

Mechanical Engineering
Master Degree Studies

Subject:	Maintenance issues in construction of machinery and devices
Subject type:	Compulsory
Subject code:	
Year:	I or II
Semester:	2 or 3
Form of studies:	Full-time course
Type of classes and hours per semester:	60
Lecture	30
Exercise	–
Laboratory practice	30
Project	–
ECTS points:	4
Form of credit:	Assessment
Lecture language:	English

Subject objective	
C1	To acquaint the student with the theory of reliability and machinery maintenance
C2	Familiarize students with the processes of degradation of machine components and methods of their minimizing
C3	To acquaint the student with the methods of evaluation of the technical condition of machinery and equipment

Prerequisites in knowledge, skills and other competencies	
1	Knowledge of statistics
2	Basic knowledge of mechanical engineering (applied mechanics and machine elements)

Educational effects	
	Knowledge:
EK 1	Student has knowledge of the principles of maintenance of machines and equipment, and the impact of the maintenance strategy for durability and reliability
	Skills:
EK 2	Student is able to determine reliability indicators and formulate service requirements placed on machines and select the method and evaluate the technical condition of machinery
	Social competencies:
EK 3	Student is aware of the impact of the maintenance strategy to system efficiency, including the effects of non-compliance with the design rules and proper maintenance for the safety of people and the environment

Curriculum content of Subject
Form of classes - Lecture



KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI



UNIA EUROPEJSKA
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Projekt współfinansowany ze środków Unii Europejskiej
w ramach Europejskiego Funduszu Społecznego

Curriculum content	
W1	Introduction. Basic concepts. Classification of machines. Phases of the existence of a technical object. Types of activities in the process of using and maintenance of technical objects. Quality of machinery. Maintenance requirements placed on machines. Serviceability of machines and devices.
W2	Legal requirements for placing of machinery on the market or putting into service. Procedures for assessment of conformity with the essential health and safety requirements. Instructions for machinery and other devices.
W3	The processes of degradation of machine parts. Technical state of a technical object.
W4	Lubrication and lubricants.
W5	Fuels and other supplies.
W6	The theory of reliability of technical objects. Reliability of a non-renewable and renewable elements. Reliability of complex objects. Reliability structures. The reliability dependence of the mechanism of failure. Determination of reliability characteristics.
W7	Technical diagnostics. Diagnostic signals. Basic diagnostic techniques. The use of diagnostic information in the maintenance of machinery.
W8	Maintenance strategies of technical objects.
W9	Organization of service and repair processes.
W10	Repetition of material. Exam. Credit.
Class form: laboratory practice	
Curriculum content	
L1	Introductory classes. Familiarization with the lab.
L2	Preparation of documentation related to the introduction of the machine into operation.
L3	Tests and acceptance of machinery.
L4	Noise measurements and thermal diagnostics.
L5	Vibroacoustic diagnostics of bearings and gears.
L6	Characteristics determination of reliability of technical objects.
L7	Supplementary classes. Credit.

Teaching methodology	
1	Lecture and multimedia presentation
2	Discussion
3	Performing experiments and preparation of reports

Student workload	
Form of activity	Average hours to complete activity
Teacher contact hours, including:	60
Attendance at lectures	30
Attendance at laboratory practice	30
Total student work time, including:	
Preparation for lectures, including assessment	20
Preparation for laboratory practice, including	20



reports	
Total student work time	100
Total ECTS for the subject:	4
Total of ECTS for practical classes (exercise, laboratory practice, projects)	2

Basic reference literature	
1	Podstawy racjonalnej eksploatacji maszyn. Pod red. M. Woropay'a. Radom, ITE 1996
2	Niziński S., Michalski R.: Diagnostyka obiektów technicznych. Radom, ITE 2002
3	Słowiński B.: Inżynieria eksploatacji maszyn. Koszalin. PK 2011
4	Legutko S.: Podstawy eksploatacji maszyn. Poznań, Wyd. Politechniki Poznańskiej 1999
Complementary reference literature	
1	Niewczas A., Koszałka G.: Niezawodność silników spalinowych – wybrane zagadnienia. Lublin, Wyd. Politechniki Lubelskiej 2003
2	Cempel C., Tomaszewski F.: Diagnostyka maszyn. Radom, NCNEM 1992.
3	Lawrowski Z.: Technika smarowania. Warszawa, PWN 1996
4	Hebda M.: Procesy tarcia, zużywania i smarowania maszyn. Radom, ITeE 2007
5	Podniato A.: Paliwa, oleje i smary w ekologicznej eksploatacji. Warszawa, WNT 2002
6	Dyrektywa maszynowa 2006/42/WE

Educational effect matrix					
Educational effect	Specific educational effect reference to curriculum-wide effects (PEK)	Subject objective	Curriculum content	Teaching methodology	Evaluation methods
EK 1	MBM2A_W09 + MBM2A_W12 +++ MBM2A_W13 +	C1, C2, C3	W1 do W9, L2 do L6	1, 2, 3	O1, O2
EK 2	MBM2A_U02 + MBM2A_U15 + MBM2A_U19 ++ MBM2A_U24 ++ MBM2A_U25 ++	C2, C3	L1 do L7, W6 i W7	3, 2, 1	O2, O3
EK 3	MBM2A_K01 + MBM2A_K02 ++ MBM2A_K03 + MBM2A_K04 +	C1, C2, C3	W1 do W10, L1 do L7	3, 2, 1	O3, O1



	MBM2A_K06 +				
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Evaluation methods and criteria		
Evaluation method symbol	Evaluation method description	Pass threshold
O1	Lecture written assessment	50%
O2	Reports of laboratory exercises	100%
O3	Evaluation of tests performed in the field of laboratory exercises	50%

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