COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fluid mechanics

Course

Field of study

Safety Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

English

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

Ph.D., D.Sc., Henryk Manikowski

Mail to: henryk.manikowski@put.poznan.pl

Faculty of Materials Engineering and Technical Physics

ul. Piotrowo 3A, 61-138 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of mathematics and mechanics. Logical and scientific thinking. Efficient calculating. Understanding necessity of broadening ones competences, readiness to working and cooperating in team and taking responsibility for jointly accomplished task.

Course objective

The subject is aimed at introducing basic terms from the fluid mechanics area, giving skills and competences for solving technical problems. Acquiring skills necessary for conducting analysis which lead for designing the safety control system mechanisms.

Course-related learning outcomes

Knowledge

Acquire basic engineering knowledge (physics, chemistry, knowledge of commercial materials, mechanics), and basic knowledge of products, equipment, objects and technical systems [P6S_WG_01; P6S_WG_06].

Skills

Student has self – study ability and comprehends it. Can make use of analytic, simulation and experimental methods to formulate and solve engineering problems. Can identify and formulate the specification of simple engineering tasks, that are of particular nature, typical of Safety Engineering [P6S_UW_04; P6S_UW_06; P6S_UK_01].

Social competences

Is aware of the relevance of the study and understands non – technical aspect as well as the consequences of engineering activity, including its impact on environment and taken responsibility of his decisions [P6S_KK_03].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

lectures:

two 45min. tests during 7th and 15th lectures. Each test contains several questions and open questions connected with the covered lecture content from current and previous lectures. Credit is given above 50% of maximal score available.

Classes:

acquired knowledge and skills learnt during solving maths problems and the direct activity during the classes is currently checked. Credit is given above 50% of maximal score available.

Programme content

Lectures

Fluid properties: density, viscosity, surface tension. Principal hydrostatic laws, pressure variation with depth in a fluid, manometers, pressure as force per unit area, buoyancy. Continuity equation. Bernoulli's equation. Laminar and turbulent flow in tubes and channels. Potential flow. Gas flow in tubes. Hydraulic and pneumatic elements.

Classes

Discussed and solved are problems relevant to topics presented during the lectures:

- physical and chemical properties of matter: liquid, gas, solid rounded by liquid or gas.

- ideal and real fluid statics.

- ideal and real fluid dynamics.

Teaching methods

Lecture: multimedial presentation, illustrated by graphical scatches of figures, grounds of formulas on the board.

Classes: multimedial presentation, examples illustrated on the board, and solving the problems selected by tutor.

Bibliography

Basic

1. R. Puzyrewski, J. Sawicki, Podstawy mechaniki płynów i hydrauliki, PWN, Warszawa 2013.

2. R. Gryboś, Podstawy mechaniki płynów, cz. 1 i 2, PWN, Warszawa 1998, pdf 2018

Additional

1. D.C. Giancoli, Physics (Fluid Mechanics), Pearson Education Inc., London 2014 (7th Edition).

2. Z. Orzechowski i inni, Mechanika płynów w inżynierii i ochronie środowiska, WNT 2009.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests) [1]	45	2,0

1 delete or add other activities as appropriate