

## GDAŃSK UNIVERSITY

## Subject card

Subject name and code	Modelling and analysis of cutting tool systems, PG_00059374							
Field of study	Mechanical Engineering							
Date of commencement of studies	February 2024		Academic year of realisation of subject		2024/2025			
Education level	second-cycle studies		Subject group		Optional subject group Subject group related to scientific research in the field of study			
Mode of study	Part-time studies		Mode of delivery			at the university		
Year of study	1		Language of instruction			Polish		
Semester of study	2		ECTS credits			3.0		
Learning profile	general academic profile		Assessment form		assessment			
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology							
Name and surname	Subject supervisor		prof. dr hab. inż. Kazimierz Orłowski					
of lecturer (lecturers)	leachers		prot. dr hab. inż. Kazimierz Orłowski dr hab. inż. Daniel Chuchała dr inż. Aleksandra Suchta					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM
	Number of study hours	18.0	0.0	9.0	0.0		0.0	27
	E-learning hours included: 0.0							
Learning activity and number of study hours	Learning activity	Participation i classes incluc plan	n didactic led in study	Participation in consultation hours		Self-study		SUM
	Number of study hours	27		7.0		41.0		75
Subject objectives	The aim of the cours manufacturing proce and means of selecti	e is to get acqu sses. Learn abo on and analysis	ainted with iss out the constru s of the implem	ues of process action and appli mentation of pro	modelin cation o	ng and o f variou on mac	operation of c s tool system hine tools.	eutting tools in is. Methods

Learning outcomes	Course outcome	Subject outcome	Method of verification			
	[K7_U06] when solving engineering problems on design, technology and operation of machines is able to assess and classify typical methods and tools, define systemic and ex-technical aspects using modern calculating methods and design tools or modifying the current ones	Students understand the phenomena occurring in the cutting zone, know the basic models of chip formation. He is able to evaluate energy effects of the machining process.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject			
	[K7_W06] possesses organized, profound knowledge necessary for designing and optimization of complex technological processes, modelling and calculations using numerical methods, knows modern manufacturing methods and tools for designing manufacturing processes of machines, devices, their elements and components	Students is able to classify manufacturing methods and distinguish between different types of means, equipment and tools used in manufacturing.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			
[K7_W11] possesses organize knowledge useful in understanding ex-technical conditioning connected with performing the profession of a engineer and taking it into consideration in engineering practice; possesses well- established knowledge within range of intellectual property, management and organization manufacturing processes, including the management an cycle of a product		The student knows criteria and algorithms for optimizing the selection of cutting conditions. He/ she can create an economic model and a performance model.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			
Subject contents	LECTURE:General characteristics and classification of materials for cutting edges of tools with definedcutting edge. Causes of wear, geometrical factors of wear, physical and technological bluntness factors of ablade. Wear in time (tool life, wear of cutting tool blades in interrupted machining). Principles of bladematerial selection. Tool loading - energy properties of machining process. Cutting forces - methods of forceestimation based on model taking into account specific cutting resistance and elements of modern fracturemechanics (Atkins's model). Models for determining shear angle in cutting zone. Tooling system overview(ISO, HSK, CAPTO, etc.). Principles of tool and insert selection. Methods of measuring cutting edge wear. Vibrations in cutting process. Dynamic stiffness of tools with low inherent stiffness. Economic efficiency andoptimization of machining process.LABORATORY: Geometry of cutting edge. Construction of modern cutting tools. Study of influence of cutting tools. Static stiffness. Determination of critical speeds of tools with low inherent stiffness. Tool cost analysis.					
Prerequisites and co-requisites						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	Practice exercises	100.0%	10.0%			
	Control test	56.0%	90.0%			
Recommended reading	Basic literature	1. Grzesik W.: Advanced machining processes of metallic materials. Theory, modelling and applications. Elsevier, 2017.				

	Supplementary literature	1. Markopoulos A.P.: Finite element method in machining processes. Springer, London, 2013.2. Training handbook. Metal cutting technology. C-2920:40 en-GB © AB Sandvik Coromant 2017.11		
	eResources addresses	Adresy na platformie eNauczanie:		
Example issues/ example questions/ tasks being completed	List and describe measures of tool cutting edge wear according to PN-ISO standard. The effect of cuttingparameters on cutting edge life.			
Work placement	Not applicable			

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