COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fluid mechanics [S1Energ1>MP]

Course

Field of study
Power Engineering

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-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

5,00

Coordinators

prof. dr hab. inż. Andrzej Frąckowiak
andrzej.frackowiak@put.poznan.pl

Lecturers

Bartłomiej Cywka
bartlomiej.cywka@doctorate.put.poznan.pl

dr inż. Paweł Czyżewski
pawel.czyzewski@put.poznan.pl

prof. dr hab. inż. Andrzej Frąckowiak
andrzej.frackowiak@put.poznan.pl

dr inż. Michał Gołębiewski
michal.golebiewski@put.poznan.pl

dr inż. Łukasz Semkło
lukasz.semklo@put.poznan.pl

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 advanced knowledge in the field of fluid mechanics, including the knowledge necessary to understand the basic physical phenomena occurring in elements and systems of fluid machines, and in their environment.
2. has structured knowledge in the field of knowledge of materials that meet the construction and operational requirements of machines and devices, modeling of mechanical systems; has the knowledge needed to understand the principles of operation of basic machine parts, the selection of typical machine parts; knows and understands the essence of technically and technologically proper construction of machines and devices, as well as knows the economic aspects of their construction.
3. has structured knowledge in the field of power equipment diagnostics, security techniques; knows and understands the methods of measuring basic quantities characterizing electrical and mechanical devices and systems of various types; knows the calculation methods and it tools necessary to analyze the results of experiments.

Skills:
1. is able to obtain information from literature, databases and other sources; is able to integrate the information obtained, interpret it, as well as to infer and formulate and justify opinions.
2. can work individually and in a team; knows how to estimate the time needed to complete the task; can develop and implement a work schedule to ensure that deadlines are met.
3. is aware of the planning and implementation of lifelong self-education, including to improve professional competence.
4. is able to use properly selected methods and devices enabling measurement of basic quantities characterizing energy elements and systems.

Social competences:
1. understands the need and knows the possibilities of continuous training, raising professional, personal and social competences (e.g. through second and third cycle studies, postgraduate studies, courses); and is ready to critically assess knowledge, recognizes its importance in solving cognitive and practical problems.
2. is aware of the importance of behaving in a professional manner, compliance with the principles of professional ethics and the requirement of this from others, care for the achievements 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:

Learning outcomes presented above are verified as follows:
Lecture: exam
Exercises: tests
Laboratories: tests and evaluation of reports

Programme content

Subject of fluid mechanics. Continuous media model. Some concepts and theorems of fluid kinematics. Power line. Current surface. Fluid element path. Acceleration of fluid element. Substantive, convective and local derivative. Circulation. The principle of mass conservation. Forces acting on the fluid. General motion properties of non-viscous and non-conductive fluids. Fluid statics. Determination of equipotential surfaces and pressure distribution. Fluid pressure on the walls of solids. Swimming and stability of floating bodies. Basic equations of fluid dynamics. The principle of mass conservation. The principle of conservation of angular momentum and angular momentum. Forces acting on 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.

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 Warszawa 1978.

Breakdown of average student's workload

	Hours	ECTS
Total workload	123	5,00
Classes requiring direct contact with the teacher	70	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	53	2,00