiencies

Teaching methods

1. Lecture: blackboard with multimedia presentation.

2. Laboratory classes: discussing the theory and assumptions for classes on the board and performing tasks given by the teacher.

Bibliography

Basic

1. S. Perycz – Turbiny parowe i gazowe, Wyd. Pol. Gdańskiej,1982

2. Tuliszka E., Sprężarki, dmuchawy i wentylatory, WNT, Warszawa 1976.

3. Tuliszka E., Turbiny cieplne, WNT, Warszawa 1973

4. Prandtl L., Dynamika gazów, PWN, Warszawa 1956.

5. Jędral W., Pompy wirowe, Wydawnictwo Naukowe PWN, Warszawa 2001

6. Wiśniewski S., Wymiana Ciepła

7. Wymiana i wymienniki ciepła

Additional

T. Chmielniak – Turbiny cieplne, Wyd. Pol. Śląskiej, 2004

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work: literature studies, preparation for classes; preparation for exam [1]	30	1,0

[1] delete or add other activities as appropriate