

## COURSE GUIDE

<u>Subject name</u>	<b>Statistical process 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>III</b>
<u>Semester</u>	<b>V</b>
<u>The implementing entity</u>	<b>Department of Production Engineering and Safety</b>
<u>The person responsible for preparing</u>	<b>dr inż. Manuela Ingaldi</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
15		30		-

### COURSE AIMS

- C1. Understanding the elements of the SPC used in industry.
- C2. Practical use of SPC tools.

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

1. Knowledge of quality management, production and service management.
2. Basic statistical and mathematical skills.

### LEARNING OUTCOMES

- EU1. Student knows the techniques, tools used within the SPC in enterprises.
- EU2. Student can choose the appropriate SPC tools.
- EU3. Student is able to perform a statistical evaluation of the process.
- EU4. Student has the ability to use literature sources to broaden his knowledge.

### COURSE CONTENT

Type of teaching – LECTURE	Number of hours
W1. Introduction to SPC. Basic definitions.	1
W2. Elements of probability.	1
W3. Elements of statistics.	1
W4. Process control with use of control cards.	3
W5. law and process/machine capacity.	2
W6. Analysis of the stability and capability of measuring systems. MSA procedures.	2
W7. Statistical acceptance control (SKO).	3
W8. Graphical representation of the results of quality analysis.	2
Type of teaching – LABORATORY	Number of hours
L1. Introduction to the subject. Overview of requirements and rules of the subject.	1
L2. Construction of statistical series.	2
L3. Analysis of basic statistical measures for data related to quality.	2
L4. Methods of normalization of data distribution. Development and analysis of the histogram shape for assessing its normality.	2
L5. Use a two-variable diagram to examine relationships between data.	2
L6. Use of control charts to assess process stability.	8
L7. Calculation and interpretation of the process/machine capacity indexes.	4

L8. R&R analysis of the measurement systems.	4
L9. Statistical acceptance control.	4
L10. Summarizing test.	2

### TEACHING TOOLS

1. Audio Visual Equipment.
2. Blackboard chalk + board.
3. Computer (optionally).

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

- F1. Student's observation during classes.  
P1. Work in the form of reports on particular tasks (laboratories).  
P2. Test.

### 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
Preparation for test		10	0.4	
Contact hours with the teacher	Laboratory	30	1.2	2.28
Preparation for laboratory		12	0.48	
Preparations of reports on particular tasks (laboratories).		15	0.6	
Getting acquainted with the indicated literature		10	0.4	0.4
Consultation		8	0.32	0.32
<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. Sałaciński T. SPC Statistical Process Control. Warszawa, Oficyna Wydaw. Politechniki Warszawskiej, 2015.
2. Oakland J.S. Statistical Process Control. Butterworth Heinemann, 2003.
3. Andruschak O., Cote I., Dumke R. Statistical Process Control (SPC): a Metrics-Based Point of View of Software Processes Achieving the CMMI Level Four. Magdeburg, Otto von Guericke Universität, 2004.

#### Supplementary resources

1. Ulewicz, R., Ingaldi, M., Klimecka-Tatar, D., Knop, K., Krynke, M., Mazur, M., Mielczarek K., Rosak-Szyrocka J. Narzędzia jakości w praktyce. Poradnik dla biznesu, Oficyna Wydawnicza Stowarzyszenia Menedżerów Jakości i Produkcji, Częstochowa, 2018.
2. Knop K., 2018. Statistical Control of the Production Process of Rolled Products. Production Engineering Archives, Vol. 20, pp. 26-31.
3. Ingaldi M. Process Capacity Indexes in the Production of Ribbed Bars. [in:] 26th Anniversary International Conference on Metallurgy and Materials (METAL 2017), Brno, Czechy Conference proceedings, Tanger Ostrava 2017, s. 2164-2169.

### 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
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<b>EU1</b>	K_W01, K_W07, K_W09, K_U01, K_U06, K_U07, K_U09, K_U10, K_K04	C1, C2	W1-W8	1,2	F1, P2
<b>EU2</b>	K_W01, K_W07, K_W09, K_U01, K_U06, K_U07, K_U09, K_U10, K_K04	C1, C2	L2-L9	1-3	F1, P1
<b>EU3</b>	K_W01, K_W07, K_W09, K_U01, K_U06, K_U07, K_U09, K_U10, K_K04	C1, C2	L2-L9	1-3	F1, P1
<b>EU4</b>	K_W01, K_W07, K_W09, K_U01, K_U06, K_U07, K_U09, K_U10, K_K04	C1, C2	L2-L9	1-3	F1, P1, P2

#### FORM OF ASSESSMENT - DETAILS

	<b>grade 2</b>	<b>grade 3</b>	<b>grade 4</b>	<b>grade 5</b>
<b>EU1</b>	Student does not know the techniques, tools used within the SPC in enterprises.	Student knows only chosen techniques, tools used within the SPC in enterprises and their elements.	Student knows the techniques, tools used within the SPC in enterprises.	Student knows the techniques, tools used within the SPC in enterprises and evaluate their suitability for the enterprise.
<b>EU2</b>	Student cannot choose the appropriate SPC tools.	Student can choose the appropriate SPC tools without any help.	Student can choose the appropriate SPC tools.	Student can choose the appropriate SPC tools and justify his decision.
<b>EU3</b>	Student is not able to perform a statistical evaluation of the process.	Student is able to perform only chosen elements of the statistical evaluation of the process.	Student is able to perform a statistical evaluation of the process.	Student is able to perform a statistical evaluation of the process and described its results.
<b>EU4</b>	Student does not have the ability to use literature sources to broaden his knowledge.	Student has the ability to literature sources use indicated by the teacher.	Student alone looks for additional literature sources in order to broaden his knowledge.	Student deepens his knowledge by searching for additional literature sources, is able to compare information contained in them, can draw conclusions from them.

#### 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.