GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00062015						
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	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 inż. Bogdan Ścibiorski				
	Teachers						
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						
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	Learning the basic techniques of computer-aided manufacturing, especially programming CNC machines with the use of CAM software						

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	The student is able to analyze the operation of devices and compare design solutions with consideration of safety, economic efficiency, and environmental impact criteria. They are capable of critically evaluating the manufacturability of the proposed solutions.	[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	He is able to design technological processes for typical machine parts using vailable production resources, taking into account measuring devices and analysis of experimental results	[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	He is able to design technological processes for typical machine parts using available production resources, taking into account CAD/CAM systems, measuring devices, and analysis of experimental results.	[SU3] Assessment of ability to use knowledge gained from the subject
[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	The student acquires knowledge in the analysis and design of manufacturing technologies, as well as the selection of construction materials. They learn the principles of designing technological processes and their impact on the quality and efficiency of production.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

Subject contents

Course content – lecture
Computer-aided manufacturing systems. Integration of CAD and CAM systems. Data exchange between systems. Declaration of the workpiece, semi-finished product, tools, and machining fixtures. Definition of the machining cycle. Types of turning and milling machining cycles. Selection of machining strategy for specific machined surfaces. Declaration of cutting parameters. Free-form surface machining. High-speed machining (HSM). Databases in CAM systems. Files containing tool path data. Machine tool post-processors. Machining simulation with collision analysis. Modification of machining programs. Development trends in computer-aided manufacturing.

Prerequisites and co-requisites

Technical drawing, basics of machining, computer-aided design (CAD).

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
completion of projects	60.0%	25.0%
completion of exercises during laboratory sessions	60.0%	25.0%
tests	60.0%	50.0%

Recommended reading

Basic literature	1. Przemysław Kochan. EdgeCAM. Wieloosiowe frezowanie CNC. Wydawnictwo Helion. Gliwice 2014. 2. Grzesik W., Niesłony P., Bartoszuk M.: Programowanie obrabiarek NC/CNC. WNT, Warszawa 2020, Wyd. IV. 3. Przybylski W., Deja M.: Komputerowo wspomagane wytwarzanie maszyn. Podstawy i zastosowanie. WNT, Warszawa 2007. 4. Augustyn K.: EdgeCAM. Komputerowe wspomaganie wytwarzania. Wydanie II. Helion, Gliwice 2006.
Supplementary literature	1. Grzesik, W. Advanced machining processes of metallic materials:theory, modelling and applications. Elsevier, 2016. 2. Kosmol J.: Automatyzacja obrabiarek i obróbki skrawaniem. WNT,Warszawa 2000. 3. Chlebus E.: Techniki komputerowe CAx w inżynierii produkcji. WNT, Warszawa 2000
eResources addresses	

Example issues/ example questions/ tasks being completed	1. Scope of application of CAD/CAM manufacturing support systems 2. Utilization and integration of CAx techniques 3. Generation of NC programs using CAD/CAM systems 4. Data exchange between different systems 5. Design-to-manufacturing consistency in computer-aided manufacturing 6. Feature Modeling 7. Generation of alternative technological solutions 8. Development trends in CAx techniques for computer-aided manufacturing 9. Integration of CAD/CAM systems with CAE systems 10. Structure of work time standards in the context of computer-aided manufacturing 11. Workflow for designing turning technologies using CAD/CAM systems 12. Workflow for designing milling technologies using CAD/CAM systems 13. Steps in designing technology using the CAM system (EdgeCam) with 2D models 14. Steps in designing technology using the CAM system (EdgeCam) with 3D models 15. Coordinate system axis designations for turning, milling, and additional axes 16. Types of models used in CAM systems 17. Types of CNC lathe constructions (tool turret positioning) and consequences for tools, spindle speeds, etc. 18. Characterization of solid modeling 19. Characterization of surface modeling 20. Fundamental differences between solid modeling and surface modeling 21. Characteristics of parametric CAD design. Methods of specifying right-handed and left-handed turning tools, and determining right-handed and left-handed spindle rotations in CNC lathes 22. Methods of setting the center of the coordinate system on the workpiece 23. Methods of setting semi-finished products in CAM systems 24. Tasks of the technical production preparation department (TPP).
Practical activites within the subject	Not applicable

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