COURSE SPECIFICATION

Course code	full-time programme:	**M#2-S2-ME-105**
	part-time programme:	
Course title in Polish	**Automatyzacja i robotyzacja produkcji**	
Course title in English	**Automation and Robotics for Manufacturing**	
Valid from (academic year)	**2024/2025**	

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**second-cycle**
Type of education	**academic**
Mode of study	**full-time programme**
Specialism	**all**
Department responsible	**Department of Mechatronics and Weapons Engineering**
Course leader	**prof. dr hab. inż. Ryszard Dindorf**
Approved by	**dr hab. Jakub Takosoglu, prof. PŚk, Dean of the Faculty of Mechatronics and Mechanical Engineering**

COURSE OVERVIEW

Course type		**programme-specific**
Course status		**compulsory**
Language of instruction		**English**
Semester of delivery	full-time programme	**Semester I**
	part-time programme	**Semester I**
Pre-requisites		
Examination required (YES/NO)		**NO**
ECTS value		**2**

Mode of instruction		**lecture**	**class**	**laboratory**	**project**	**seminar**
No. of hours per semester	full-time programme	**15**		**15**		
	part-time programme					

LEARNING OUTCOMES

Category of outcome	Outcome code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	It has in-depth, structured, and advanced knowledge in the field of automation and robotization of production processes.	MiBM2_W09
	W02	It has established in-depth knowledge related to programming and controlling manipulation machines and industrial robots.	MiBM2_W12
Skills	U01	Can skilfully select methods and advanced software to solve issues in automation equipment and industrial robots..	MiBM2_U02
	U02	Can quickly identify and diagnose engineering problems, proposing innovative methods to solve them. Conducts critical systems analysis and evaluates existing technical solutions, equipment, systems and processes for automation and robotisation of production.	MiBM2_U09
Competence	K01	It is aware of the need to supplement and expand my knowledge in the field of production robotics automation. It is ready to critically evaluate the knowledge it possesses, the importance of knowledge in solving cognitive and practical problems, and the need to acquire new information from both literature and experts in the field of production robotics automation. Understand the need and understand the possibilities of continuous improvement (third-cycle studies, postgraduate studies, courses) aimed at improving professional, personal, and social competencies.	MiBM2_K01
	K02	It is aware of the importance of providing society with opinions and information in the field of production automation and robotization, acting for the benefit of society, fulfilling appropriate functions within it, and initiating and organizing activities for the benefit of the social environment.	MiBM2_K04

COURSE CONTENT

Mode of instruction	Topics covered
lecture	Fundamentals of industrial production automation and robotization. Manipulation and manipulation machines in production processes. Mechanisms of manipulation machines and manipulators. Review and application of industrial robots. Industrial robot software. Safety measures for production automation and robotization. Kinematic structures of industrial robots. Kinematics and dynamics of industrial robots. Computer modeling of kinematics and dynamics of industrial robots.
laboratory	Construction and control of manipulators and industrial robots with serial kinematic structures. Construction and control of manipulators and industrial robots with parallel kinematic structures. Construction and control of servo drives for manipulators and industrial robots. Construction and control of industrial robot grippers.

ASSESSMENT METHODS

Outcome code	Methods of assessment					
	Oral examination	Written examination	Test	Project	Report	Other
W01			X			
W02			X			
U01					X	
U02					X	
K01						X
K02						X

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	Assessment criteria
lecture	non-examination assessment	Passing the colloquium. Obtaining at least 50% of the points.
laboratory	non-examination assessment	Positive assessment of reports and control questions from laboratory. The final grade is the arithmetic mean.

OVERALL STUDENT WORKLOAD

ECTS weighting													
No.	Activity type	Student workload										Unit
		full-time programme					part-time programme					
		L	C	Lb	P	S	L	C	Lb	P	S	
1.	Scheduled contact hours	**15**		**15**								h
2.	Other contact hours (office hours, examination)	**2**		**2**								h
3.	**Total number of contact hours**	**34**										h
4.	**Number of ECTS credits for contact hours**	**1,4**										ECTS
5.	**Number of independent study hours**	**16**										h
6.	**Number of ECTS credits for independent study hours**	**0,6**										ECTS
7.	**Number of practical hours**	**25**										h
8.	**Number of ECTS credits for practical hours**	**1,0**										ECTS
9.	**Total study time**	**50**										h
10.	**ECTS credits for the course** *1 ECTS credit = 25-30 hours of study time*	**2**										ECTS

READING LIST

1. Dindorf R.: Modeling and simulation of nonlinear elements and control systems of fluid drives, Kielce University of Technology Publishing House, Kielce 2004.
2. Dindorf R. Flexible pneumatic actuators. Monograph. Kielce University of Technology Publishing House, Kielce 2013.
3. Dindorf R., Dziechciarz S., Łaski P.: Laboratory of automation and robotics basics. Kielce University of Technology Script No. 371, Kielce 2001.
4. Dindorf R.: Fluid power systems. Theoretical foundations and calculation methods of hydrostatic and pneumatic drives. Academic textbook. Kielce University of Technology Publishing House, Kielce, 2009.
5. Honczarenko J.: Industrial robots: construction and application. WNT, Warsaw 2004.
6. Kowalski T., Lis G., Szenajch W.: Technology and automation of machine assembly. OW PW, Warsaw 2000.
7. Kosmol Jan.: Automation of machine tools and machining. WNT, Warsaw 1995.
8. Mikulczyński T., Automation of production processes. WNT, Warsaw 2006.
9. Morecki A., Knapczyk J., Fundamentals of robotics. Theory and elements of manipulators. WNT, Warsaw 1999.
10. Pochopień B., Automation of industrial processes. WSiP, Warsaw 1993.
11. Jezierski E.: Robot dynamics, WNT 2006.
12. Honczarenko J.: Industrial robots. WNT 2004.
13. Merlet J.P. Parallel robots. Springer 2006.
14. Morecki A., Oderfeld J.: Theory of machines and mechanisms, PWN, 1987.
15. Pochopień B., Automation of industrial processes. WSiP, Warsaw 1993.
16. Olszewski M.: Manipulators and industrial robots. WNT, Warsaw, 1985.