COURSE SPECIFICATION

Course code	full-time programme:	**M#2-S1-ME-504**
	part-time programme:	
Course title in Polish	**Podstawy konstrukcji maszyn II**	
Course title in English	**Machine Design II**	
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 Machine Design and Machining**
Course leader	**dr hab. inż. Jarosław Gałkiewicz, prof. PŚk**
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 V**
	part-time programme	
Pre-requisites		**Machine Design I**
Examination required (YES/NO)		**YES**
ECTS value		**5**

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

LEARNING OUTCOMES

Category of outcome	Outcome code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	Has knowledge of the advanced vocabulary necessary to describe the components of mechanical devices and explain the principles of their operation. Understands the operating principles of typical mechanical devices and how to drive them	MiBM1_W06
	W02	Knows the engineering methods and tools used in the design of mechanical devices	MiBM1_W09
	W03	Knows and understands the principles of designing typical mechanical equipment and selecting standardized machine components	MiBM1_W15
Skills	U01	Has the skills to apply the knowledge gained to design a new mechanical device and evaluate its properties	MiBM1_U01
	U02	Is able to speak efficiently about mechanical devices enriching his descriptions with drawings, diagrams and calculations	MiBM1_U07
	U03	Is able to use computer programs that make the work of a design engineer easier and faster.	MiBM1_U19
	U04	Is able to assess the impact of the selected material on the production costs of the element and its durability.	MiBM1_U18
Competence	K01	Is ready to critically evaluate the impact of the designed device on human safety and the environment	MiBM1_K02
	K02	Is ready to consciously apply the principles of design, especially those affecting the ethical aspects of design that shape the ethos of the engineer.	MiBM1_K06

COURSE CONTENT

Type of instruction lecture	Topics covered
lecture	Characteristics, structure, and strength assessment of the permanent non-separable joints. Designing of shafts. Discussion of rolling and plain bearings. Discussion of couplings. Characteristics of mechanical gears. Introduction to toothed gears, characteristics of the involute tooth, profile shifting, smoothness of gear meshing in spur gears and helical gears.
class	A set of tasks including tension, bending, torsion, and shear of structural elements. Calculation of detachable joints. Calculation of non-detachable joints. Selection of bearings.

laboratory	Performing in any order a set of experiments: 1. Determination of the critical speed and natural frequency of the shaft. 2. Analysis of the operation of sliding contact bearings (distribution oil pressure, coefficient of friction). 3. Analysis of the operation of a belt transmission. 4. Analysis of the operation of a spur/helical gear. 5. Analysis of rolling contact bearing operation. 6. Statistical analysis of the results.
project	The design of a power screw-based mechanism.

ASSESSMENT METHODS

Outcome code	Methods of assessment *(Mark with an X where applicable)*					
	Oral examination	Written examination	Test	Project	Report	Other
W01		X				
W02		X		X		
W03		X	X	X		
U01				X		
U02			X	X	X	
U03				X	X	
U04				X		
K01				X	X	
K02				X	X	

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	Assessment criteria
lecture	examination assessment	A minimum of 50% for the final examination.
class	non-examination assessment	Positive grade for homework and successful completion of the final test (obtaining at least 50% of points).
laboratory	non-examination assessment	A pass mark for each post-lab report. The final grade is the arithmetic average of the grades obtained.
project	non-examination assessment	Completion and defense of the project.

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**	**15**	**15**							

2.	Other contact hours (office hours, examination)	4	2	2	2							h
3.	**Total number of contact hours**	**70**										h
4.	**Number of ECTS credits for contact hours**	**2,8**										ECTS
5.	**Number of independent study hours**	**55**										h
6.	**Number of ECTS credits for independent study hours**	**2,2**										ECTS
7.	**Number of practical hours**	**94**										h
8.	**Number of ECTS credits for practical hours**	**3,8**										ECTS
9.	**Total study time**	**125**										h
10.	**ECTS credits for the course** *1 ECTS credit = 25-30 hours of study time*	**5**										ECTS

READING LIST

1. L. W. Kurmaz, Projektowanie węzłów i części maszyn, Wydawnictwo Politechniki Świętokrzyskiej, Kielce 2007
2. E. Guliński Podstawy Konstrukcji Maszyn. Część I, Wydawnictwo Politechniki Świętokrzyskiej, Skrypt nr 130, Kielce 1989
3. E. Guliński Podstawy Konstrukcji Maszyn. Część II, Wydawnictwo Politechniki Świętokrzyskiej, Skrypt nr 174, Kielce 1989
4. M. Dietrich, Podstawy Konstrukcji Maszyn, Wydawnictwa Naukowo- Techniczne, Warszawa 2006
5. E. Mazanek Przykłady obliczeń z podstaw konstrukcji maszyn, Wydawnictwa Naukowo-Techniczne, Warszawa 2005
6. V. B. Bhandari, Design of Machine Elements, Tata McGraw Hill Education Private Limited, 2010
7. R. G. Budynas, J. K. Nisbett, Shigley's Mechanical Engineering Design, McGraw-Hill Education, 2015
8. J. M. Gere, B. J. Goodno, Mechanics of Materials, Eighth Edition, SI, Cengage Learning, 2013