



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fluid mechanics [N1Energ1>MP]

### Course

Field of study

Power Engineering

Year/Semester

2/4

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

polish

Form of study

part-time

Requirements

compulsory

### Number of hours

Lecture

20

Laboratory classes

10

Other (e.g. online)

0

Tutorials

10

Projects/seminars

0

### Number of credit points

5,00

### Coordinators

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

### Lecturers

### 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 necessary for: 1) description and analysis of the operation of hydraulic and pneumatic elements, as well as basic physical phenomena occurring in them; 2) description and analysis of flow machinery operation; 3) mathematical description of physical processes, including continuous and discrete processes.
2. has advanced knowledge in the field of fluid mechanics, including knowledge necessary to understand the basic physical phenomena occurring in elements and systems of fluid machines, and in

their environment.

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.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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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. Gołębiowski C., Łuczywek E., Walicki E., Zbiór zadań z mechaniki płynów, PWN Warszawa 1978.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	80	3,00