GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer-aided manufacturing, PG_00055064		
Field of study	Komputerowe wspomaganie wytwarzania (CAM)		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
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	5.0
Learning profile	general academic profile	Assessment form	exam
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	prof. dr hab. inż. Mariusz Deja	
	Teachers	dr inż. Dawid Zieliński mgr inż. Karolina Chodnicka-Wszelak prof. dr hab. inż. Mariusz Deja	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	15.0	0.0	60
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 2324 Komputerowe wspomaganie wytwarzania (CAM) - ZiIP (PG_00055064) - 25/26 W/L/P https://enauczanie.pg.edu.pl/2025/course/view.php?id=2324						

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	60	4.0	61.0	125

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_W05] has systematized, theoretically founded knowledge of modelling the operation of production systems with various structures and forms of their organization and the analysis of production processes using computer simulation methods	Analysis of the production process using computer simulation for a specific manufacturing system.	[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym
	[K6_K02] is able to interact and work in a group, assuming different roles, can inspire and organize the learning process of others, properly identifies priorities for realization of a task specified by themselves or others	Group design of the technological process with the use of a computer system.	[SK1] Ocena umiejętności pracy w grupie
	[K6_W09] knows the general principles of creating and developing forms of individual entrepreneurship and stimulating employee creativity, using knowledge in the field of design, production and operation of machinery and technical devices	The manufacturing process selection depending on the class, type of parts, material, dimensional and shape requirements as well as time and cost of production.	[SW1] Ocena wiedzy faktograficznej
	[K6_U09] can use analytical techniques as well as computer simulation and numerical analysis methods in solving specific problems in the field of production engineering, is able to carry out simple engineering tasks related to the production of typical machine parts using widely understood techniques and computer tools, is able to select and apply appropriate methods of project planning and control courses with the use of computer aided means	The student applies the practical use of CAD/CAM systems to present the designed technology for the production of mechanical components	[SU1] Ocena realizacji zadania
	[K6_W03] has knowledge of the design record (the record structure)for the preparation of the manufacturing process documentation and basic knowledge of the implementation and management of production systems, including the principles of designing machine parts and manufacturing technologies using information techniques	The student can design technological processes of typical machine parts for the available means of production, including measuring devices and analysis of experimental results.	[SW2] Ocena wiedzy zawartej w prezentacji

Subject contents	Course content – lecture Systems for computer-aided manufacturing. Integration of CAD and CAM systems. The exchange of data between systems. Declaration of the workpiece, semi-finished product, tools and fixtures. Definition of machining cycle. Types of turning and milling machining cycles. Selection of machining strategy for specific areas treated. Declaration of cutting parameters. Treatment of free surfaces. High speed machining HSM. Databases in CAM systems. Files containing data access tools. Postprocessors machine tool. Simulation with an analysis of collision. Modification of machining programs. Trends in the development of computer aided manufacturing. Additive technologies and reverse engineering. Course content – laboratory Developing computer models of selected prismatic and axisymmetric design elements, along with technical drawings. Saving computer models in appropriate formats for CAM systems. Preparing milling machining of selected prismatic elements using 2D and 3D models. Preparing turning machining of selected axisymmetric elements using 2D and 3D models. Selecting and analyzing selected machining cycles and strategies, including determining cutting parameters. Creating advanced simulations of the machining process, including analysis of selected technological solutions. Generating and analyzing NC code for CNC machine tools. Course content – project Writing an NC program using a simulator for a specific CNC machine tool. Determining the shape, dimensions, and material type of the blank. Selecting a machining fixture. Determining the zero point. Selecting and characterizing a set of cutting tools, including milling, turning, and drilling tools. Writing NC code using a dedicated programming language and available machining cycles. Analyzing and validating the created NC code through machining process simulation. Evaluating the designed machining process.
Prerequisites and co-requisites	Technical drawing, basics of manufacturing techniques, Computer Aided Design CAD

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Active participation in lectures	80.0%	20.0%
Practical exercises during laboratories 60.0% 20.0%	60.0%	20.0%
Projects	60.0%	20.0%
Exam	60.0%	40.0%

Recommended reading

Basic literature	1. Zalewski A.., Grzesik, W., Deja, M., Jarosz, K., & Ruszaj, A. (2024). Obrabiarki CNC. Podstawy funkcjonowania i programowania. Procesy ubytkowe, przyrostowe i hybrydowe. Wydawnictwo Naukowe PWN, s. 140, ISBN: 978-83-01-23716-5. 2. Przemysław Kochan. EdgeCAM. Wieloosiowe frezowanie CNC. Wydawnictwo Helion. Gliwice 2014. 3. Grzesik W., Niesłony P., Bartoszuk M.: Programowanie obrabiarek NC/CNC. WNT, Warszawa 2020, Wyd. IV. 4. Przybylski W., Deja M.: Komputerowo wspomagane wytwarzanie maszyn. Podstawy i zastosowanie. WNT, Warszawa 2007.
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. The range of applications of CAD/CAM manufacturing support systems.
2. Use and integration of CAx techniques.
3. Generating NC programs using the CAD/CAM system.
4. Data exchange - between different systems.
5. Design and technological compliance in computer-aided manufacturing.
6. Object modeling - Feature Modeling.
7. Generating variants of technological solutions.
8. Trends in the development of CAx techniques in the field of computer-aided manufacturing.
9. Integration of CAD / CAM systems with CAE systems.
10. The structure of the standard of working time in terms of computer-aided production.
11. Process planning for turning technology with the use of the CAD/CAM system.
12. Process planning for milling technology with the use of the CAD/CAM system.
13. List the steps to be followed when designing technology using the CAM system (EdgeCam) with the use of 2D models.
14. List the steps to be followed when designing technology using the CAM system (EdgeCam) with the use of 3D models.
15. Designations of the axes of the coordinate system for: turning, milling and designation of additional axes.
16. List the types of models used in CAM systems.
17. List the designs of CNC lathes (positioning of the tool head) and the consequences of tools, spindle revolutions, etc.
18. Characterize the solid models.
19. Characterize the surface models.
20. Present the essential differences between the solid model and the surface model.
21. Characteristics of parametric CAD design.
22. Ways of determining the center of the coordinate system on the workpiece.
23. Ways of determining the blank in CAM systems.
24. Tasks of the technical preparation of production (TPP) department.

Practical activites within the subject

Not applicable

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