COURSE DESCRIPTION CARD - SYLLABUS

Course name

Dynamics of gas transportation proceses

Course

Field of study

Transport

Year/Semester

3/5

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

part-time

Requirements

elective

Number of hours

Lecture

9

Laboratory classes

9

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Prof. dr hab inż. Michał Ciałkowski

email: michał.ciałkowski@put.poznan.pl

Piotrowo 3, 60-965 Poznan

Responsible for the course/lecturer:

Prerequisites

The student has a basic knowledge of mathematics, physics and fluid mechanics. The student knows and understands the basic phenomena of fluid mechanics. The student is able to use the concepts and methods in the description of the phenomena associated with the movement of ideal gases. Students can use their knowledge to analyze specific events and processes related to the gas flow. Students are able to solve specific problems related to the ideal gas flow. Students can work together in a group, taking the different roles. The student is able to prioritize important in solving the tasks posed in front of him. The student demonstrates self-reliance in solving problems, acquire and improve their knowledge and skills.

Course objective

To familiarize students with basic knowledge of theoretical governing the movement of ideal gases

Course-related learning outcomes

Knowledge

The student has an extended and deepened knowledge of mathematics useful for formulating and solving complex technical tasks concerning various means of transport

The student has extended and in-depth knowledge of physics useful for formulating and solving selected technical tasks, in particular for correct modeling of real problems

Skills

The student is able to obtain information from various sources, including literature and databases (both in Polish and in English), integrate it properly, interpret it and critically evaluate it, draw conclusions, and comprehensively justify his/her opinion.

The student is able to properly plan and conduct perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions

The student is able to assess the computational complexity of algorithms and transport problems

Social competences

The student understands that in technology, knowledge and skills very quickly become obsolete

The student is aware of the importance of knowledge in solving engineering problems, knows examples and understands the causes of malfunctioning transport systems that have led to serious financial and social losses or to serious loss of health and even life

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture and exercises - written exam. Obtaining credit from a minimum of 51% of the points possible to get. There is a possibility of an oral question to raise the grade.

Programme content

Bernoulli's equation. Critical parameters of gas. Classification of the gas flow. Wave phenomena in one-dimensional flow. Oblique shock wave. Polar shock wave. The shock wave in a flat opływie wedge. Some problems of the theory of linear. Linearization equation velocity potential. Transformation Prandtl and Glauerta. Some analytical solutions.

Teaching methods

Informative lecture (conventional) (information transfer in a systematic way)

Conversational lecture ("external dialogue" of the lecturer with the student; students participate in solving the problem) - the continuation of the lecture may be a seminar

Exercise method (subject exercises, exercises) - in the form of auditorium exercises (the application of acquired knowledge in practice - it can take a different nature: solving cognitive tasks or training psychomotor skills; transforming conscious activity into a habit through repetition)

Bibliography

Basic

1. Mechanika gazów : jednowymiarowe przepływy ustalone / Czesław Grabarczyk,Wydawnictwo WNT, 2012.

2. Mechanika płynów / Michał Ciałkowski, Wydaw. Politechniki Poznańskiej, 2000.

Additional

1. Mechanika płynów : zbiór zadań z rozwiązaniami / pod red. Michała Ciałkowskiego ; Wydawnictwo Politechniki Poznańskiej, 2008.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	18	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	32	1,0

[1] delete or add other activities as appropriate