

# SYLLABUS

## Course description

Course code		Course	MECHANIKA PŁYNÓW		
MB/O/I/ST/A.6			FLUID MECHANICS		
Language of instruction		English			
Academic year		2023/2024			
field of study:		Mechanics and machine construction			
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		Basic classes			
Course status		Obligatory			
Types of classes, instruction hours, ECTS credits		Types of classes	Number of instruction hours	Number of ECTS credits	
		Lecture	15 [h]	4 ECTS	
		Classes	15 [h]		
		Laboratories	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		4 ECTS
		with qualifications	It is used to acquire engineering competences by the student		4 ECTS
		with science discipline	Mechanical engineering		4 ECTS
Form of teaching		Traditional – classes organized at the University /classes conducted using online learning methods and techniques			
Prerequisites		Basic knowledge, skills acquired in high school in physics			
Department		Faculty of Mechanical Engineering, UTH Radom			
Coordinator		Przemysław Motyl, PhD			
The website of the basic organizational unit		www.wm.uniwersytetradom.pl			
E-mail address, phone number of the coordinator		p.motyl@uthrad.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.
Curriculum Content:	<p>Lectures and exercises:</p> <p>Methods to describe the state and movement of fluids. Elements of hydrostatics. Fluid kinematics. Models of viscous fluid. Fluid motion equations. Dynamic similarity of flows. Elements of hydraulics. Non-compressible and compressible fluids. Established flows in the ducts. Flows with heat exchange. Nozzles and shock waves. Flow through the palisade of profiles. Flow models in rotating machines.</p> <p>Laboratories:</p> <p>Measurement of the critical Reynolds number. Determination of the friction loss coefficient. Determination of the local loss coefficient. Marking of liquid micromanometers. Measurement of average air velocity in a circularly symmetrical channel. Measurement of subsonic stream characteristics. Determination of the drag coefficient <math>C_x</math> at the cylinder roll. Measurement of the boundary layer in the subsonic diffuser. Measurement of liquid viscosity using the Hagen - Poiseuille method. Marking Prandtl probe. Visualization of the flow of bodies in a smoky tunnel.</p>
Didactic (educational) methods:	feeding methods (information lecture, lecture, reading), problem methods (problem lecture, conversational lecture), activating methods (case method, situational method, didactic games, seminar, didactic discussion), exposing methods (film, exhibition, show), programmed methods (with the use of a computer), practical methods,
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	The condition for passing a subject is to achieve all the required learning outcomes specified for a given subject. Obtaining positive grades in all forms of classes included in the course is tantamount to passing it and gaining by the student the number of ECTS points assigned to the subject. The final grade is the average of grades from all forms of classes included in the course.

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	Student classifies liquids, determines their properties. Has knowledge of the description of the state and motion of fluids.	K_WG07	Lecture	evaluation	test
U1	The student is able to use analytical and experimental methods to formulate and solve engineering tasks.	K_UW02	Exercises Laboratories	evaluation	test
U2	The student is able to plan and carry out experiments, including measurements, interpret the results and draw conclusions.	K_UW06 K_UW13	Exercises Laboratories	evaluation	test
K1	The student is able to work in an engineering team.	K_KK02	Exercises Laboratories	verbal assessment	

Literature and teaching aids
<p>Basic and supplementary 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>

Student workload required to achieve the assumed learning outcomes – the balance of ECTS credits			
Attendance, participation	Student workload [h].		
	Other contact hours (IGK)	Student's self-study hours Classes without a teacher (ZBN)	Classes
Participation in ... lectures			15 [h]
Participation in .... classes/laboratory classes			30 [h]
Meeting with teachers during their duty hours	5 [h]		
Preparation for lectures/classes/.... , Preparation for ... credit / exam		40 [h] 10 [h]	
Total student workload	5 [h]/ 0,2 ECTS	50 [h]/ 2 ECTS	45 [h]/ 1,8 ECTS
ECTS credits for the course	100 [h]/ 4 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>

