STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Mechanics of fluids**		Code **1010314441010635573**
Field of study **Power Engineering**	Profile of study (general academic, practical) **general academic**	Year /Semester **2 / 4**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **15** Classes: **15** Laboratory: **15** Project/seminars: **-**		No. of credits **5**
Status of the course in the study program (Basic, major, other) **basic**	(university-wide, from another field) **university-wide**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **5 100%** **5 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of mathematics, physics, fluid mechanics
2	**Skills**	Ability to effective self-education in a field related to the chosen area of study
3	**Social competencies**	Is aware of the need to broaden their competence, readiness to work together as a team

Assumptions and objectives of the course:

Learning some chosen theoretical results in the field of fluid mechanics. Introduction to the various fluid models (Newtonian and non-Newtonian) and their behavior during the flow. Familiarization with the selected topics of numerical modeling of fluid flow

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

Knowledge:

1. explain the laws which rule the flow of fluids and the principles of numerical modeling of fluid flow - [K_W01 ++ K_W02 ++]

Skills:

1. use knowledge of fluid mechanics to describe the phenomena occurring as a result of fluid flow in the machines? channels and energy devices - [K_U01 ++ K_U02 ++]

Social competencies:

Assessment methods of study outcomes

Lecture

?evaluation of the knowledge and skills shown on the exam written

Laboratory Exercises:

?testing and rewarding knowledge necessary to solve presented problems in the current area of laboratory tasks,

?continuous assessment, on all classes ? rewarding the gain of skill of using known rules and methods,

?assessment of skills and knowledge related to the implementation of the task module, evaluation of the report from completed exercise.

Achieving extra points for the activity classes, and especially for:

?suggesting additional aspects of the issue to discuss;

?the efficiency of application of knowledge gained while solving the problem given;

?the ability to cooperate in a team solving practically a particular task in the laboratory

?comments related to improving teaching materials;

?aesthetic care of tasks and reports developed ? in self-study.

Course description

Basic equations of fluid dynamics. The dynamics of a viscous liquid. Navier-Stokes equation. Bernoulli equation for the real liquid. Coefficient of friction losses. Local loss coefficient. The issue of the Rayleigh-Stokes equations for a plate. The boundary layer. Karman integral formula. Chosen issues of viscous fluid flow. The flow around a plate with uniform fluid suction. The collapse of a potential vortex in a viscous fluid. Selected issues of the numerical fluid mechanics. Modeling of mixing fluids in a static mixer. Non-Newtonian fluids.

Basic bibliography:

1. Tuliszka E. Mechanika płynów, PWN, Warszawa 1980.
2. Prosnak W.J. Mechanika płynów, tom I i II, PWN, Warszawa 1970.
3. Ciałkowski M. Mechanika płynów, Wyd. Politechniki Poznańskiej, Poznań 2015.
4. pod red. Ciałkowski M Mechanika płynów, Wyd. Politechniki Poznańskiej, Poznań 2008.

Additional bibliography:

1. Kundu P.K., Cohen I.M., Dowling D.R.. Fluid Mechanics, Elsevier 2012.
2. Graebel W.P. Advenced fluid mechanics, Elsevier 2007.
3. Sengupta T.K., Instabilities of flows and transition to turbulence,CRC Press Taylor & Francis Group, 2012.

Result of average student's workload

Activity	Time (working hours)
1. Participations in classes	60
2. Preparing for classes	25
3. Hold messages	10
4. Consultation	5
5. Exam preparation and academic achievements	20
6. Examination and assessment	5

Student’s workload

Source of workload	hours	ECTS
Total workload	125	5
Contact hours	65	3
Practical activities	25	2