COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fluid Mechanics

Course

Field of study

Power Engineering

Year/Semester

1/1

Area of study (specialization)

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

Prof. dr hab inż. Andrzej Frąckowiak

email: andrzej.frackowiak@put.poznan.pl

tel. 616652212

Wydział Inżynierii Środowiska i Energetyki

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge in the field of mathematics, physics, fluid mechanics. Ability of depth understanding and interpretation of messages and effective self-education in the field related to the chosen field of study. Is aware of the need to expand their competences, readiness for individual work and cooperation within the team.

Course objective

Knowledge of selected theoretical results in the field of fluid mechanics. Familiarization with various fluid models (Newtonian and non-Newtonian) and their behavior during flow. Familiarization with selected issues of numerical modeling of fluid flow.

Course-related learning outcomes

Knowledge

1. has advanced knowledge in the field of physics, including mechanics, thermodynamics, fluid mechanics, electricity and magnetism, optics, nuclear physics and solid state physics, including knowledge necessary to understand the basic physical phenomena occurring in electrical, energy and electronic components and systems and in their surroundings

2. explain the laws governing the flow of fluids and the principles of numerical modeling of fluid flow

3. ordered knowledge in the field of power equipment diagnostics, knows and understands the methods of measuring basic quantities characterizing devices and electric and mechanical systems of various types; knows the calculation methods and IT tools necessary to analyze the results of experiments

Skills

1. can acquire information from literature, databases and other sources; can integrate the obtained information, make their interpretation, as well as apply and formulate and justify opinions

2. apply knowledge in the field of fluid mechanics to describe the phenomena occurring as a result of fluid flow in the machine channels and in energy devices

Social competences

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

2. Is aware of the importance of acting in a professional manner, adherence to the principles of professional ethics and requirements from others, care for the heritage and traditions of the profession, as well as respect for the diversity of views and cultures

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture. Knowledge acquired as part of the lecture is verified on the basis of a written exam carried out during the examination session. The exam consists of 6-10 questions, variously scored. Passing threshold: 50% of points. Exam issues, on the basis of which questions are prepared, will be sent to students by e-mail using the university e-mail system.

Programme content

Lecture. Basic equations of fluid dynamics. Dynamics of viscous liquid. Navier-Stokes equation. Bernouli equation for real liquid. Coefficient of friction losses. Rayleigh-Stokes issue for the plate. The boundary layer. Integral formula of Karman. Selected issues of viscous fluid flow. Plate flow with even suction of fluid. Disintegration of a potential vortex in a viscous fluid. Selected issues from numerical fluid mechanics. Modeling of mixing liquids in a static mixer. Non-Newtonian fluids.

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board.

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	37	1,0
Classes requiring direct contact with the teacher	24	1,0
Student's own work (literature studies, preparation for test) [1]	13	1,0

[1] delete or add other activities as appropriate