COURSE DESCRIPTION CARD

Course name	**Gas dynamics**				
Course type	**elective**	**Course code**	**SDPB0031**	**ECTS credits**	**2**
Forms and number of hours	**Lecture: 10 h** **Exercises: 10h**	**Scientific discipline**	**mechanical engineering, environmental engineering, mining and energy**		
Course objectives	To provide the course participants with the knowledge about the principles and laws of transonic and supersonic flows, to identify the differences between compressible and incompressible fluid flows, to understand the creation of shock waves and consequences of their presence; preparation for the design of machine parts in which supersonic flows occur;				
Course content	Lecture: Application of compressible flow in engineering, compressible flow fundamentals, speed of sound, star conditions and their consequences, isentropic flow of perfect and real gases, normal shock wave, isothermic flow, Fanno flow, Rayleigh flow, oblique shock wave, Prandtl-Mayer flow, Exercises: compressible flow parameters - analytical and numerical solutions, calculation of isentropic and real flows, calculation of nozzles and diffusers, calculations of normal and oblique shocks				
Teaching methods	Lecture: problem-oriented and conversational lecture with a multimedia presentation, Exercises: solving problems using analytical and numerical approach				
Assessment method	Lecture: written exam, Exercises: written exam				

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study for the 8th level of Polish Qualification Framework (PRK)**	**Methods of assessing the learning outcomes**
LO1	understands and defines the parameters describing the flows of compressible fluids	SD_W1	written exam
LO2	understands the phenomenon of a shock wave and the consequences of its occurrence	SD_W5, SD_U1	written exam
LO3	is able to design nozzles and diffusers used in power engineering, refrigeration technology, environmental engineering, aerodynamics,	SD_U1, SD_U8, SD_W7	written exam
LO4	uses mathematical equations to analyze the physical, chemical, thermal and flow phenomena occurring in mechanical, environmental, thermal engineering and aeronatics.	SD_U1, SD_W2	written exam

Student workload (in hours)	
Lecture / classes	10 /10
Consultations	3
The unassisted student work	25
Implementation of project tasks and preparation for and participation in exams/tests	3
Total	**51**
ECTS credits	**2**

Basic references	1. Bar-Meir, Genick, "Basics of Fluid Mechanics", publikacja elektroniczna, www.potto.org/downloads.php; 2. Bar-Meir, Genick, "Fundamentals of Compressible Fluid Mechanics", publikacja elektroniczna, www.potto.org/downloads.php"; 3. Sado J., Jednowymiarowy Przepływ Gazu Rzeczywistego, Biuletyn Instytutu Techniki Cieplnej Politechniki Warszawskiej Nr 86, 1999;
Supplementary references	1. Zucker R.D., Biblarz O., Fundamentals Of Gas Dynamics, Second Edition, John Wiley & Sons, Inc., 2002. 2. Egon Krause, Fluid Mechanics, Springer, 2005 3. Graebel, W. P., Engineering fluid mechanics, Taylor & Francis, 2001 4. P.K. Kundu, I. M. Cohen, Fluid Mechanics, Second Edition, Academic Press (Elsevier), 2002 5. tematyczne strony internetowe:, słowa kluczowe (PL): przepływy ściśliwe, gazodynamika, przepływ naddźwiękowy; słowa kluczowe (EN): compressible flow, gasdynamics, supersonic flow
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