COURSE SPECIFICATION

Course code	full-time programme:	**M#2-S1-ME-308A**
	part-time programme:	
Course title in Polish	**Teoria maszyn i mechanizmów**	
Course title in English	**Theory of machines and mechanisms**	
Valid from (academic year)	**2024/2025**	

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**first-cycle**
Type of education	**academic**
Mode of study	**full-time programme**
Specialism	**all**
Department responsible	**Department of Mechanics and Heat Transfer**
Course leader	**dr inż. Andrzej Bąkowski**
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		**elective**
Language of instruction		**English**
Semester of delivery	full-time programme	**Semester III**
	part-time programme	
Pre-requisites		**Engineering Mechanics I, Engineering Mechanics II**
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	Has advanced, structured knowledge of machine safety, kinematics of mechanism links and kinematic analysis of plane mechanisms, understands d'Alembert's principle. Has knowledge in determining the reaction in kinematic pairs and the balancing moment for a given working load.	MiBM1_W02 MiBM1_W05
	W02	Has advanced knowledge of basic machine elements. Knows the principles of balancing flat mechanisms and rotors. Has knowledge of the analysis of forces in kinematic pairs, taking into account friction and efficiency of mechanisms.	MiBM1_W06 MiBM1_W11
	W03	Has advanced knowledge of basic concepts such as: link, kinematic pair, kinematic chain, mechanism. Has advanced knowledge of structural analysis, classification of kinematic pairs and mobility of mechanisms necessary during design.	MiBM1_W18
Skills	U01	Is able to use the acquired knowledge to analyze and determine the mobility of mechanisms. He can read and draw kinematic diagrams of planar mechanisms.	MiBM1_U03
	U02	The student is able to use basic forms of communication in mechanics in the field of the construction and operation of machines, is able to present and evaluate various opinions and draw conclusions.	MiBM1_U07 MiBM1_U12
Competence	K01	Is ready to critically evaluate the acquired knowledge, is aware of the need to supplement specialist knowledge throughout life and is able to select appropriate sources of knowledge and learning methods for himself and others.	MiBM1_K01 MiBM1_K02
	K02	Is aware of the responsibility associated with decisions made as part of engineering and managerial activities.	MiBM1_K05

COURSE CONTENT

Type of instruction lecture	Topics covered

lecture	Basic concepts: link, kinematic pair, kinematic chain, mechanism. Classification of kinematic pairs. Structural analysis of mechanisms. Mobility of planar and spatial mechanisms. Classification of flat mechanisms. Passive constraints and local degrees of freedom. Mechanisms with a rational design. Kinematic analysis of planar mechanisms using velocity and acceleration diagrams. Analytical methods for determining the velocities and accelerations of links and selected points of lever mechanisms. Kinematic analysis of wheel gears. Static and kinetostatic analysis of lever mechanisms without taking into account friction. Determining reactions in kinematic pairs. Determination of the torque balancing the working load. Sample analysis of a gripper. Analysis of forces in kinematic pairs taking into account friction. Efficiency of the mechanisms. Machine energy balance. Balancing mechanisms.
project	Implementation of projects covering the following issues: Structural analysis - mobility of planar mechanisms. Kinematic analysis of lever mechanisms using the graphical method - velocity diagrams and acceleration diagrams. Kinematic analysis of the mechanism using the analytical method - determining the velocities and accelerations of selected points of the lever mechanism. Kinetostatic/static analysis of a flat lever mechanism. Determination of the balancing moment (balancing force) for the working load without taking into account friction in kinematic pairs. Balancing flat lever mechanism.

ASSESSMENT METHODS

Outcome code	Methods of assessment *(Mark with an X where applicable)*					
	Oral examination	Written examination	Test	Project	Report	Other
W01			X	X		
W02			X	X		
U01			X	X		
U02			X	X		
K01			X	X		
K02			X	X		

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	Assessment criteria
lecture	non-examination assessment	Positive completion of the final colloquium. Obtaining at least 50% of points.
project	non-examination assessment	Final grade based on the developed projects. Obtaining at least 50% of points.

OVERALL STUDENT WORKLOAD

ECTS weighting			
No.	Activity type	Student workload	Unit

		full-time programme					part-time programme					
1.	Scheduled contact hours	L	C	Lb	P	S	L	C	Lb	P	S	h
		15			15							
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**										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. Kędzior, Knapczyk, Morecki: Teoria mechanizmów i maszyn, WNT, W-wa, 2001.
2. A. Olędzki: Podstawy teorii maszyn i mechanizmów, PWN, W-wa, 1987.
3. S. Miller : Teoria maszyn i mechanizmów, PW, Wrocław, 1996.
4. J.Felis, H.Jaworowski: Teoria Maszyn i Mechanizmów cz. I i II. Wyd. uczelniane
5. AGH. Kraków 2007.