GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer Aided Design of Technological Processes, PG_00055503		
Field of study	Mechanical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Optional subject group 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	6	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
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	prof. dr hab. inż. Mariusz Deja	
	Teachers	dr inż. Dawid Zieliński dr inż. Tomasz Seramak dr inż. Piotr Sender prof. dr hab. inż. Mariusz Deja	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	15.0	0.0	60

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 5397 Komputerowo wspomagane projektowanie procesów technologicznych 2026 lato MiBM, s. 6
https://enauczanie.pg.edu.pl/2025/course/view.php?id=5397

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

A student designs technological processes of typical machine parts using CAD and CAM systems. Selects a system to support manufacturing depending on the needs and capabilities of the production plant.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U08] is able to design a technological manufacturing process for typical elements of machines or devices, using analytical and numerical calculating tools	The selection of the manufacturing process plan depending on the class, type of parts, material, and dimensional and shape requirements.	[SU1] Assessment of task fulfilment
[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	Design of machine components and selection of technology taking into account quality control requirements and manufacturing tolerances.	[SW3] Assessment of knowledge contained in written work and projects
[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	Comparison of various manufacturing techniques, including subtractive and additive technologies, with an indication of their advantages and disadvantages.	[SU2] Assessment of ability to analyse information

Subject contents

Course content – lecture

LECTURE Production process and its components supported by computer systems. Data for the technological design process, documentation and technical time standard. Selection of machining allowances. Design of semi-finished products. Technology of construction. Machining bases and principles of setting workpieces on machine tools and machining accuracy. Technological methods of shaping the surface layer of machine parts and their impact on operational properties. Technological processes of typical machine parts for various types and degrees of automation of processing and assembly. Process typification. Group processing. Flexible manufacturing systems. **LABORATORY** Selection of semi-finished products and machining bases in the CAM system. Determining the technical standard for processing time in the CAM system. Selection and programming of machining depending on dimensional and shape accuracy. Selection of technology for axially symmetric and prismatic parts. Programming and machining on CNC machines. **PROJECT** Designs of technological processes of typical machine parts: e.g. shaft and prismatic components using the CAM system. Preparation of documentation, selection of: allowances, tooling, tools, technological parameters, determination of the technical time standard based on simulation of the machining process.

Course content – laboratory

LABORATORY Selection of semi-finished products and machining bases in the CAM system. Determining the technical standard for processing time in the CAM system. Selection and programming of machining depending on dimensional and shape accuracy. Selection of technology for axially symmetric and prismatic parts. Programming and machining on CNC machines.

1. An introduction to automating lathe programming using JavaScript macros.
2. Creating custom milling and turning tools using CSV files. Milling and turning operations using contoured tools.
3. Programming machining for multi-spindle automatic lathes with counter-spindles.
4. Milling operations within the lathe module.
5. Analyzing, editing, and programming machining codes and cycles in selected graphical post-processors. An introduction to post-processor development.
6. The impact of the technological basis accuracy on machining precision.
7. Programming and operation of CNC machine tools.

Course content – project

PROJECT Designs of technological processes of typical machine parts: e.g. shaft and prismatic components using the CAM system. Preparation of documentation, selection of: allowances, tooling, tools, technological parameters, determination of the technical time standard based on simulation of the machining process.

1. Development and analysis of the machining process for selected prismatic parts using a CAM system and 3- or 5-axis milling.
2. Development and analysis of the machining process for selected prismatic parts using a CNC machine simulator and 3- or 5-axis milling.

Prerequisites and co-requisites

Manufacturing technology, basics of machining, Computer Aided Design CAD and Computer Aided Manufacturing CAM

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Exam</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>Projects</td><td>60.0%</td><td>20.0%</td></tr>
<tr><td>Completing tasks during laboratories</td><td>60.0%</td><td>20.0%</td></tr>
<tr><td>Activity during classes</td><td>80.0%</td><td>20.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. A. Zalewski, M. Deja, A. Ruszaj, W. Grzesik: Obrabiarki CNC. Podstawy funkcjonowania i programowania. Procesy ubytkowe, przyrostowe i hybrydowe. Wydawnictwo Naukowe PWN, Warszawa, 2024.
2. Feld M.: Podstawy projektowania procesów technologicznych typowych części maszyn. WNT, Warszawa, 2013.
3. Gawlik E. i inni: Projektowanie procesów technologicznych obróbki skrawaniem. Wydawnictwa AGH, Kraków 2019.
4. Poradnik inżyniera. Obróbka skrawaniem. T. I-III. WNT, Warszawa, 1993.
5. Przemysław Kochan. EdgeCAM. Wieloosiowe frezowanie CNC. Wydawnictwo Helion. Gliwice 2014.
6. Przybylski W., Deja M.: Komputerowo wspomagane wytwarzanie maszyn. Podstawy i zastosowanie. WNT, Warszawa 2007.</td></tr>
<tr><td>Supplementary literature</td><td>1. Grzesik, W. Advanced machining processes of metallic materials: theory, modelling and applications. Elsevier, 2016.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Selected production processes for parts of a specific class type, with specific design and technological requirements.

2. Basic principles of selecting technological parameters for technological operations.

3. The influence of manufacturing technique on the properties of the surface layer.

4. Technical standard of working time.

5. Methods of generating CNC programs for controlling technological devices.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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