COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fluid mechanics

Course

Field of study

Aerospace Engineering

Year/Semester

2/4

Area of study (specialization)

-

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

15

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Transportu

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Mathematics and physics news in the field of study program. The student is able to describe the basic physical phenomena and perform calculations related to them. The student is able to determine the priorities important in solving the tasks set before him. The student demonstrates independence in solving problems, acquiring and improving acquired knowledge and skills.

Course objective

To familiarize students with the theoretical foundations and applications of fluid mechanics.

Course-related learning outcomes

Knowledge

1. Has knowledge in the field of fluid mechanics necessary to understand and describe the basic issues related to aviation engineering

2. Has basic knowledge of measurement measurement methods used in fluid mechanics in the scope of stationary and non-stationary processes, measurement systems, measurement errors - the impact of external factors, statistical analysis of measurement results, principles of organization of active and passive experiment

3. Has ordered, theoretically founded general knowledge covering key issues in the field of fluid mechanics, in particular aerodynamics, i.e. ideal liquids and gases, viscous Newtonian and non-Newtonian liquids, theory of heat-flow machines

Skills

1. Has the ability to self-study with the use of modern teaching tools, such as websites, databases and electronic publications

2. Is able to carry out elementary technical calculations in the field of fluid mechanics, such as mass and energy balances, pressure losses in restricted flows in ducts and free around technical flying objects and their modules, select parameters of fans, compressors and turbines for flow systems

3. Is able to carry out a research experiment using measuring apparatus, is able to make measurements, such as measurements of pressure, speed and mass flow, acting forces, and interpret results and draw conclusions

Social competences

1. Is aware of the importance of maintaining the principles of professional ethics

2. Is able to properly prioritize the implementation of tasks specified by himself or other in the field of fluid mechanics based on the available knowledge

3. Understands the need for critical assessment of knowledge and continuous learning

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: exam

Exercises: tests

Laboratories: continuous assessment, during each class - rewarding the increase in the ability to use known issues, assessment of the report from the exercise

Programme content

Basic equations of fluid dynamics. The principle of mass conservation. The principle of conservation of angular momentum and angular momentum. Forces affecting the fluid. General motion properties of non-viscous and non-conductive fluids. Euler equation. Bernoulli's equation and its applications. The reaction exerted by the liquid stream. The principle of conservation of mass and momentum.

PART - 66 (THEORY - 22.5 hours, PRACTICE - 11.25 hours)

MODULE 2. PHYSICS

2.2 Mechanics

2.2.4 Fluid dynamics

b) Viscosity, fluid resistance, effects of streamlining;

Effects of compression of fluid;

Static, dynamic and total pressure: Bernoulli's law, Venturi. [2]

Teaching methods

1. Lecture: multimedia presentation and on the board.

2. Accounting exercises: examples analyzed on the board and self-made by students.

3. Laboratories: presentation of the content and course of research, supervision over their implementation.

Bibliography

Basic

1. Ciałkowski M., Mechanika Płynów. Skrypty Uczelniane. Wydawnictwo Politechniki Poznańskiej.

2. Ciałkowski M., Bartoszewicz J., Frąckowiak A., Grudziński M., Grzelczak M., Kołodziej J., Piątkowski R., Rybarczyk J., Wróblewska A., Mechanika płynów: zbiór zadań z rozwiązaniami, Wydawnictwo Politechniki Poznańskiej, Poznań 2008.

3. Prosnak W.J. Mechanika Płynów, t. I. PWN Warszawa 1971

Additional

1. . Gołębiewski C., Łuczywek E., Walicki E., Zbiór zadań z mechaniki płynów, PWN Warszawa1978

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam) [1]	25	1,0

[1] delete or add other activities as appropriate