GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer-Aided Manufacturing CAD/CAM/CNC, PG_00063627		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Specialty subject group Subject group related to scientific research in the field of study
Mode of study	Part-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	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Roland Ryndzionek	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	10.0	0.0	10.0	0.0	0.0	20

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	20	6.0	24.0	50

Subject objectives

The aim of the course is to familiarise students with CAD, CAS, CAE, CAM, CNC tools.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K06] is aware of the impact of engineering activities on the quality of applied solutions and the environment	Select and use appropriate specialist literature, identify relevant components of a mechatronic system, select appropriate simulation methods and tools, present and analyse simulation results, use specialist engineering tools, evaluate correct operation of the designed system, explain differences between simulation results and laboratory tests.	[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work
[K7_W06] has an extended knowledge of the design of automation components and devices, control and decision support systems control and decision support systems and complex mechatronic systems	chooses appropriate methods to solve a problem, exchanges information with team members.	[SW3] Assessment of knowledge contained in written work and projects

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

CAD lecture Description of computer aided design (CAD) tools for the design of electrical machines and equipment. Design calculations using CAS (computer algebra system) programs (Mathcad, Mathematica, Macsyma, SMath). Construction of 2D and 3D parametric geometrical models of equipment and preparation of technical documentation (AutoCAD, Inventor, CATIA). Demonstration of virtual prototyping capabilities using Computer Aided Engineering (CAE) programs (Flux2D, Maxwell, Opera, Ansys). CAM Description of programmes controlling machines, robots, internal transport systems, storage systems, etc. Link to the shop-floor scheduling (SFC) and workstation management (I/OC) modules of the MRP II system. Automation in CAM systems of manufacturing functions: technological operations (e.g. machining), management of tool changing (tooling), control of part assembly, control of transport of components and finished products, control of intermediate storage, ensuring continuity of the manufacturing process. CNC Description of computer numerical control systems (numerically or computer controlled machine tools). Structure, principle of operation, control methods and programming of numerically controlled machine tools.

Course content – laboratory
Laboratory Produce technical documentation of an electrical device component (or electrical machine) indicated by the instructor, including a 3D model, detailed technical drawings and description of the technology.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of computer programming.</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>Poject</td><td>50.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Chlebus E.: Techniki komputerowe CAx w inżynierii produkcji. WNT, Warszawa 2000.
2. Jaskólski A.: Autocad 2010/LT2010+. Kurs projektowania parametrycznego i nieparametrycznego 2D i 3D. Wydawnictwo Naukowe PWN/MIKOM, 2009.
3. Jaskólski A.: Autodesk Inventor 2009PL/2009+. Metodyka projektowania. Wydawnictwo Naukowe PWN/MIKOM 2009.
4. Kolka A., Kosmol J., Słupik H.: Programowanie obrabiarek sterowanych numerycznie, Wydawnictwo Politechniki Śląskiej, Gliwice 2001.
5. Kosmol J.: Serwonapędy obrabiarek sterowanych numerycznie, Wydawnictwo Naukowo-Techniczne, Warszawa 1998.

Miecielica M., Wiśniewski W.: Komputerowe wspomaganie projektowania procesów technologicznych. Wydawnictwo Naukowe PWN/MIKOM, 2005.</td></tr>
<tr><td>Supplementary literature</td><td>Przybylski W., Deja M. : Komputerowo wspomagane wytwarzanie maszyn. Wydawnictwa Naukowo - Techniczne, Warszawa 2007.

Weiss Z.: Techniki CAx w produkcji, Poznań, Politechnika Poznańska2002.

Wolski P.: Podstawy obróbki CNC. Wydawnictwo REA, Warszawa 1995.</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 a 3D model of an electrical machine in Autodesk Inventor.Making calculations of the main dimensions of the electric machine in MathCAD.Development of a programme for a CNC machine tool to make the shaft of an electric machine.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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