GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer Aided Manufacturing Systems, PG_00063000		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	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		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	0.0	30

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	30	0.0	0.0	30

Subject objectives

Getting acquainted with the subject of computer-aided manufacturing as well as with the tendencies in modern manufacturing

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U81] is able to communicate with ease in foreign language at B2+ level of the Common European Framework of Reference for Languages (CEFR) in everyday life, in academic and professional environments	Ability to communicate in a foreign language	[SU4] Assessment of ability to use methods and tools
[K7_K81] is able to cooperate in international team at her/his own university, during work placement and during study abroad	The student is able to collaborate within an international project team to develop technologies for medical devices, utilizing English engineering nomenclature.	[SK1] Assessment of group work skills
[K7_W12] identifies and interprets the main developmental trends and significant new achievements in the field of engineering and technical sciences and disciplines relevant to the course of study	The student identifies and interprets contemporary development trends in advanced medical device manufacturing systems, with a particular focus on hybrid production lines, additive manufacturing (3D printing) technologies for implants, and automated bio-fabrication systems implemented within Industry 4.0 standards.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U02] formulates hypotheses to test research problems in the field of medical engineering	The student formulates research hypotheses regarding the impact of CAM process parameters and manufacturing strategies (subtractive and additive) on the biomechanical properties, geometric accuracy, and biocompatibility of implant structures and medical devices.	[SU5] Assessment of ability to present the results of task

<table>
<tr><td>Subject contents</td><td>Course content – lecture

Emergence of multitasking machining systems, applications and best selection practices. Manufacturing System classification. Flexible Manufacturing. Group Technology. Cell formation.Extra clustering algorithms. FMS control introduction. Petri nets fundamentals. CIM Concepts - information integration. Machine tool metrology. Robots in Manufacturing. Trends in the development of computer-aided manufacturing: STEP NC, cyber-physical manufacturing , digital twin in manufacturing. Intelligent manufacturing methods: smart manufacturing, Industry 4.0-based manufacturing systems, feature-based process planning. IoT - Internet of Things. Industrial Internet of Things - Cybermanufacturing Systems. Application Reverse Engineering Technology in Part Design and Manufacturing.

Course content – project

Development of a manufacturing system along with computer simulation for a specific medical device.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Technical drawing, manufacturing techniques, basics of cutting technologies, Computer Aided Design CAD</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Colloquium</td><td>60.0%</td><td>80.0%</td></tr>
<tr><td>Presence during classes</td><td>60.0%</td><td>10.0%</td></tr>
<tr><td>Project</td><td>60.0%</td><td>10.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Karkalos, N. E., Markopoulos, A. P., & Davim, J. P. (2019). Computational Methods for Application in Industry 4.0. Springer International Publishing.
2. Choi, B. K., & Jerard, R. B. (2012). Sculptured surface machining: theory and applications. Springer Science & Business Media.
3. Rawat, D. B., Brecher, C., Song, H., & Jeschke, S. (2017). Industrial Internet of Things: Cybermanufacturing Systems. Springer.
4. Gunal, Murat M. (Ed.) (2019). Simulation for Industry 4.0 Past, Present, and Future Series: Springer Series in Advanced Manufacturing.
5. Deja, M., & Siemiatkowski, M. S. (2018). Machining process sequencing and machine assignment in generative feature-based CAPP for mill-turn parts. Journal of Manufacturing Systems, 48, 49-62.
6. Deja, M., & Siemiatkowski, M. S. (2013). Feature-based generation of machining process plans for optimised parts manufacture. Journal of Intelligent Manufacturing, 24(4), 831-846.</td></tr>
<tr><td>Supplementary literature</td><td>Selected articles from the scientific journals available on-line, e.g. :
1. Computer-Aided Design
2. Computers in Industry
3. Journal of Micro and Nano Manufacturing
4. Journal of Mechanical Design
5. Journal of Manufacturing Systems</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>• Development of CAD/CAM systems.
• Machine tool selections with high level of automation.
• Parts grouping.
• Modelling of manufacturing processes.
• Development trends of CAM systems: STEP NC.
• Intelligent manufacturing methods, smart manufacturing.
• Algorithms for automating the design of technological processes.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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