



Subject card

Subject name and code	Ballistics and Dynamics of Firearms, PG_00005086						
Field of study	Mechanical Engineering, Mechanical Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
Education level	first-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Machine Design and Vehicles -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Jerzy Ejsmont				
	Teachers		prof. dr hab. inż. Jerzy Ejsmont				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		0.0		0.0	30
Subject objectives	Student describes the structure and rules for handling firearms. Student identifies the types of firearms. Student describes and explains the physical processes associated with movement of the bullet. Student supports some types of firearms.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U06] is able to use mathematical and physical models for analysing the processes and phenomena occurring in mechanical devices within the range of material strength, thermodynamics and fluid mechanics		Can carry out simple simulations in the field of weapons.		[SU4] Assessment of ability to use methods and tools		
	[K6_U01] is able to acquire information from specialized literary sources, databases and other resources, essential for solving engineering tasks; is able to compile the obtained information pieces and to interpret them, additionally is able to form conclusions and present justified opinion		He can search for the necessary information about weapons.		[SU2] Assessment of ability to analyse information		
	[K6_W08] possesses basic knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle		Has knowledge of weapons and ammunition production technology.		[SW1] Assessment of factual knowledge		
	[K6_W11] possesses knowledge on design, technology and manufacturing of machine parts, metrology, and quality control; knows and understands methods of measuring and calculating basic values describing the operation of mechanical systems, knows basic calculating methods applied to analyse the results of experiments		He has knowledge in the construction of firearms and ammunition.		[SW1] Assessment of factual knowledge		

Subject contents	Firearms classification. Internal ballistics. Gunpowder combustion and gas dynamics. Barrel vibrations and vibrations management. Recoil and jump of the firearms. External ballistics. Supersonic aerodynamics. Bullet trajectory. Bullet stabilization. Center of pressure. Gyroscopic stability. Wind influence. Influence of temperature, pressure and humidity on bullet trajectory. Terminal ballistics. Automatic and semi-automatic systems. History of firearms construction. Ammunition and its components. Influence of bullet construction on trajectory and terminal effect. Handguns - pistols and revolvers. Rifles, carbines and shotguns. Sporting firearms. Automatic and semiautomatic guns. Polish firearms. Gas guns. Sights, collimators, riflescopes, NV, thermovision. Basics of optical science. Sighting the gun. Barrel technology - drilling, grooving. Bullet-proofed materials. Safe firearms handling.		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
Recommended reading	Basic literature	1. Ejsmont J.A.: Celność broni strzeleckiej, WNT 2007 2. Ejsmont J.A.: Amunicja i jej elaboracja, WNT 2009 3. Kočański S.: Broń strzelecka lat osiemdziesiątych, Bellona, 1985 Rinker R.A.: Understanding ballistics, Mulberry House Publishing, 1998	
	Supplementary literature	No requirements	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		