

## COURSE GUIDE

<u>Subject name</u>	<b>Management of machinery and equipment operation</b>
<u>Course of study</u>	<b>Quality and Production Management</b>
<u>The form of study</u>	<b>Full-time</b>
<u>Level of qualification</u>	<b>First</b>
<u>Year</u>	<b>III</b>
<u>Semester</u>	<b>VI</b>
<u>The implementing entity</u>	<b>Department of Production Engineering and Safety</b>
<u>The person responsible for preparing</u>	<b>dr inż. Marek Krynke</b>
<u>Profile</u>	<b>General academic</b>
<u>ECTS points</u>	<b>3</b>

### TYPE OF TEACHING – NUMBER OF HOURS PER SEMESTER

LECTURE	CLASS	LABORATORY	PROJECT	SEMINAR
15E	15	15	-	-

### COURSE AIMS

- C1. To familiarize students with issues related to the use and operation of machines and the evaluation of machines from an operational point of view.
- C2. Ability to assess the use and modernity of technical objects.
- C3. Practical application of TPM coefficients, PAMCO and ABC technology methods.

### ENTRY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student has basic knowledge in the field of quality management and production processes.
2. Student has the ability to perform mathematical calculations.
3. Student can use basic computer programs like text editor and spreadsheet.

### LEARNING OUTCOMES

- EU1. Has basic knowledge about machine operation, their reliability and technical condition.
- EU2. It is possible to prepare a report on the performed tests and to determine basic reliability characteristics, to calculate selected operating factors of technical objects.
- EU3. Student is able to assess modernity of selected machine or equipment.
- EU4. Is aware of the effects of improper use of equipment for the safety of people and the environment

### COURSE CONTENT

Type of teaching – Lecture	Number of hours
W1. Basic concepts related to the operation of machines and devices.	1
W2. Operation and reliability of technical equipment.	1
W3. Quality problems of operations and organizer techniques.	1
W4. Basics of wear processes.	1
W5. Diagnosis of technical condition of machines and devices.	1
W6. Concepts of TPM and defining its objectives.	1
W7. The major loss of performance of the equipment.	1
W8. Reliability characteristics of technical objects.	1
W9. The generation of the SMED method.	1
W10. Practices 5S - Implementation Steps and Application.	1
W11. Analysis of working time of machines and devices.	1
W12. Using the ABC technology method to evaluate the modernity of machines and devices.	1
W13. IT systems supporting the maintenance of machines and equipment.	1
W14. Risk analysis in the process of exploitation of technical objects.	1

W15. Legal and normative aspects in the construction and operation of machine equipment.	1
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<b>Type of teaching - CLASS</b>	<b>Number of hours</b>
C1. Planning the maintenance structure of machinery and equipment.	1
C2. Classification of fixed assets in the enterprise.	1
C3. Deployment of a new machine or device.	1
C4. Machine operating documentation, equipment.	1
C5. Repair and maintenance plan for the selected production facility.	1
C6. Calculation of operating costs.	1
C7. Environmental Protection Manual.	1
C8. Operating Instructions for Machine or Equipment.	1
C9. Instructions for performing particularly dangerous work.	1
C10. Occupational risk for the selected workplace.	1
C11. Assessment of modernity of identified parts of machinery and equipment components using the 5-step Parker scale.	1
C12. Analysis of quality of manufactured products and quality of selected machines.	2
C13. Summing lessons. Examination.	2
<b>Type of teaching - LABORATORY</b>	<b>Number of hours</b>
L1. Calculation of selected operating factors of technical objects.	2
L2. Study and analysis of the coefficients of operation graphs.	2
L3. Qualitative analysis of machinery and equipment. Indicators Cpm, Cpmk.	2
L4. Graphical analysis of modern machines and devices.	2
L5. Development of selected quality management instruments for work pieces by analyzed machines.	2
L6. Identification of machine operating times and their analysis.	1
L7. The division of machine operating times according to PAMCO structure and their analysis.	2
L8. Specification of parts of subassemblies of selected machine units. Division into three groups according to ABC technology method.	1
L9. Summing lessons. Examination.	1

### TEACHING TOOLS

1. Audiovisual presentation.
2. Chalk + board.
3. Textbooks + scripts + magazines.
4. Computer software: MO Excel and Word.

### WAYS OF ASSESSMENT (F – FORMATIVE, P – SUMMATIVE)

- F1. Observation of students' work in the classroom.  
 F2. Observation of students' work in the laboratory.  
 P1. Assessment test.  
 P2. Written exam.

### STUDENT WORKLOAD

<b>Form of activity</b>		<b>Average number of hours for realization of the activity</b>		
		<b>[h]</b>	<b>ECTS</b>	<b>ECTS</b>
Contact hours with the teacher	Lecture	15	0.6	1.08
Preparation for exam		10	0.4	
Exam		2	0.08	
Contact hours with the teacher	Class	15	0.6	0.72

Preparation for class	3	0.12	
Contact hours with the teacher	Laboratory	15	0.6
Getting Acquainted with the indicated literature	10	0.4	0.4
Consultation	5	0.2	0.2
<b>TOTAL NUMBER OF HOURS / ECTS POINTS FOR THE COURSE</b>	<b>75</b>	<b>3</b>	

## BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

### Basic resources

1. Balbir S. Dhillon. Maintainability, Maintenance and Reliability for Engineers. Boca Raton: Taylor and Francis, 2006.
2. Summerville N. Basic Reliability: an Introduction to Reliability Engineering. Bloomington, Author House, 2004.
3. Zein A. Transition Towards Energy Efficient Machine Tools. Springer-Verlag. 2012

### Supplementary resources

1. Borkowski S., Selejdak J. Effectiveness of the Machines Maintenance and Processes. Technical University Publisher 2009.
2. Borkowski S., Krynke M. Machines Operating Conditions. Oficyna Wydawnicza Stowarzyszenia Menedżerów Jakości i Produkcji. 2014
3. Robert C. Rosaler. HVAC Maintenance and Operations Handbook. M(a)cGraw-Hill Book Company, New York 1997.
4. Krynke M., Zasadzień M., Czaja P. Systemy techniczne – technologia, jakość, eksploatacja. Monografia. Oficyna Wydawnicza Stowarzyszenia Menedżerów Jakości i Produkcji. Częstochowa 2016. 120s.

## TEACHERS ( NAME, SURNAME, E-MAIL ADDRESS)

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## MATRIX OF LEARNING OUTCOMES REALISATION

Learning outcome	Reference of given outcome to outcomes defined for whole program (PRK)	Course aims	Course content	Teaching tools	Ways of assessment
EU1	K_W01, K_W02, K_W05, K_W09, K_W10, K_U06, K_U07, K_U09, K_U10	C1	W1-W5, C1-C5,	1, 2, 3	F1, P1, P2
EU2	K_W05, K_W07, K_W09, K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U07, K_U09, K_U10, K_K01	C2, C3	W6-W13, C6, C8, C9, C11-C13, L1-L4, L6-L9	1, 2, 3,4	F1, F2, P1, P2
EU3	K_W07, K_W09, K_U01, K_U02, K_U06, K_U08, K_U09, K_K01, K_K04, K_K05	C2,	W5, W12, C11	1, 2, 3,4	F1, P1, P2
EU4	K_W01, K_W02, K_W03, K_W05, K_W08, K_W09, K_U04, K_U05, K_U07, K_U09, K_U10, K_K02	C2, C3	W14, W15, C7, C10, C13, L5, L9	1, 2, 3, 4	F1, F2, P1, P2

## FORM OF ASSESSMENT - DETAILS

	<b>grade 2</b>	<b>grade 3</b>	<b>grade 4</b>	<b>grade 5</b>
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<b>EU1</b>	Student can not use the concepts of operating the technical systems.	Student knows use the concepts of operating the technical systems.	Student knows how to use technical systems. He can evaluate the technical condition of the machines.	Student knows how to use technical systems and can express their opinions. It is characterized by reliability, evaluates the technical condition of machines.
<b>EU2</b>	Student can not describe the functioning of the machine maintenance system (TPM) in the production process, does not distinguish methods of improving the functioning of technical objects in the production system.	Student can describe the functioning of the machine maintenance system (TPM) in the production process, does he distinguish methods of improving the functioning of technical objects in the production system.	Student can describe the functioning of the machine maintenance system (TPM) in the production process. Student distinguishes methods of improving functioning of technical objects in the production system.	Student can describe the functioning of the machine maintenance system (TPM) in the production process and can plan it.
<b>EU3</b>	Student can not assess the modernity of the selected machine or device.	Student can partially assess the modernity of the selected machine or device.	Student is able to evaluate the modernity of identified parts of machine and device components using the Parker 5-point scale.	Student is able to assess the modernity of identified parts of machine and device components using the Parker 5-point scale, and draw appropriate conclusions.
<b>EU4</b>	Student does not have the ability to synthesize and use knowledge from various fields of study in order to analyze and solve the technical objects set up.	Student uses the results of his knowledge to a limited extent and is not able to sufficiently analyze or solve the problem of the use of technical facilities.	Student is able to use the acquire knowledge to solve the problem of the exploitation of technical objects.	Student distinguishes methods of improving the functioning of technical objects in the production system and can adjust them accordingly. It is characterized by reliability, evaluates the technical condition of machines.

#### **ADDITIONAL USEFUL INFORMATION ABOUT THE COURSE**

1. Information where presentation of classes, instruction, subjects of seminars can be found, etc. - presented to students during first classes, if required by the formula classes are sent electronically to the e-mail addresses of individual dean groups.
2. Information about the place of classes - Information can be found on the website of the Faculty of Management.
3. Information about the timing of classes (day of the week / time) - Information can be found on the website of the Faculty of Management
4. Information about the consultation (time + place) - Information can be found on the website of the Faculty of Management.