



Subject card

Subject name and code	Technological Machines and Devices, PG_00039918						
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			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	5	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			exam		
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 prof. dr hab. inż. Kazimierz Orłowski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	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	45		6.0		24.0	75
Subject objectives	The aim of the course is to familiarize students with the basics of construction and operation of technological machines, including in particular selected machine tools. The contents presented in the course concern the following issues: kinematics of technological machines, design solutions of basic mechanical assemblies, issues of static and dynamic rigidity of the machine tool, varieties of powertrains and their operational features, construction and operation of manual and automatic control systems of machines.						
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 student has a basic knowledge of computer aided applications in the issues of machine control, diagnostic tests of machine tools and the selection of mechanical elements during design.		[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
[K6_W08] possesses basic knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle		The student has a basic knowledge of the construction and principles of designing machine tools and other technological machines, including kinematic systems, mechanical units, drive units and control systems.		[SW1] Assessment of factual knowledge			

Subject contents	<p>LECTURE:</p> <p>The spatial-motor system of a technological machine. Classification of movements in machine tools. Kinematics of machine drive assemblies: kinematic scheme, kinematic chains, graded drives, kinematic systems for implementing complex shaping movements, comparison of kinematic systems of selected traditional and CNC machine tools. Main drives - examples of solutions. Spindles of machine tools, spindle bearings, examples of solutions. Feed drives, mechanisms for converting rotary motion into linear motion. Guides - guide varieties, their characteristics, examples of applications. Couplings and brakes - tasks performed, varieties, examples of solutions. Bodies of technological machines - requirements, examples of construction. Mechanical components for the construction of modular machines, examples and advantages of modular machines. OUPN system of machine tools, deformations and vibrations, static and dynamic rigidity, thermal deformations, typical machining errors caused by vibrations and deformations in cutting machines. Technical-utility characteristics of technological machines: productivity, accuracy, rigidity, safety, ergonomics, durability, reliability. Analysis of the machine tool kinematic system: definitions, kinematic couplings, kinematic accuracy. Construction of selected CNC machine tools with serial and parallel structures. Translated with www.DeepL.com/Translator (free version)</p> <p>LABORATORY: Computer-aided selection of selected machine tool components. Experimental determination of technological bases on a CNC milling machine. Determination of tool length on CNC milling machine. Analysis of kinematic chains of a gear hobbing milling machine. Structural structure of numerically controlled technological machines. Power balance of technological machines. Modular technological machines</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="451 707 794 741">Subject passing criteria</th> <th data-bbox="794 707 1137 741">Passing threshold</th> <th data-bbox="1137 707 1487 741">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 741 794 775">laboratory exercises</td> <td data-bbox="794 741 1137 775">100.0%</td> <td data-bbox="1137 741 1487 775">20.0%</td> </tr> <tr> <td data-bbox="451 775 794 808">Final exam</td> <td data-bbox="794 775 1137 808">50.0%</td> <td data-bbox="1137 775 1487 808">80.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	laboratory exercises	100.0%	20.0%	Final exam	50.0%	80.0%
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laboratory exercises	100.0%	20.0%										
Final exam	50.0%	80.0%										
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Honczarenko J.: Obrabiarki sterowane numerycznie. WNT. Warszawa 2008. 2. Wrotny L.T.: Obrabiarki skrawajace do metali. WNT. 1979. 3. Wrotny L.T.: Podstawy konstrukcji obrabiarek. WNT.1973. 4. Wrotny L. T.: Kinematyka i dynamika maszyn technologicznych i robotów przemysłowych. Oficyna Wydawnicz Poli. Warsz. 1996. 5. Praca zbiorowa (Balul W.M. i inni): Obrabiarki do skrawania metali. WNT. 1974. 6. Selected web pages of manufacturers and sellers of components for machine building. 										
	Supplementary literature	<ol style="list-style-type: none"> 1. Instructions for laboratory exercises. 2. Instructions for PLC controllers available on manufacturer's web pages. 										
	eResources addresses	<p>Adresy na platformie eNauczenie:</p> <p>Maszyny i urządzenia technologiczne W/L -MiBM I st., sem. 5 2022/23 (M:31566W0) - Moodle ID: 15269 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=15269</p>										
Example issues/ example questions/ tasks being completed	The final exam takes the form of a test covering issues from the whole subject.A written report is required after each exercise.											
Work placement	Not applicable											