COURSE SPECIFICATION

Course code	full-time programme:	**M#2-S2-ME-PT-211**
	part-time programme:	
Course title in Polish	**Projektowanie maszyn i urządzeń**	
Course title in English	**Machine Design**	
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-timeprogramme**
Specialism	**Design and Manufacturing**
Department responsible	**Department of Maintenance, Laser and Nanoscale Technologies**
Course leader	**dr inż. Piotr Kurp**
Approved by	**dr hab. Jakub Takosoglu, prof. PŚk, Dean of the Faculty of Mechatronics and Mechanical Engineering**

COURSE OVERVIEW

Course type		**specialism-related**
Course status		**compulsory**
Language of instruction		**English**
Semester of delivery	full-time programme	**Semester II**
	part-time programme	**Semester II**
Pre-requisites		
Examination required (YES/NO)		**NO**
ECTS value		**3**

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 knowledge in the design of machinery and equipment and the solution of engineering tasks in mechanics and mechanical engineering. Can understand the physical relationships in mechanical machines and the complex relationships between them.	MiBM2_W02
	W02	Has advanced knowledge of creating and analyzing technical documentation, including elements of engineering design. Has detailed theoretical knowledge of designing machine parts and their construction.	MiBM2_W06 MiBM2_W07
	W03	Has established and in-depth knowledge of engineering graphics and CAD/CAM systems used to design mechanical parts and devices.	MiBM2_W12
Skills	U01	Be able to apply knowledge from the basic sciences to solve complex engineering problems in mechanics and mechanical engineering. This includes design, construction, selection and materials.	MiBM2_U01
	U02	Be able to select and use methods and tools, including advanced computer software, to solve complex problems related to mechanics and mechanical engineering. Is able to apply analytical, numerical and simulation methods in design and construction.	MiBM2_U02 MiBM2_U08
	U03	Is able to prepare documentation using specialised terminology. Is able to design mechanical systems using computer aided design and performs design of complex machine components using CAD/CAM software.	MiBM2_U04 MiBM2_U13
Competence	K01	Is aware of the need to independently supplement and expand knowledge in the field of mechanics and machine design. Is ready to critically evaluate the knowledge they possess, the importance of knowledge in solving cognitive and practical problems, and the need to acquire new information both from literature and from experts in the field of mechanics and machine design.	MiBM2_K01
	K02	Is ready to responsibly perform professional roles related to the field of study of mechanics and machine design, adhere to ethical principles and work to ensure compliance with these principles, taking into account changing social needs, cares about the achievements, ethos and traditions of the profession. Adheres to the principles of professional ethics and takes action to ensure their compliance.	MiBM2_K05

COURSE CONTENT

Mode of instruction	Topics covered

lecture	Repetition of the principles of creating technical drawing documentation - principles in technical machine drawing. Basic principles of designing mechanical devices. Definition of transmission: geometric, kinetic and dynamic. Types of mechanical transmissions, calculations of transmissions, selection of transmissions in mechanical devices. Clutches in mechanical devices - types, principle of operation, principles of clutches' selection. Shafts and axles and bearings in machine design - types of bearings, calculations of bearings, principles of bearings' selection in mechanical devices. Linear technique in machine design - types of guide rails and rolled ball screws mechanisms, calculations and principles of selection of guide rails and rolled ball screws mechanisms in mechanical devices. Basic information on the connections of machine parts - types, calculations, principles of selection.
Class	Computational exercises concerning: calculation of power/torque requirements of engines used in mechanical drives (engine selection depending on operating parameters), calculation and selection of selected mechanical transmissions, calculation and selection of rolled ball screw mechanisms.
project	An individual design task consisting in performing basic calculations of selected mechanical transmissions and rolled ball screw mechanisms, selecting construction elements (bearings, clutches, guide rails) and drives, and presenting own design solution in the form of technical and drawing documentation for an exemplary mechanical system.

ASSESSMENT METHODS

Outcome code	Methods of assessment					
	Oral examination	Written examination	Test	Project	Report	Other
W01			X			
W02			X			
W03			X			
U01			X	X		
U02			X	X		
U03			X	X		
K01						X
K02						X

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	Assessment criteria
lecture	non-examination assessment	Obtaining at least 51 points out of 100 possible in the final assignment
class	non-examination assessment	Obtaining at least 51 points out of 100 possible in written assignments
project	non-examination assessment	Obtaining at least 51 points out of 100 possible for the completed design task

OVERALL STUDENT WORKLOAD

ECTS weighting												
No.	Activity type	Student workload										Unit
		full-time programme					part-time programme					
1.	Scheduledcontacthours	L	C	Lb	P	S	L	C	Lb	P	S	h

		15	**15**		**15**							
2.	Other contact hours (office hours, examination)	**2**	**2**		**2**							h
3.	**Total number of contact hours**	**51**										h
4.	**Number of ECTS credits for contact hours**	**2,0**										ECTS
5.	**Number of independent study hours**	**24**										h
6.	**Number of ECTS credits for independent study hours**	**1,0**										ECTS
7.	**Number of practicalhours**	**50**										h
8.	**Number of ECTS credits for practical hours**	**2,0**										ECTS
9.	**Total study time**	**75**										h
10.	**ECTS credits for thecourse** *1 ECTS credit = 25-30 hours of study time*	**3**										ECTS

READING LIST

1. Leonid W. Kurmaz, Oleg L. Kurmaz., Podstawy konstruowania węzłów i części maszyn: podręcznik konstruowania, Wydawnictwo Politechniki Świętokrzyskiej, Kielce 2011.
2. Eugeniusz Mazanek (red.), Przykłady obliczeń z podstaw konstrukcji maszyn cz. 1, Połączenia, sprężyny, zawory, wały maszynowe, Wydawnictwa Naukowo-Techniczne, Warszawa 2012.
3. Eugeniusz Mazanek (red.), Przykłady obliczeń z podstaw konstrukcji maszyn cz. 2, Łożyska, sprzęgła i hamulce, przekładnie mechaniczne, Wydawnictwa Naukowo-Techniczne, Warszawa 2012.
4. Joachim Potrykus, Poradnik mechanika, REA, 2022.
5. Zdzisław Bańkowski et al., Mały poradnik mechanika. T. 1, Nauki matematyczno-fizyczne, materiałoznawstwo, Wydawnictwa Naukowo-Techniczne, Warszawa 1994.
6. Zdzisław Bańkowski et al., Mały poradnik mechanika. T. 2, Podstawy konstrukcji maszyn, maszynoznawstwo, Wydawnictwa Naukowo-Techniczne, Warszawa 1994.
7. Katalogi producentów: łożysk ślizgowych i tocznych, napędów liniowych, silników