

## COURSE GUIDE

<u>Subject name</u>	<b>Production scheduling and control</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>II</b>
<u>Semester</u>	<b>IV</b>
<u>The implementing entity</u>	<b>Department of Production Engineering and Safety</b>
<u>The person responsible for preparing</u>	<b>dr inż. Magdalena Mazur</b>
<u>Profile</u>	<b>general academic</b>
<u>ECTS points</u>	<b>4</b>

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

LECTURE	CLASS	LABORATORY	PROJECT	SEMINAR
<b>15</b>		<b>30</b>	-	-

### COURSE AIMS

- C1. Knowledge of basic information about production systems and control of production flow depending on the production volume and its purpose (per warehouse, commissioned).
- C2. Overview of scheduling and production control.
- C3. Practical designation of orders for determining the size of batches and balancing of tasks.

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

1. The student knows the basic principles about functioning of production systems.
2. The student is knowledgeable about the implementation stages and logistics flow.
3. Student knows the basics of Microsoft Office programmes.
4. Student can do mathematical calculations.

### LEARNING OUTCOMES

- EU1. Student knows the basic issues of production flow control on production lines.
- EU2. Student uses the concepts of planning and production control techniques.
- EU3. Student can design a schedule of production works based on designated production batches.
- EU4. The student knows the guidelines and conditions for assessing the completeness of the production schedule, including all elements of the manufacturing system

### COURSE CONTENT

Type of teaching – LECTURE	Number of hours
W1. Production factors and their role.	1
W2. Concept of production capacity.	1
W3. The basic functions of planning and production control.	1
W4. Types of workpiece flow through production sites.	1
W5. Output and norms in production planning and control: batch size, production reproducibility intervals (bar, rhythm), production cycle, production stocks in progress.	2
W6. General assignment of production batches and load index of machines.	1
W7. Control by order urgency. Classification of priority rules.	1
W8. Push and pull production systems.	1
W9. Size of the production batch or delivery batch.	1
W10. Models and algorithms for load balancing.	1
W11. The concept of "bottlenecks" in production processes.	1
W12. Schedule at the workplace including the "bottleneck".	1
W13. Importance of constraint theory in OPT.	1
W14. Rules for recording production orders.	1

<b>Type of teaching - LABORATORY</b>	<b>Number of hours</b>
L1. Overview of organization rules and final evaluation conditions.	1
L2. Principles of organization of production systems - repetition.	1
L3. Overview of basic concepts in the field of scheduling and production control	2
L4. Overview of modular construction of integrated management systems in companies.	2
L5. Exercises in creating production cyclograms and Gantt chart - based on elements from production systems known by the participants	4
L6. Exercises in creating main production schedule MPS and Palmer Algorithm - based on elements from production systems known by the participants	2
L7. Exercises in creating production schedules using the CPM network method – based on elements from production systems known by the participants.	4
L8. Exercises in creating production schedules using the PERT network method – based on elements from production systems known by the participants.	4
L9. Laboratory classes based on the module of production flow simulation in the Push system - Factory of Things.	4
L10. Laboratory classes based on the module of production flow simulation in the Pull system - Factory of Things.	4
L11. Final test.	2

### TEACHING TOOLS

1. Lecture with audiovisual - presentation.
2. Simulation program "Factory of Things".
3. Compilation of numerical data for performance analyzes.
4. Textbooks and scripts.
5. Microsoft Office (excel, word) software.

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

- F1. Evaluation of sub-reports.  
 F2. Observation of student work.  
 P1. Partial control studies.

### 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	1.12
Preparation for classes		13	0.52	
Contact hours with the teacher	Laboratory	30	1.2	2.28
Preparation of the laboratory		12	0.48	
Preparing for test		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>100</b>	<b>4</b>	

### BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

#### Basic resources

1. Degrandis D., DeMaria T. Making Work Visible: Exposing Time Theft to Optimize Work & flow. Natl Book Network 2017.
2. Myerson P. Lean Supply Chain and Logistics Management. MCGRAW-HILL Professional 2012.
3. Kuehn U. Integrated Cost and Schedule Control in Project Management. Berrett- Koehler Publishers; 2 edition - 2010.

4. Burr D.S. The Schedule Book: 75 Schedules for Any Work Environment. Createspace Independent Pub, 2009.

#### Supplementary resources

1. Schutt J.H. Directing the Flow of Product. J.Ross Publishing 2004.
2. Quadt D. Lot-Sizing and Scheduling for Flexible Flow Lines. Springer 2004.
3. Mazur M. Zastosowanie schematów blokowych do analizy i syntetycznej charakterystyki procesów. [in:] Paliszkiewicz J., Ingaldi M. (eds.) Teoria i praktyka w zarządzaniu produkcją i usługami. Stowarzyszenie Menedżerów Jakości i Produkcji, Częstochowa, 2016.
4. Ulewicz R., Jelonek D., Mazur M. Implementation of Logic Flow in Planning and Production Control. Management and Production Engineering Review, 2016 Vol.7 nr 1

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

dr hab. inż. Robert Ulewicz, prof. PCz, robert.ulewicz@wz.pcz.pl

dr inż. Magdalena Mazur, magdalena.mazur@wz.pcz.pl

dr inż. Manuela Ingaldi, manuela.ingaldi@wz.pcz.pl

dr hab. inż. Dorota Klimecka-Tatar, dorota.klimecka-tatar@wz.pcz.pl

dr inż. Marta Jagusiak-Kocik, marta.jagusiak-kocik@wz.pcz.pl

dr inż. Krzysztof Knop, krzysztof.knop@wz.pcz.pl

dr inż. Renata Stasiak-Betlejewska renata.stasiak-betlejewska@wz.pcz.pl

#### 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_W05, K_W07, K_W08, K_W09, K_U05, K_U07, K_U10	C1, C2	W1-W5, W13, W14, L2, L3	1,4, 5	F2, P1
EU2	K_W01, K_W02, K_W05, K_W09, K_U01, K_U02, K_U06, K_U07, K_U09, K_U10	C10, C2	W4-W13, L3-L8	1,4	F1, P1
EU3	K_W02, K_W04, K_W05, K_W08, K_U01, K_U04, K_U05, K_U06, K_U07, K_U08, K_U09, K_U2	C2, C3	W8-W10, L5-L10	1,2,3,4,5	F1, F2, P1
EU4	K_W02, K_W05, K_W08, K_U05, K_U06, K_U07, K_U09, K_U2	C2, C3	L3, L5-L7	1,2,3,4,5	F1, P1

#### FORM OF ASSESSMENT - DETAILS

	grade 2	grade 3	grade 4	grade 5
EU1	Student doesn't know the basic issues of production flow on production lines and control methods.	Student knows only selected issues in the scope of production flows on the production lines and their control.	Student knows all aspects of production flow control on the production lines that were presented during the classes.	Student knows all aspects of the flow of production on the production lines, and can also indicate the differences between them.
EU2	Students don't know the concepts of planning and production control techniques.	Student knows how to use the selected concepts in the field of planning and production control techniques.	Student knows how to use the techniques of planning and production control.	Student knows how to use the concepts of planning and production control techniques and he can express his opinion.
EU3	Student is unable to develop a production	Student is able to present the assumptions of	Student is able to analyze selected areas	Student is able to analyze the

	schedule based on designated production batches.	scheduling production works based on designated production batches but can not perform their analysis.	of production scheduling based on designated production batches.	production schedules based on the designated production batches.
<b>EU4</b>	The student does not know the guidelines for creating a schedule.	The student knows only selected guidelines for creating and evaluating schedules.	The student knows the guidelines for creating schedules, but he can not make their own evaluation.	The student is able to assess the completeness and compliance of the schedule by himself.

#### **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.