GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00062018		
Field of study	Mechanical and Naval Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	8.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Manufacturing and Production Engineering -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Daniel Chuchała	
	Teachers	dr hab. inż. Daniel Chuchała dr inż. Wojciech Blacharski mgr inż. Sławomir Klimkiewicz	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	36.0	0.0	9.0	18.0	0.0	63
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 4638 Budowa, programowanie i obsługa obrabiarek CNC; W/L, BMiO, I stop. niest., 6 sem., lato 2025/2026 (PG_00062018) https://enauczanie.pg.edu.pl/2025/course/view.php?id=4638						

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	63	0.0	0.0	63

Subject objectives	The aim of the course is to familiarise the student with the basic construction, principle of operation, handling and programming of CNC machine tools.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U14] is able to analyse the operation of devices and compare the construction solutions applying usage, safety, environmental, economic and legal criteria	Students will be able to select a machine tool to meet the needs of the planned production of a mechanical component based on the basic design of CNC machine tools.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
[K6_W11] has knowledge of analysis, design, technology and manufacturing of selected technical systems, machinery and equipment, metrology and quality control, knows and understands methods of measurement and calculation of basic quantities describing the operation of technical systems, knows basic calculation methods used to analyse experimental results	The student is able to select the machining parameters necessary for programming and implementation of CNC machining	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_U03] is able to identify, formulate and develop the documentation of a simple design or technological task, including the description of the results of this task in Polish or in a foreign language and to present the results using computer software or other aiding tools	The student is able to read the technical - commissioning documentation of a CNC machine tool, in order to prepare and carry out the necessary maintenance tasks on the machine tool	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K6_W08] has a knowledge of the analysis and design of selected technical systems, machines and technical equipment, selection of construction materials, manufacturing and operation, including their life cycle	Can select the basic components to design a machine tool drive	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

LectureFundamentals of construction and operation of selected 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. List of requirements for drives of modern machine tools. Classification, basic features and range of applications of modern drives with electric motors. Definition and structure of a servo drive.LaboratoryConventional technological machines and with CNC control. Experimental determination of technological bases on a CNC milling machine. Tool length measurement on a CNC milling machine. Linear and circular interpolation during the CNC milling process.ProjectProject of the machining process for a selected mechanical component. Selection of machine tool, tools, parameters and writing CNC code for the designed machining.

Prerequisites and co-requisites

Basic machining, strength of materials, fundamentals of machine design and materials science are required

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture	56.0%	40.0%
Laboratory	100.0%	30.0%
Project	56.0%	30.0%

Recommended reading	Basic literature	1. Jemielniak K.: Automatyczna diagnostyka stanu narzędzia i procesu skrawania. Oficyna Wydawnicza Poli. Warsz. 2002. 2. Kosmol J.: Serwonapędy obrabiarek sterowanych numerycznie. WNT1998. 3. Honczarenko J.: Obrabiarki sterowane numerycznie. WNT Warszawa 2008 4. Grzesik W., NIesłony P., Kiszka P.: Programowanie obrabiarek CNC. PWN Warszawa, 2020.
	Supplementary literature	1. Users Manual HEIDENHAIN Conversational TNC 640, 4, 2012 2. Lathe Operators Manual. December 2018, English, Original Instructions, Haas Automation Inc., U.S.A. HaasCNC.com 3. 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. 4. Fundamentals of CNC Machining. A Practical Guide for Beginners. Compliments of Autodesk, Inc. USA, 20145. 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	
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	
Practical activites within the subject	Not applicable	

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