

Faculty of Civil Engineering and Environmental Sciences						
Name of the education program (direction)	Agri - Food Engineering			The level and form of studies I degree stationary		
Specialty:				Path diploma:		
Name of the course:	Process Engineering			Course code: RS 1401		
Type of course ⁰⁾	compulsory	Semester: 3	Points ECTS ¹⁾ 4			
Number of hours	W - 15	C- 15	L- 30	P- 0	Ps- 0	S- 0
Introductory Courses	<i>Mathematics, Physics, Chemistry</i>					
Aims and objectives:	To familiarize students with the basic process of flow and heat transfer. Knowledge of the methods of measurement and the calculation of the flow rate, heat flux density, pressure, flow velocity and expenditure lines closed completely filled with liquid and open tanks. Education skills critical choice of technological solutions.					
Examination	Lecture - written exercises - written, laboratories - evaluation reports, written test.					
Course content:	Basic concepts and laws of the theory of flow and heat transfer. Pressure units. Apparatus for measuring the speed and flow, fluid mass flux density of heat, humidity. Measurements of physical quantities used in engineering and environmental protection.					
Learning outcomes	<i>Save a minimum 4, maximum 8 in the order of learning outcomes: knowledge-skills-competence. Use verbs ²⁾ with a set of given below.</i>				<i>The reference to the direction of learning outcomes ³⁾</i>	
EK1	understands the basic physical phenomena				K_W01	
EK2	has the necessary knowledge of the understanding of the phenomena occurring in the environment				K_W02	
EK3	can integrate the information obtained, to make their interpretations and draw conclusions				K_U02	
EK4	able to work independently and in a team able to work independently and in a team				K_U03	
EK5	can measure the basic quantities characterizing the phenomenon in the environment associated with the flow				K_U09	
EK6	apply the principles of BHP				K_U10	
EK7	knows the possibilities of continuous training				K_K01	

The balance of student workload (in hours)	Participation in lectures	15 x 1h =	15
	Participation in the auditorium and laboratory exercises	15 x 3h =	45
	Preparation for tutorials / lab / seminar	15 x 1h =	15
	Developing reports from the laboratory or workshop and/or completion of homework assignments (homework)	15 x 1h =	15
	Participation in the consultations related to the exercise / seminar / project	5 x 1h =	5
	Implementation of the project tasks (including preparing presentations)		
	Preparation for the exam and the presence on it		5
	Preparing to pass exercises + presence during tests		5
		SUM: ¹⁾	105
Quantitative Indicators	Student workload associated with activities that require direct participation of the teacher 15h+45h+5h+3h=	68	ECTS ^{4,5)} 2,6
	Student workload associated with the activities of practical 45h+15h+15h+5h+5h+5h=95	90	3,4
Base Literature:	1. Mitosek M.: <i>Mechanika płynów w inżynierii i ochronie środowiska</i> , Wydawnictwo Politechniki Warszawskiej, Warszawa, 2007. 2. Sawicki J.: <i>Mechaniki Płynów: laboratorium</i> , Wydaw. Uczelniane Uniwersytetu Technologiczno-Przyrodniczego w Bydgoszczy, 2010. 3. Pistun E., Stańda J.: <i>Pomiary ilości oraz strumienia masy i objętości przepływających płynów</i> , Wydawnictwo Politechniki Wrocławskiej, Wrocław 2006. 4. Wiśniewski S.: <i>Wymiana ciepła</i> , Wydawnictwa Naukowo-Techniczne, Warszawa 2000. 5. Kołodziejczyk L., Mańkowski S., Rubik M.: <i>Pomiary w inżynierii sanitarnej</i> , Arkady, Warszawa 1980		
Additional literature:	1. Robert W. Fox, Alan T. McDonald, Philip J. Pritchard.: <i>Introduction to fluid mechanics</i> , Hoboken : John Wiley a. Sons, 2010. 2. Ratajczyk M., Walicka A., Walicki E: <i>Mechanika płynów II. Materiały pomocnicze do ćwiczeń laboratoryjnych</i> , Wydawnictwo Uniwersytetu Zielonogórskiego, 3. Madejski J: <i>Teoria wymiany ciepła</i> , Politechnika Szczecińska 1998		
Number effect of education	Verification method of learning outcome	Form of classes (if there is more than one), where there is a verification	
EK1	written exam lecture, tutorials and laboratory	W, C, L	
EK2	written exam lecture, tutorials and laboratory	W, C, L	
EK3	laboratory reports	L	
EK4	observation work auditorium and laboratory exercises, discussion on the report from the laboratory	C, L	
EK5	assessment of laboratory	L	
EK6	observe the work in the classroom	L	
EK7	observe the work in the classroom	C, L	
Department:	Heating Department	Persons engaged:	<i>mgr Małgorzata Kowczyk-Sadowy dr hab. inż. Mariusz Adamski</i>
Date	21.03.2020	The program developed:	<i>dr hab. inż. Mariusz Adamski</i>