

# SYLLABUS

## Course description

Course description				
Course code		Course	Mechanika płynów	
ME/O/I/ST/A5			Fluid mechanics	
Language of instruction		English		
Academic year		2025/2026		
field of study:		Mechanical Engineering		
field of specialisation:		All		
Educational level		first-cycle studies		
Education profile		General academic		
Mode of study		Full-time studies		
Semester(s)		3		
Affiliation with a group of classes		A. Group of basic course		
Course status		Obligatory		
Types of classes, instruction hours, ECTS credits		Types of classes	Number of instruction hours	Number of ECTS credits
		Lecture	15[h]	3ECTS
		Classes	15[h]	
		Lab	15[h]	
Linkage of the course	with the education profile	Related to the conducted scientific activity in the discipline to which the field of study is assigned		3ECTS
	with qualifications	It is used to acquire engineering competences by the student		3 ECTS
	with science discipline	Mechanical engineering		3ECTS
Form of teaching		Traditional – classes organized at the University /classes conducted using distance learning methods and techniques		
Prerequisites		knowledge of mathematics		
Department		Faculty of Mechanical Engineering		
Coordinator		dr hab. inż. Przemysław Motyl, prof. URad.		
The website of the basic organizational unit		http://wm.uniwersytetradom.pl		
E-mail address, phone number of the coordinator		p.motyl@urad.edu.pl		

## LEARNING OUTCOMES, CURRICULUM CONTENT, TEACHING CLASSES, VERIFICATION OF LEARNING OUTCOMES

Learning Objective:	The aim of the course is to acquire the ability to describe the state and movement of fluids, determine flow parameters in simple cases.
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Curriculum Content:	<p>Lectures and exercises: Methods for describing the state and motion of fluids. Elements of hydrostatics. Fluid kinematics. Viscous fluid models. Equations of fluid motion. Dynamic similarity of flows. Elements of hydraulics. Incompressible and compressible fluid flows. Steady flows in ducts. Heat-exchanging flows. Nozzles and shock waves. Flow through blade cascades. Flow models in turbomachinery.</p> <p>Laboratory: Measurement of the critical Reynolds number. Determination of the friction loss coefficient. Determination of local loss coefficients. Calibration of liquid micromanometers. Measurement of average air velocity in an axisymmetric duct. Measurement of subsonic stream characteristics. Determination of the drag coefficient <math>C_x</math> for flow around a cylinder. Measurement of the boundary layer in a subsonic diffuser. Measurement of liquid viscosity using the Hagen–Poiseuille method. Determination of the Prandtl number.</p>
Didactic (educational) methods:	feeding methods (information lecture, lecture, reading), problem methods (problem lecture, conversational lecture), activating method
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	The condition for passing the course is to achieve all the required learning outcomes specified for the course. This includes obtaining positive grades from laboratory reports and the final written or oral examination. Active participation in laboratory classes and completion of all assigned measurements and reports are mandatory. A minimum threshold of 50% of the total available points is required to pass the course. Additionally, students must demonstrate the ability to apply theoretical knowledge to solve practical problems related to fluid mechanics.

Learning outcomes for the course in relation to the field of study learning outcomes and the type of classes				Methods of verifying learning outcomes	
Learning outcome number	Description of the learning outcomes for the course (PEU) A student who has passed the course ( <b>W</b> ) knows and understands / ( <b>U</b> ) can / ( <b>K</b> ) is ready to:	Field of study learning outcome (KEU)	Types of classes	Form of verification (credits)	Methods of testing and assessment
W1	The student classifies fluids and determines their fundamental physical properties. Has structured knowledge of the methods used to describe the state and motion of fluids, including hydrostatics, kinematics, and dynamics of fluid flow.	K_WG07	Lecture	Credit with grade	Written test (evaluation test)
U1	The student is able to apply analytical and experimental methods to formulate and solve typical engineering problems related to fluid mechanics.	K_UW02	Exercises Laboratories	Credit with grade	Written test, assessment of laboratory reports, observation during classes
U2	The student is able to plan and conduct experiments, perform fluid flow measurements, analyze obtained results and formulate engineering conclusions.	K_UW06	Exercises Laboratories	Credit with grade	Laboratory reports, practical performance during laboratory sessions, oral test
K1	The student is able to work effectively as a member of an engineering team, demonstrating responsibility and communication skills in solving fluid mechanics problems.	K_KK02	Exercises Laboratories	Credit (pass/fail or grade, depending on system)	Observation of teamwork, participation during exercises, verbal assessment

Literature and teaching aids
<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Frank M. White, Fluid Mechanics, Mc Graw Hill India (2016), ISBN-10: 9385965492</li> <li>2. K. L. Kumar, Engineering Fluid Mechanics, S. Chand Publishing, 2008</li> </ol> <p>Study aids:</p> <p>To support students' learning process, the following materials and tools are made available:</p> <ul style="list-style-type: none"> <li>• Lecture slides and detailed handouts</li> <li>• Sample problems with solutions for self-study</li> <li>• Access to laboratory manuals and experiment instructions</li> <li>• Instructional videos on selected fluid mechanics experiments</li> </ul>

Student workload required to achieve the assumed learning outcomes – the balance of ECTS credits		
Attendance, participation	Student workload [h].	
	Student's self-study hours Classes without a teacher (ZBN)	Classes
Participation in lectures/classes/lab	X	15/15/15[h]
Preparation for lectures/classes/lab , Preparation for ... credit / exam	15/15/15 [h]	X
Total student workload Preparation for ... credit / exam	45[h]/ 1,5 ECTS	45 [h]/ 1,5 ECTS
ECTS points per subject	3 ECTS	

Additional information, comments
<p>In the case of students with special needs, including disabilities, and chronic illnesses, the methods and forms of verification of learning outcomes specified above (in the syllabus) are adapted to the individual needs of these students, as appropriate.</p> <p>Detailed rules and forms of support for students with special needs, including those with disabilities and chronically ill, during classes, credits, and exams are specified in: University Regulations (Regulamin Studiów Uniwersytetu Technologiczno-Humanistycznego w Radomiu), Study Regulations (Zasady Studiowania), and Procedure for Ensuring Accessibility of the Educational Process to Students with Special Needs, Including Those with Disabilities and Chronically ill (Procedura dotycząca zapewnienia dostępności procesu kształcenia studentom ze szczególnymi potrzebami, w tym: z niepełnosprawnością, przewlekłe chorych).</p>

