

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Aerodynamics		Code 1010604121010633794
Field of study Aerospace Engineering	Profile of study (general academic, practical) general academic	Year /Semester 1 / 2
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time,part-time) part-time	
No. of hours Lecture: 9 Classes: 9 Laboratory: 9 Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: phd Łukasz Brodzik email: lukasz.brodzik@put.poznan.pl tel. +48 61 665 2213 Faculty of Transport Engineering Piotrowo 3 street, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	In mathematics, physics of fluid mechanics in the field presented in the studies
2	Skills	Can apply the scientific method in problem solving, experiments implementation and inference
3	Social competencies	Knows the limits of his knowledge and skills; can precisely formulate questions, understands the need for further education
Assumptions and objectives of the course: -To learn the basic rights and dependencies in the field of aerodynamics and dynamics of aircraft movement and the ability to physically interpret phenomena. Familiarize with the basic equations describing aerodynamic parameters in the flow of solids and equations describing the dynamics of aircraft movement.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Has knowledge in the field of mathematics, including algebra, analysis, theory of differential equations, probabilistic, analytical geometry necessary for: description of the operation of discrete mechanical systems, understanding of computer graphics methods, description of the operation of electrical and mechatronic systems - [[K1A_W01]] 2. Has a structured, theoretically founded general knowledge covering key issues in the field of technical thermodynamics, ie the theory of thermodynamic transformations, heat transfer, thermal machines - [[K1A_W10]] 3. He has extended the knowledge necessary for understanding the items profile and expertise of construction, methods of construction, manufacturing, operations, air traffic management - [[K1A_W23]] 4. . He has an elementary knowledge of law, especially the law on security, copyright and the protection of industrial property and his influence on the development of technology - [[K1A_W25]]		
Skills:		

<p>1. Can use languages: native and international to the extent that enables understanding technical texts and writing technical descriptions of machines in the field of aviation and astronautics using dictionaries (knowledge of technical terminology) - [[K1A_U01]]</p> <p>2. Has the ability to self-study using modern teaching tools, such as remote lectures, websites and databases, didactic programs, e-books - [[K1A_U03]]</p> <p>3. Can use the formulas and tables, technical and economic calculations using a spreadsheet and conduct a simple relational database of mechanical structures using the finite element method and correctly interpret their results - [[K1A_U05]]</p> <p>4. Can plan and carry out a research experiment using measuring equipment, computer simulations, can perform measurements, such as temperature measurements using liquid thermometers, thermistor, thermocouple, velocity and flow rate using turbine, laser and ultrasonic flowmeters, and interpret results and draw conclusions - [[K1A_U11]]</p>
<p>Social competencies:</p> <p>1. Is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for decisions - [[K1A_K02]]</p> <p>2. Can properly determine priorities for implementation specified by the tasks themselves or others - [[K1A_K04]]</p> <p>3. Can think and act in an entrepreneurial way - [[K1A_K06]]</p>

Assessment methods of study outcomes		
<p>- written exam</p> <p>- oral exam</p>		
Course description		
<p>- Basics of aerodynamics, basic equations of fluid mechanics, real fluid flows, the influence of gas compressibility, flow ranges, aerodynamic characteristics, aerodynamic interference</p> <p>- Basics of aircraft motion dynamics, fixed and unsteady movements, static and dynamic stability of an airplane, lateral control system.</p>		
Basic bibliography:		
<p>1. Arżanikow N.S., Malcew W.N, Aerodynamika, PWN, 1959</p> <p>2. A.Krzyżanowski. Mechanika Lotu, skrypt WAT, 1984 r</p> <p>3. Proszak W.J., Równania klasycznej Mechaniki płynów, PWN, 2006</p>		
Additional bibliography:		
<p>1. Anderson J.D. Jr., Fundamentals of Aerodynamics, McGraw-Hill, 1991</p>		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation for the lecture exam	10	
2. Preparation for assessment	10	
3. Participation in lectures	15	
4. Participation in exercise classes	15	
5. Participation in laboratory classes	15	
6. Participation in the exam	2	
7. Preparation for assessment	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	69	4
Contact hours	49	2
Practical activities	30	2