GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer Aided Manufacturing (CAM), PG_00055396		
Field of study	Mechanical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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	4.0
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. Tadeusz Bocheński dr inż. Piotr Sender inż. Jakub Grabarczyk mgr inż. Karolina Chodnicka-Wszelak prof. dr hab. inż. Mariusz Deja dr inż. Dawid Zieliński	

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: 8797 Komputerowe wspomaganie wytwarzania (CAM) (PG_00055396) 2026/2027
https://enauczanie.pg.edu.pl/2025/course/view.php?id=8797

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	36.0	100

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_W11] possesses knowledge on design, technology and manufacturing of machine parts, metrology, and quality control; knows and understands methods of measuring and calculating values describing the operation of mechanical systems, knows calculating methods applied to analyse the results of experiments	Individual design of the technological process, taking into account technological and design data as well as production assumptions	[SW3] Assessment of knowledge contained in written work and projects
[K6_U02] is able to work in a team and individually, also in multi-disciplinary teams, is able to draw a plan of completing a construction or technological design, shows self-learning abilities	Group design of the technological process with the use of a computer system	[SU1] Assessment of task fulfilment
[K6_U04] is able to perform a critical analysis of the existing technical solutions, present the specification of the technology of manufacturing basic construction elements of machines and engineering assemblies	The student applies the practical use of CAD/CAM systems to present the designed technology for the production of mechanical components	[SU5] Assessment of ability to present the results of task
[K6_U08] is able to design a technological manufacturing process for typical elements of machines or devices, using analytical and numerical calculating tools	The manufacturing process selection depending on the class, type of parts, material, and dimensional and shape requirements.	[SU4] Assessment of ability to use methods and tools

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. Principle of complete machining. Manufacturing systems in terms of machining flexibility. Additive and hybrid manufacturing.Trends in the development of computer aided manufacturing.

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
Practical exercises during laboratories	60.0%	20.0%
Active participation in lectures	80.0%	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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