COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6"></td><td>Degree level and programme type</td><td>Bachelor's degree

full-time</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td>Study profile</td><td></td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Fluid Mechanics</td><td>Course code</td><td>IS-MER0021W
IS-MER0021S</td></tr>
<tr><td>Course type</td><td>elective</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>winter / summer</td></tr>
<tr><td>30</td><td>30</td><td>15</td><td></td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Mathematics II</td></tr>
<tr><td>Course objectives</td><td colspan="9">To provide the students with knowledge of technical terms used in fluid mechanics, basic definitions and fundamental principles; to obtain an understanding of problems associated with hydrostatic pressure distributions and inviscid/viscous fluid flow; to develop skills to identify and to formulate hydrostatic and fluid flow problems in processes and pipe systems; teaching the rules of using instruments to the pressure, velocity and fluid flow rate measurement.</td></tr>
<tr><td>Course content</td><td colspan="9">Fundamental concepts of fluids. Physical properties: density and viscosity of fluids; compressibility and thermal expansion of liquids; ideal gas low. Fluid statics: surface and body forces, equation of fluid balance, hydrostatic pressure, manometers, hydrostatic forces on flat and curved surfaces, buoyancy and floating of body. Continuity equation. Fluid dynamics: Bernoulli’s equation for inviscid and viscous fluid flow; laminar and turbulent flow, Reynolds number. Friction and minor losses in pipe systems. Pump in pipe system.
Pressure measurement: manometer with inclined tube, a null-type manometer. Flow rate and velocity measurements: static-Pitot (Prandtl) probe, rotameter. Reynolds experiment: laminar and turbulent flow. Major and minor losses measurements. A pump performance curve determination.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Regular lectures: lecture with the use of a multimedia presentation, discussions
Regular classes: blackboard classes, discussion
Self-study under supervision: tutorial sessions with worked examples, discussion, problem solving, homework assignments.
Laboratory: experimentations in groups under supervision of a teacher, lab reports preparing, problem solving</td></tr>
<tr><td>Assessment method</td><td colspan="9">lecture – two written tests
classes – two in-class tests
laboratory classes – pre-lab tests, lab reports evaluation</td></tr>
<tr><td>Symbol of</td><td colspan="7">Learning outcomes</td><td colspan="2">Reference to the</td></tr>
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learning outcome		learning outcomes for the field of study
LO1	Student describes with understanding basic properties of fluids and methods used to describe fluid at rest state and fluid flows	M1_W06
LO2	Student performs basic hydrostatic calculations	M1_W06
LO3	Student is able to determine basic fluid flow quantities for inviscid and viscous flows in pipes	M1_W06, M1_U20
LO4	Student describes fundamental methods used in fluid mechanics measurements and performs basic velocity, pressure and flow rate measurements	M1_W06, M1_U11
LO5	Student can present the results in numerical and graphical form, interpret the results and make conclusions	M1_U12
LO6		

Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	written pass, pre-lab tests	L, LC
LO2	in-class tests	C
LO3	in-class tests	C
LO4	pre-lab tests, lab reports evaluation, activity	LC
LO5	lab reports evaluation, activity	LC
LO6		

Student workload (in hours)		No. of hours
Calculation	lecture attendance	30
	participation in classes	30
	participation in laboratory classes	15
	preparation for classes and laboratory classes	30
	working on reports	15
	participation in student-teacher sessions related to the lectures and classes	10
	preparation for lectures	20
	TOTAL:	150

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	85h	3.5
Student workload – practical activities	110h	4.5

Basic references	1. Çengel Y.A., Cimbala J.M.: Fluid mechanics: fundamentals and applications, McGraw-Hill Education, Singapore 2014. 2. Munson B. R. [et al.]: Fundamentals of fluid mechanics: international student version, Wiley, New York 2009. 3. White F.M.: Fluid Mechanics, 7th Edition, McGraw-Hill, New York 2011. 4. Kundu P. K., Cohen I. M., Dowling D. R.: Fluid mechanics, Elsevier/Academic Press,

	Amsterdam 2012. 5. Fox R.W., Pritchard P.J., McDonald A. T.: Introduction to fluid mechanics, John Wiley a. Sons, Hoboken 2010. 6. Genick Bar–Meir: Basics of Fluid Mechanics, Version (0.3.4.0 July 25, 2013), ebook, www.potto.org/downloads.php	
Supplementary references	1. White F. M.: Fluid mechanics, McGraw-Hill, New York 1979. 2. Crowe C. T., Elger D. F.: A guide for learning engineering fluid mechanics: practice problems with solutions, John Wiley a. Sons, Hoboken 2009. 3. Douglas J. F. [et al.], Fluid mechanics, Prentice-Hall, Harlow 2005.	
Organisational unit conducting the course	Department of Thermal Engineering	Date of issuing the programme
Author of the programme	Michał Łukaszuk	2021.03.20

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar