

## COURSE GUIDE

<u>Subject name</u>	<b>Production Systems</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 hab. inż. Robert Ulewicz, prof. PCz</b>
<u>Profile</u>	<b>general academic</b>
<u>Course type</u>	<b>specialty subjects</b>
<u>ECTS points</u>	<b>4</b>

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

<b>LECTURE</b>	<b>CLASS</b>	<b>LABORATORY</b>	<b>PROJECT</b>	<b>SEMINAR</b>
<b>15E</b>	<b>15</b>	-	<b>15</b>	-

## COURSE AIMS

- C1. Understanding the rules of functioning of flexible and classic production systems
- C2. Knowledge of the principles of construction and control of production systems.

## ENTRY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

- 1. Basic knowledge of the course of productions systems
- 2. Knowledge about the functioning of the economy
- 3. The ability to carry out mathematical calculations

## LEARNING OUTCOMES

EU 1-.The student has basic knowledge about the classification and construction of production systems

EU 2 - Able to describe, present and select a production system with particular emphasis on production control techniques

EU 3 - The student has the ability to synthesize and use knowledge from different areas of education in order to analyze and solve the stated problem related to the organization and control of production.

EU 4 - Student is able to use basic information, communication and organizational techniques necessary to control production.

## COURSE CONTENT

<b>Type of teaching – Lecture</b>	<b>Number of hours</b>
W 1-Characteristics of production systems, flexible, conventional, unit production, low-volume, mass production	2
W 2-Flexible and conventional production systems	2
W 3-Conventional production systems	2
W 4-Flexibility of the production system, ESP system, premises for increasing the flexibility of production systems	2
W 5-The concept of rapid generation -QRM	1
W 6-Production systems based on the flow of one piece	1
W 7-Personalized mass production	1
W8-The production system of Toyota, Elektrolux, Canon	1
W 9- Methods and techniques of production control	2
W 10-New trends in the organization of production systems - virtual enterprises	1
<b>Type of teaching - class</b>	<b>Number of hours</b>
C 1- Analysis of selected aspects of production and manufacturing processes, parametric description of the production system	2
C 2- Analysis of selected production systems - process mapping	2
C 3- Selection of equipment, calculation of the overall effectiveness of machinery and equipment, coefficients	3
C 4- The use of methods of intercellular production control	2
C 5- The use of methods of intracellular production control	2
C6- Production control using the Just in time concept	2
C 7-Designing and improving production. Line (s) in the shape of the letter "U" and "S"	2
<b>Type of teaching - project</b>	<b>Number of hours</b>
P 1-Identification (case study) of the production system, decomposition of the production system, analysis of production flow in the analyzed or designed production system, parametric description of the production system	4
P 2-Development of a matrix of products manufactured in the analyzed production system - presentation of the so-called product families	4

P 3-Selection or identification of means of production with particular emphasis on the possibility of process automation and the use of flexible means of production	4
P 4-Evaluation of the functioning of production equipment, availability, time of cycle. Calculation of the overall effectiveness of selected machines and devices.	3

### TEACHING TOOLS

1. Visual media (computer, overhead projector, projector).
2. Chalk + blackboard + pen marker.
3. Manuals, scripts.
4. Calculation sheets

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

- F1. Observation of the student's work on the grade.  
 F2. Evaluation of the implementation of partial exercises.  
 P1. Final test.  
 P2. Written exam.

### STUDENT WORKLOAD

Form of activity		Average number of hours for realization of the activity		
		[h]	ECTS	ECTS
Contact hours with the teacher	Lecture	15	0.6	1.2
Preparation for exam		13	0.52	
Presence on the exam		2	0.08	
Contact hours with the teacher	Exercises	15	0.6	1
Preparation for the test of exercises		10	0.4	
Contact hours with the teacher	Project	15	0.6	1.88
Preparation of your own project		12	0.48	
Getting Acquainted with the indicated literature		12	0.48	
Presence on consultations		6	0.24	0.24
<b>TOTAL NUMBER OF HOURS / ECTS POINTS FOR SUBJECT</b>		<b>100</b>	<b>4</b>	

### BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

#### Basic resources:

1. Borkowski S., Ulewicz R.: Instruments of production processes improvement. PTM, Warszawa 2009
2. Borkowski S., Ulewicz R.: Manufacturing systems, Orgmasz, Warszawa 2009.
3. Tullio Tolio, Design of Flexible Production Systems, methodologies and Tools, Springer 2009.
4. Yasuhiro Monden, Toyota Production System: An Integrated Approach to Just-In-Time, 4th Edition, CRC press, 2012.

#### Supplementary resources:

1. Groover Mikell P. Fundamentals of Modern Manufacturing, Binder Ready Version: Materials, Processes, and Systems, John Wiley & Sons Inc, 2015
- 2.. Constanze Clarke, Automotive Production Systems and Standardisation from Ford and Mercedes-Benz, Springer 2005

**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
EU 1	K_W02, K_W05	C1, C2	W1-W4, C1-C3 P1	1, 2, 3, 4	P1, P2, F1, F2
EU 2	K_W02, K_W05, K_U01, K_U02, K_U04, K_U05, K_U06, K_U08, K_U09, K_U10,	C1, C2	W1-W11, C1-C7	1, 2, 3, 4	P1, P2
EU 3	K_W01, K_W02, K_W05, K_W07, K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U07, K_U08, K_U09, K_U10, K_K01	C1, C2	W1-W11, C1-C7 P1-P4	1, 2, 3, 4	P1, P2, F1, F2
EU4	K_W01, K_W02, K_W05, K_W07, K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U07, K_U08, K_U09, K_U10, K_K01	C1, C2	W1-W11, C1-C7 P1-P4	1, 2, 3, 4	P1, P2, F1, F2

**FORM OF ASSESSMENT - DETAILS**

	grade 2	grade 3	grade 4	grade 5
EU 1	he can not use concepts in the field of production management and organization of production systems	knows how to use concepts in the field of production management and organization of production systems	knows how to use the concepts of production management and organization of production systems	knows how to use the concepts of production and organization of production systems and express their opinion about them

EU 2	can not describe, present and select a production system with particular emphasis on production control techniques	can describe, present and make a selection of the production system	can describe, present and make a selection of a production system with particular emphasis on production control techniques	can describe, present and make a selection of the production system with particular emphasis on production control techniques, can express their opinion on their operation
EU 3	does not have the ability to synthesize and use knowledge from various areas of education in order to analyze and solve the stated problem associated with the organization and control of production.	has the selected ability to use knowledge from different areas of education in order to analyze and solve the stated problem associated with the organization and control of production.	has the ability to use knowledge from different areas of education in order to analyze and solve the stated problem associated with the organization and control of production.	has the ability to synthesize the use of knowledge from different areas of education in order to analyze and solve the stated problem associated with the organization and control of production.
EU 4	student is not able to use the basic information and communication techniques, organizational necessary to control production.	student knows how to use basic information and communication techniques, necessary to control production.	Student is able to use basic information and communication techniques, and selected organizational techniques necessary to control production.	Student is able to use basic information, communication and organizational techniques necessary to control production.

**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

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Coordinator