GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer aided maintenance of the stock of machines, PG_00053660		
Field of study	Mechanical Engineering, Mechanical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	English
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Manufacturing and Production Engineering -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Wojciech Blacharski	
	Teachers	dr inż. Wojciech Blacharski dr hab. inż. Daniel Chuchała dr inż. Agata Sommer	

Lesson types and methods of instruction

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

Familiarizing students with basic issues of maintenance of the stock of machines in contemporary manufacturing enterprices, including: different maintenance strategies and principles of their selection, possibilities of applying computer aiding in the maintenance, categories and terms of reference of the software dedicated for maintenance, issues of diagnostics and calibration of numerically controlled machines, also tuning their drives, use of DAQ hardware and software (eg Labview) for mobile diagnostic tests,

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U09	The student describes the principles of selecting an effective maintenance strategy for a machine park in a production plant.	[SU2] Assessment of ability to analyse information
K6_U08	The student describes the categories of software used to support maintenance in production plants, their purpose and basic functionality.	[SU2] Assessment of ability to analyse information
K6_W12	The student describes the safety requirements at workplaces in a production plant, the principles of ensuring compliance with legal requirements and the use of computer support in the area of compliance.	[SW1] Assessment of factual knowledge
K6_W11	The student has knowledge of the maintenance and repair of CNC machine tools and other machines and devices used in production.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>LECTURE:

Preliminary information and definitions related to maintenance. Tasks for maintenance of the machinery park in the contemporary production plants. Assessment of maintenance efficiency in the plant. OEE indicator and other indicators used to assess the effectiveness of the company's maintenance system. Organizational solutions of maintenance systems and rules for their selection to the specifics of the production plant. Typical strategies applied for maintaining production machines and the rules for their selection. Computer supporting areas and software categories used for aiding contemporary maintenance systems: DMS - preparing and flow of the related to maintenance documents; CMMS - scheduling work and managing maintenance resources; EAM - management of the life cycle of machines and other assets in the enterprise; HMI/SCADA - monitoring, control and registration of the machinery parameters and the course of processes during operation; DAQ - data acquisition for diagnostic purposes; MES - assessing how effective is the operation of machines. Maintenance issues, especially for numerically controlled machines (CNCs, PLCs, and others); computer support during initial start up, tuning, diagnostics, correctness tests of the control software. Methods and equipment for assessing the accuracy and calibration of CNC machine tools. Contemporary machine safety systems. Legal requirements in the maintenance of machinery park. Principles of risk assessment and compliance with safety requirements.

AUDITORIUM EXERCISES:

1. Development of spare parts orders using electronic catalogs and DMS class programs.
2. Experimental verification of the correctness of the PLC application program that was developed to control a production device.
3. Management of maintenance activities using a CMMS program -data collection and scheduling the inspection and maintenance activities.
4. Computer aided data acquisition (DAQ) - possibilities of using Labview and other DAQ programs to maintain production systems.
5. Monitoring of machines and production processes using the HMI/SCADA systems - registration of working time and machine downtime.
6. Computer-aided compliance management and risk assessment at workplaces - part 1.
7. Computer-aided compliance management and risk assessment at workplaces - part 2.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge related to machines building and operating, technologies of manufacturing, manufacturing machines, metrology, electrotechnics, informatics.</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>Final test</td><td>50.0%</td><td>90.0%</td></tr>
<tr><td>Auditorium and laboratory exercise</td><td>100.0%</td><td>10.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Manuals for computer programmes used during lectures and exercises. 2. Websites on maintenance issues discussed during classes. 3. Publications concerning maintenance and diagnostics of numerically controlled machines available in Internet. 4. Blacharski W.: "Computer aided maintenance" - a set of presentations. 5. Blacharski W.:"Diagnostics of drives and examining of motional accuracy of CNC-controlled machines" - a set of presentations</td></tr>
<tr><td>Supplementary literature</td><td>1. Legutko S.: Podstawy eksploatacji maszyn i urządzeń. WSiP. 2007. 2. Honczarenko J.: Roboty przemysłowe, budowa i zastosowanie. WNT. 2009.2. 3. Honczarenko J.: Obrabiarki sterowane numerycznie. WNT. 2010. 4. Other books on maintenance in production plants</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>During the final test the students have to fill out the prepared form with a set of detailed questions connected with Issues processed in the framework of the subject.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>