COURSE SPECIFICATION

Coursecode	full-timeprogramme:	**M#2-S2-ME-302**
	part-time programme:	
CoursetitleinPolish	**Eksploatacja systemów produkcyjnych**	
CoursetitleinEnglish	**Maintenance of Production Systems**	
Validfrom (academicyear)	**2024/2025**	

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**second-cycle**
Type of education	**academic**
Mode of study	**full-timeprogramme**
Specialism	**all**
Department responsible	**Department of Maintenance, Laser and Nanoscale Technologies**
Course leader	**dr inż. Piotr Sęk**
Approved by	**dr hab. Jakub Takosoglu, prof. PŚk, Dean of the Faculty of Mechatronics and Mechanical Engineering**

COURSE OVERVIEW

Coursetype		**programme-specific**
Course status		**compulsory**
Language of instruction		**English**
Semester of delivery	full-timeprogramme	**Semester III**
	part-time programme	**Semester III**
Pre-requisites		**none**
Examinationrequired (YES/NO)		**NO**
ECTS value		**3**

Mode of instruction		**lecture**	**class**	**laboratory**	**project**	**seminar**
No. of hours per semester	full-timeprogramme	**30**		**15**		
	part-time programme					

LEARNING OUTCOMES

Category of outcome	Outcomec ode	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	Has in-depth knowledge of the life cycle of the machine and production systems in connection with operational issues and the impact of maintenance and operational strategies on the course of wear processes	MiBM2_W05 MiBM2_W07 MiBM2_W08
	W02	Has in-depth knowledge of the impact of the technical condition of the machine and production systems on durability and reliability, as well as methods of shaping them in various phases of the production system's existence.	MiBM2_W07 MiBM2_W08
	W03	Has comprehensive knowledge of surface engineering, assessment of surface condition and durability, measurement of surface geometric parameters and tribological tests.	MiBM2_W07 MiBM2_W08 MiBM2_W11
Skills	U01	Is able to perform tribological tests and properly interpret the obtained results. Is able to measure the geometric parameters of surfaces and coatings and evaluate the obtained results.	MiBM2_U10
	U02	Is able to select appropriate engineering materials and coatings due to their tribological properties in order to achieve proper operation of the machine or production system.	MiBM2_U12
Competence	K01	Is aware of responsibility for his own work and is ready to comply with work rules and taking responsibility for jointly performed tasks.	MiBM2_K01
	K02	Is aware of the social role of a technical university graduate and understands the need to provide the public with information regarding scientific achievements related to the proper operation of machines and production systems in an understandable way.	MiBM2_K04

COURSE CONTENT

Mode of instruction	Topics covered
lecture	Basic issues of operation of machines, devices and systems. Operational requirements for machines and production systems. Aging and wear – elementary and technical wear processes. Operating machines and systems – renovation cycles. Lubrication - basics of lubrication theory, types of lubrication, lubrication methods. Properties of lubricants - characteristics of liquid, plastic and solid lubricants - selection of lubricants. Exploitation strategies and their selection. Surface engineering in the operation of production systems and machines. Modern technologies in surface engineering. Basic concepts of reliability theory - reliability characteristics of technical objects - methods of shaping and assessing reliability. Operational durability. Management of the operation of machines and systems.
laboratory	Identification of technical wear cases. Comparative assessment of materials' resistance to abrasion. Testing the scratch resistance of coatings. The influence of surface heat treatment on the operational properties of materials. Measurements of the thickness of operational coatings. The influence of abrasive blasting on the geometric structure of the surface - roughness measurements. The influence of electrical current parameters on the properties of coatings deposited by electro-spark machining.

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	
K01						X
K02						X

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	Assessment criteria
lecture	non-examination assessment	Obtaining a minimum of 50% points on the written test covering the content of the lectures.
laboratory	non-examination assessment	Preparation of independent reports covering the laboratory content. Obtaining a minimum of 50% points in the written test.

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	**30**		**15**								h
2.	Other contact hours (office hours, examination)	**2**		**2**								h
3.	**Total number of contact hours**	**49**										h
4.	**Number of ECTS credits for contact hours**	**2,0**										ECTS
5.	**Number of independent study hours**	**26**										h
6.	**Number of ECTS credits for independent study hours**	**1,0**										ECTS
7.	**Number of practicalhours**	**25**										h
8.	**Number of ECTS credits for practical hours**	**1,0**										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. Stanisław Legutko – Eksploatacja maszyn - Wydawnictwo Politechniki Poznańskiej 2007

2. Stanisław Borkowski, Selejdak Jacek, Salamon Szymon – Efektywność eksploatacji maszyn i urządzeń – Częstochowa 2006
3. Lech Dwiliński – Podstawy eksploatacji obiektu technicznego - Oficyna Wydawnicza Politechniki Warszawskiej 2006
4. Jan Bucior – Podstawy teorii i inżynierii niezawodności – Oficyna Wydawnicza Politechniki Rzeszowskiej – Rzeszów 2004
5. Hebda M. - Procesy tarcia, smarowania i zużywania maszyn. Wydawca: Instytut Technologii Eksploatacji – PIB. Rok wydania: 2007
6. Downarowicz D. - System eksploatacji- zarządzanie zasobami techniki. ITE Gdańsk 2000.
7. Żółtowski B., Niziński S. - Modelowanie procesów eksploatacji maszyn. ATR – Bydgoszcz i WiTPiS Sulejówek 2002.
8. Niziński S. - Elementy eksploatacji obiektów technicznych. NWM Olsztyn 2000