STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Fluid Mechanics**	Code **1010632221010630432**

Field of study **Mechanika i budowa maszyn**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 2**

Elective path/specialty **Gas technology and renewable energy**	Subject offered in: **English**	Course (compulsory, elective) **obligatory**

Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**

No. of hours

Lecture: **1**	Classes: **1**	Laboratory: **-**	Project/seminars: **-**	No. of credits **2**

Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**

Education areas and fields of science and art **technical sciences** **Technical sciences**	ECTS distribution (number and %**)** **2 100%** **2 100%**

Responsible for subject / lecturer: Mgr inż. Bartosz Ziegler email: bartosz.ziegler@put.poznan.pl tel. 61 665 2135 Wydział Maszyn Roboczych i Transportu ul. Piotrowo 3, 60-965 Poznań	Responsible for subject / lecturer: dr inż. Przemysław Grzymisławski email: przemyslaw.grzymislawski@put.poznan.pl tel. tel. 61 665 21 35 Wydział Maszyn Roboczych i Transportu ul. Piotrowo 3A, 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowladge in the field of fluid mechanics, thermodyanmics, aerodynamics.
2	**Skills**	The student can describe the basic physical phenomena, and to perform calculations associated with them.
3	**Social competencies**	Student is able to prioritize important in solving the tasks posed in front of him. The student demonstrates self-reliance in solving problems, acquire and improve their knowledge and skills.

Assumptions and objectives of the course:

-Learning basic concepts and theories of fluid mechanics and their engineering applications.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has a basic knowledge of technical fluid mechanics (ideal gases and ideal fluids), Newtonian and non-Newtonian viscous fluids, heat and fluid flow machinery. - [K1A_W07] - [-]

2. Has a basic knowledge of linear measurement methods, stress, strain, velocity, temperature and fluid streams measurement, including electrical methods of measurement. - [K1A_W14] - [-]

Skills:

1. Is able to perform rudimentary technical calculations in fluid mechanics and thermodynamics, such as heat and mass balance, pressure loss in pipes, selected parameters of blowers and fans in ventilation and transportation systems, calculate the thermodynamic flows in thermal machines. - [K1A_U17] - [-]

2. Is able to use acquired mathematical theories to create and analyze simple mathematical models of machines, their components and simple technical systems. - [K1A_U07] - [-]

Social competencies:

1. Has a sense of responsibility for one?s own work and is willing to comply with the principles of teamwork and taking responsibility for collaborative tasks. - [K1A_K04] - [-]

2. Is aware of the importance of behavior in a professional manner, compliance with the rules of professional ethics and respect for cultural diversity. - [K1A_K03] - [-]

Assessment methods of study outcomes
Lecture: exam
Exercise: test

Course description
-Basics of Eulerian description of fluid motion. Chosen concepts and theorems of the kinematics of fluids. Streamlines, streamtubes, pathlines. Substantial derivatives and their components. Acceleration of fluid element in Eulerian description. Stress tensor in inviscid and Newtonian fluid flows. Basic equations of fluid dynamics: transport equations for mass, momentum and energy. Flow similarity theory, criterial numbers. Some general integrals of Euler equations. Dynamic forces acting on channel walls for some specific cases like jet engines and cascades .

Basic bibliography:

1. Batchelor, G. K., An Introduction to Fluid Dynamics, Cambridge University Press; ISBN: 0521663962

Additional bibliography:

1. Douglas, J.F., Matthews, R.D. (Contributor), Solving Problems in Fluid Mechanics, Addison-Wesley Pub Co; ISBN: 0582239877

Result of average student's workload	
Activity	**Time (working hours)**
1. Preparation for the lecture	5
2. Participation in the lecture	15
3. Fixing the lecture	15
4. Consultation for the lecture	2
5. Preparing to pass the lecture	10
6. Participation in the completion of the lecture	2
7. Preparation of practical classes	5
8. Participation in the classes	15
9. Consultation for the classes	5
10. Preparing to pass the classes	5
11. Participation in the completion of the classes	2

Student's workload		
Source of workload	**hours**	**ECTS**
Total workload	81	2
Contact hours	41	2
Practical activities	0	0