GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00061826
Field of study	Management and Production Engineering

Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Zakład Technologii Maszyn i Automatyzacji Produkcji -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology

Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Daniel Chuchała
	Teachers	dr hab. inż. Daniel Chuchała dr inż. Dawid Zieliński

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	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	45	0.0	0.0	45

Subject objectives	Introduction to the basics of programming CNC multi-axis machine tools

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_K02] is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for decisions made demonstrates knowledge of actions to reduce risk and anticipate the social impact of engineering and manufacturing activities	The student will have knowledge of sustainable manufacturing by removal methods and basic ways to reduce the negative impact of these processes on the environment	[SK5] Assessment of ability to solve problems that arise in practice
	[K7_U01] can obtain information from literature, databases and others sources, also in English or another foreign language recognized as the language of international communication in a given engineering discipline; is able to integrate the obtained information, interpret it, as well as draw conclusions and formulate and justify opinions.	The student has knowledge of obtaining information on the necessary parameters of the cutting process on multi-axis machine tools using tooling catalogues and catalogues of machine tool equipment	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
	[K7_K01] is aware of the need to expand knowledge and verify the methods of solving problems by consulting experts	The student is able to solve basic problems related to multi-axis machining and its software	[SK5] Assessment of ability to solve problems that arise in practice
	[K7_W01] knows and understands to a greater extent selected issues in the field of management and quality sciences and mechanical engineering, their location in the field of social sciences and engineering and technical sciences, as well as relationships with related disciplines, and sees the possibility of applying the knowledge in practice.	Students will be familiar with the limitations of multi-axis machining processes, which can significantly affect product quality	[SW1] Assessment of factual knowledge

Subject contents	
	Lecture:Fundamentals of design and operation of multi-axis CNC machine tools. Basic CNC controllers and their programming languages. Construction of a CNC machining programme. Basic programming in ISO-Code (G-Code). Basic programming in Heidenhain. Parametric programming. Use of logic functions in CNC programming. 5-axis indexed and floating programming. Use of special cycles for machining holes and pockets. Use of contour programming in the machining of advanced shapes. Laboratory:Linear interpolation. Circular interpolation. Tool radius compensation in circumferential machining. Special cycles for machining holes. Special cycles for machining rectangular pockets. Contour programming. Logic functions and parameterisation in CNC programming.

Prerequisites and co-requisites	
	Basic knowledge of machining and construction of machine tools and cutting tools

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory exercises	100.0%	20.0%
	tests	56.0%	80.0%

Recommended reading	Basic literature	
		1. Grzesik W., NIesłony P., Kiszka P.: Programowanie obrabiarek CNC. PWN Warszawa, 2020.2. Honczarenko J.: Obrabiarki sterowane numerycznie. WNT Warszawa 20083. Users Manual HEIDENHAIN Conversational TNC 640, 4, 20124. Lathe Operators Manual. December 2018, English, Original Instructions, Haas Automation Inc., U.S.A. HaasCNC.com

	Supplementary literature	1. Kaushik Kumar, Chikesh Ranjan, J. Paulo Davim. CNC Programming for Machining. Springer International Publishing, 1stEdition, 2020, p.136. DOI: 10.1007/978-3-030-41279-12. Fundamentals of CNC Machining. A Practical Guide for Beginners. Compliments of Autodesk, Inc. USA, 20143. Graham T. Smith. CNC Machining Technology. Volume 3: Part Programming Techniques. Springer-Verlag London, 1993, p. 137. DOI: 10.1007/978-1-4471-1748-3
	eResources addresses	Adresy na platformie eNauczanie: Programowanie wieloosiowych obrabiarek CNC, W/L; ZiIP; II stop.; 3 sem., lato 2023/2024 (PG_00061826) - Moodle ID: 36251 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36251
Example issues/ example questions/ tasks being completed	Write a part of a program describing the peripheral machining process of the contour shown on the drawing	
Work placement	Not applicable	