COURSE DESCRIPTION CARD - SYLLABUS

Course name
Selected aspects of fluid mechanics [S2EPiO1>WZMP]

Course

Field of study
Industrial and Renewable Energy Systems

Year/Semester
1/1

Area of study (specialization)
Thermal and Renewable Energy

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
15

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Bartosz Ziegler
bartosz.ziegler@put.poznan.pl

Lecturers

Prerequisites

Knowledge of basic physical principles and the ability to balance mass, energy, momentum. Mathematical apparatus allowing understanding of physical descriptions using vector calculus and differential calculus, engineering basics of fluid mechanics

Course objective

To teach fluid mechanics to the extent that gives qualitative and quantitative skills in the analysis of flow phenomena being a prerequisite for teaching subjects about flow machinery and flow installations.

Course-related learning outcomes

Knowledge:
1. e2a_w02 (p7s_wg) has extended and in-depth knowledge in mathematics, optimization methods, including numerical methods used in the description of thermodynamic processes, fluid mechanics, heat exchange, mass and momentum transport.
2. e2a_w03 (p7s_wg) has expanded knowledge necessary to understand profile objects and specialist in the gas technology sector, knows the main processes and transformations taking place in these machines.

3. e2a_w04 (p7s_wg) has extended knowledge of the latest scientific discoveries in the field of thermodynamics, fluid mechanics, heat exchange, combustion processes, technical mechanics and material strength.

Skills:
1. e2a_u01 (p7s_uw). can use the acquired knowledge to formulate ranges of issues necessary to solve the application problem and search for information needed for it.
2. e2a_u02 (p7s_uw). can apply the acquired theoretical foundations to detailed application problems (eg. mechanics of a rotary flow machine to specific examples of pumps, turbine compressors, etc.)

Social competences:
1. e2a_k01 (p7s_kk) – he is ready to critically assess his knowledge, and in particular as to the limitations of models and the framework of functioning theories.
2. e2a_k05 (p7s_ko) – he is ready to organize further development of his competences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
1. Lecture exam
2. Completion of written exercises
3. Laboratory reports

Programme content

Mathematical foundations; Euler"s description; Stress state in Newtonian fluid; General transport equations; Similarity theory; Buckingham Pi theorem; Criterion numbers; Boundary layer mechanics; Qualitative description of typical flow phenomena; Potential flows; Kutta-Joukowski"s theory and its implementations; Wind turbine rotor description theories; Compressible flows

Course topics

none

Teaching methods

1. Conversational lecture
2. Practice method
3. Laboratory method

Bibliography

Basic
Additional
B. R. Munson, T. H. Okiishi, W. W. Huebsch, "Fundamentals of fluid Dynamics"
J. D. Anderson, "Fundamentals of Aerodynamics"

Breakdown of average student's workload

	Hours	ECTS
Total workload	113	4,00
Classes requiring direct contact with the teacher	70	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	43	1,50