



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fluid mechanics

Course

Field of study

Construction and Exploitation of Means of Transport

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

9

Laboratory classes

Tutorials

9

Projects/seminars

Other (e.g. online)

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Faculty of Environmental and Energy

Engineering

Piotrowo 3, PL60-965 Poznan

Responsible for the course/lecturer:

Prerequisites

KNOWLEDGE: has basic knowledge in the field of mathematics, physics, fluid mechanics.

SKILLS: in-depth understanding and interpretation of the messages conveyed and effective self-education in the field related to the selected field of study.

SOCIAL COMPETENCES: has an increased awareness of the need to expand their competences, readiness to work individually and cooperate within a team.



Course objective

Understanding selected theoretical results in the field of fluid mechanics. Getting to know different fluid models (Newtonian and non-Newtonian) and their behavior in flow.

Course-related learning outcomes

Knowledge

Has extended knowledge of fluid mechanics to the extent necessary to understand the principle of operation and flow calculations occurring in working machines

Skills

Can formulate and test hypotheses related to simple research problems

Social competences

Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in the event of difficulties in solving the problem on its own

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lecture is verified on the basis of a written exam carried out during the examination session. The exam consists of 6-10 questions, with different scores. Passing threshold: 50% of points. The issues for the exam, on the basis of which the questions are developed, will be sent to students by e-mail using the university's e-mail system.

The knowledge acquired during the exercises is verified by two 45-minute tests carried out during the 7th and 15th hours of exercises. Each test consists of 3-7 tasks, with different scores. Passing threshold: 50% of points.

Programme content

The theory of similarity. The torque acting on the rotor. Steady plane motion. Complex potential. The principle of flow superposition. The reaction and the moment exerted by the liquid on the profile. Dynamics of a viscous liquid. Some solutions to the analytical Navier and Stokes equations. The boundary layer concept. Karman integral formula. Selected issues of viscous fluid flow. Floating the plate with even fluid suction. Breakdown of a potential vortex in a viscous fluid. Rayleigh-Stokes flow. Non-Newtonian fluids.

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given on the board.
2. Exercises: performing the tasks given by the teacher.

Bibliography

Basic

1. M.Ciałkowski – Mechanika płynów, Wyd. Politechniki Poznańskiej, P-ń 2000.



2. M.Ciałkowski – Mechanika płynów. Zbiór Zadań z rozwiązaniami, Wyd. Politechniki Poznańskiej, P-ń 2008.

3. Z. Orzechowski, P. Wiewiórski – Ćwiczenia audytoryjne z mechaniki płynów, Wyd. Politechniki Łódzkiej, Łódź 1993

4. W.J. Prosnak – Równania klasycznej mechaniki płynów, PWN 2006

Additional

1. J.A. Kołodziej – Podstawy mechaniki płynów, Wyd. Politechniki Poznańskiej, P-ń 1982.

2. J. Walczak – Inżynierska mechanika płynów, Wyd. Naukowo-Techniczne, 2010

Breakdown of average student's workload

| | Hours | ECTS |
|--|-------|------|
| Total workload | 60 | 2,0 |
| Classes requiring direct contact with the teacher | 32 | 1,0 |
| Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam) ¹ | 28 | 1,0 |

¹ delete or add other activities as appropriate