GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Robotics, PG_00059364
Field of study	Mechanical Engineering

Date of commencement of studies	February 2024	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study
			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	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Zakład Mechaniki, Wytrzymałości i Sterowania Złożonych Obiektów Technicznych -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology

Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Yurii Tsybrii
	Teachers	dr inż. Yurii Tsybrii

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	9.0	0.0	9.0	0.0	0.0	18
	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	18	4.0	28.0	50

Subject objectives	The aim of the lectures is to teach the students on the basic problems connected with the robotics including the robots and manipulators. These concern the methodology, methods, modeling and analysis.
	The aim of the course is to familiarize students with the basic issues related to the research, design and operation of industrial robots.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U05] is able to plan and conduct the experimental research determining the parameters of a device or system, assesses the usability and correctly selects methods and tools, is able to interpret the results and estimate the measurement errors and is able to apply computer systems to simulate the operation of a machine or technology	The student has the ability to solve basic problems related to the research, design and operation of industrial robots, in terms of assessing the functionality, performance and safety of industrial robots, including performing simple engineering tasks and experiments. The student has the ability to analyze the basic issues related to the research, design and operation of industrial robots, issues of mechatronics, in the field of theory and solution of the practical problems, i.e. the selection of methods and tools. This includes the topics listed in the objective and item sheet.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
	[K7_W06] possesses organized, profound knowledge necessary for designing and optimization of complex technological processes, modelling and calculations using numerical methods, knows modern manufacturing methods and tools for designing manufacturing processes of machines, devices, their elements and components	The student has the ability to analyze basic issues related to the research, design and operation of industrial robots in the field of theory and solve simple tasks and practical problems. This includes the topics listed in the objective and item sheet. The student is able to work in a group, observing all the rules that determine professionalism.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
	[K7_W05] possesses profound knowledge on the operation of complex systems and mechanical devices, including process equipment	The student has the ability to analyze basic research problems related to the mechanics, construction and mechatronics of combined advanced systems. These problems relate in particular to: Critical assessment of the knowledge of industrial robots. Industrial robots. Mobile robots. Industrial robots - research issues (phenomena, parameters, characteristics, features). Industrial robots – design and simulation. Industrial robots - construction and schematics. Industrial robots - operation, operational environment, missions, tasks.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

Subject contents	During the lectures the following problems concerning the robotics will be presented:
	- fundamentals of robotics
	- robots
	- robots and manipulators
	- robots and manipulators - methods of solutions concernig the applied mechanics and mechatronics
	- robots and manipulators - classification
	- manipulators and grippers - classification
	- sources of energy supply for robots
	- robotic drives
	- robotic sensors
	- advanced simulation of robot operations
	- applications of robots
	- Industry 4.0
Prerequisites and co-requisites	The student should have basic information in the field of physics and applied mathematics, mathematical analysis, numerical methods, solid state mechanics, including kinetics and dynamics, construction and construction of complex technical objects, technical drawing and the basics of programming as well as mechatronics and automation.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	half term exam, final exam	56.0%	100.0%

Recommended reading	Basic literature	Tchon K., Muszynski R. Robotyka: Notatki do wykładów z dziedziny automatyki i robotyki, Wrocław 2018.
		Craig J.J. Wprowadzenie do robotyki. Mechanika i sterowanie, Warszawa 1995.
		Jakubiak J., Muszynski R., Narzędzia komputerowe w robotyce. Modelowanie kinematyki i dynamiki, Wrocław 2012.
		Kalicka R. Podstawy automatyki i robotyki. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2016.
	Supplementary literature	AUVSI/ONR,2007. Engineering Primer Document for the Autonomous Underwater Vehicle (AUV) Team Competition Association for Unmanned Vehicle Systems International (AUVSI) US Navy Office of Naval Research (ONR), Version 01 - July 2007.
		Szulist N., Gerigk M.K., 2015. Metodyka nadawania cech stealth małym bezzałogowym pojazdom wodnym. Logistyka, nr 4, Poznań 2015.
	eResources addresses	Adresy na platformie eNauczanie:

| Example issues/ example questions/ tasks being completed | Quiz:

1. The mobile robot is

a) a technical device designed to perform locomotive functions

b) an automatic machine, which assists a human standing, walking or similar machine operation using one, two or more 'legs' and 'feet', and a single 'leg' of a 'walking' machine

c) integration of naturally different construction systems: mechanisms, electrical circuits and software

d) a technical device designed to perform locomotion functions of animals and insects with limbs or legs

2. The asynchronous motor has

a) 3 phases

b) 2 phases

c) 1 phase

d) 4 phases

3. The part that changes the inductance in the inductive position sensor is

a) body

b) coil

c) tube

d) ferromagnetic core

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| Work placement | Not applicable |

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