

SDAŃSK UNIVERSITY 的 OF TECHNOLOGY

Subject card

Subject name and code	Mechanics of Solids and Fluids II, PG_00039796								
Field of study	Materials Engineering, Materials Engineering, Materials Engineering								
Date of commencement of studies	October 2021		Academic year of realisation of subject			2022/2023			
Education level	first-cycle studies		Subject group			Obligatory subject group in the field of study			
						Subject group related to scientific research in the field of study			
Mode of study	Full-time studies		Mode of delivery			at the university			
Year of study	2		Language of instruction			Polish			
Semester of study	4		ECTS credits			4.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of			Ity of Mechani	ical Engineering and Ship Technology				
Name and surname	Subject supervisor dr hab. inż. Krzysztof Lipiński								
of lecturer (lecturers)	Teachers		dr inż. Piotr Patrosz						
			dr hab. inż. Krzysztof Lipiński						
			dr inż. Marzer	na Banaszek					
Lesson types and methods of instruction	l esson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
	Number of study	30.0	15.0	0.0	0.0		0.0	45	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity Participation ir classes includ		a didactic Participation in ed in study consultation hours		Self-study SUM		SUM		
	Number of study 45 hours			5.0		50.0		100	
Subject objectives	Acquainting the students with basic principles of kinematics, as well as basic principles of dynamics of particle, dynamics of solid body and mechanics of fluid. Forming of abilities in solving of practical problems, in issues of dynamics of particle, solid body and fluid mechanics.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	K6_K01		understands the need to improve competence in the field of solid and fluid mechanics; is aware of its own limitations and knows when and with what to ask the experts, is able to properly define priorities for the implementation of self or other people			[SK5] Assessment of ability to solve problems that arise in practice			
	K6_W05		Student has read, understood and he can explain phenomena of rigid body dynamics processes and fluid mechanics using language of mathematics and tools of computer supports, He/she can in particular recreate yourself basic theorems and laws Is able to integrate elements of			[SW1] Assessment of factual knowledge [SU1] Assessment of task			
			information obtained, interpret these fragments and the whole task, as well as draw conclusions and formulate and justify opinions			fulfilment [SU4] Assessment of ability to use methods and tools			

Subject contents	LECTURES Repetition of the main principles of kinematics. Dynamics: The principal terms of dynamics of material point. The special cases of the dynamic equations of motion. The principles of dynamics. Work of a force. Power of a forces. The work-energy principle. Potential. The principle of conservation of mechanical energy. Alternative forms of the work-energy principle. Dynamics of systems of material points. The work of forces that act on systems of material points. The principal terms of dynamics of rigid body. The mass geometry of rigid bodies: mass moments of inertia. Steiner principle. Differential equations of dynamics of translational, rotational and planar motions of rigid body. The momentum, momentum of momentum and kinetic energy of a rigid body in translational, rotational and planar motions of fluid body. The momentum, momentum of momentum and kinetic energy of a rigid body in translational, rotational and planar motions of fluids - Principle of mass conservation; Fluid Dynamics - The principle of conservation of momentum. Navier-Stokes equations; The principle of conservation of energy. Bernoullis equation; Criteria of flows similarities; Laminar and turbulent flows. Basic theory of the boundary layers; Flows in closed channels; aerofoil aerodynamics; Cavitations. Physical basis, hydrodynamic effects. EXERCISES: The kinematics of material point and rigid body. Developments and solutions of dynamic equations of motion of material point. d"Alembert principle of work-energy as well as the principle of conservation of momentum. Use of principle of work-energy as well as the principle of conservation of momentum of momentum. Use of principle of d'Alemberts principle, reactions of bearings. Vibrational and planar motion of rigid body. The use of d"Alemberts principle, reactions of bearings. Vibrational and planar motion of rigid body. Developments and solutions of motion of motion of momentum conservation principle for solving simple fluid flow problems. Application of momentum conservation principle f						
Prerequisites and co-requisites	Laws of physics and the mathematics on level of school of average, in this particularly: geometry and trigonometry, differential calculus, vectorial and matrix calculus, the statics and the kinematics of point. Participation in lectures end exercises of Mechanics of solids and fluids I						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Midterm colloquiums	56.0%	50.0%				
	Written exam	56.0%	50.0%				
Recommended reading	Puzyrewski R., Sawicki A.: Podstawy mechaniki płynów i hydraulik PWN, Warszawa, 1998						
	Leyko J. Mec hanika ogólna, t. 1 i 2, PWN, Warszawa, 2004 Gryboś R.: <i>Podstawy mechaniki płynów</i> , tom I, PWN Warszawa 199 Burka E.S., Nałęcz T.J.: <i>Mechanika płynów w przykładach</i> , PWN Warszawa 1999 Ciałkowski M.: <i>Mechanika płynów zbiór zadań z rozwiązaniami</i> , Wydawnictwo Politechniki Poznańskiej 2008 Tesch K.: Mechanika płynów, Wyd. Politechniki Gdańskiej 2008						
	eResources addresses	Adresy na platformie eNauczanie: Mechanika ciała stałego i płynów II W, Inż. Materiałowa, sem4, lato 22/23 (PG_00039796) - Moodle ID: 31117 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31117					
Example issues/ example questions/ tasks being completed	Determining of positions of the centres of mass and the mass moments of inertia of rigid bodies. The dynamic analysis of the point mass and stiff bodies, determining of the dynamic reactions at bearings of rotors, with use of the differential equations of rigid body motion as well as the other principles of dynamics. What are the main categories of forces that act on element of fluid. Analysis of parameters of static and dynamic liquids at laminar and turbulent flows in opened and closed channels.						
Work placement	Not applicable						