

## COURSE GUIDE

<u>Subject name</u>	<b>Six sigma</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>IV</b>
<u>Semester</u>	<b>VII</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>3</b>

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

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

### COURSE AIMS

- C1. Understanding Six Sigma methodology used in industry.  
C2. Practical application of Six Sigma instruments.

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

1. Students knows the basics of quality management and SPC.
2. Students uses quality management tools and methods, SPC instruments.
3. Students knows the basis of production management.

### LEARNING OUTCOMES

- EU1. Student knows how to use the Six Sigma method in an enterprise.  
EU2. Student knows the tools and methods used in Six Sigma.  
EU3. Student knows how to perform basic DMAIC project.  
EU4. Student has the ability to use literature sources to broaden his knowledge.

### COURSE CONTENT

<b>Type of teaching – LECTURE</b>	<b>Number of hours</b>
W1. Idea of Six Sigma concept.	1
W2. Six Sigma tasks. Tools and methods for their implementation.	1
W3. DMAIC project.	3
W4. DMADV project.	2
W5. KANO model.	3
W6. DOE.	2
W7. Implementation of Six Sigma in the enterprise.	2
W8. Effects of organization management according to Six Sigma.	1
<b>Type of teaching – LABORATORY</b>	<b>Number of hours</b>
L1. Introduction to the subject. Overview of requirements and rules of the subject.	1
L2. D- Define. Defining the problem, the purpose of the project. Use of selected tools: CTQ tree, SIPOIC diagram, Kano, design card.	2
L3. M- Measure. Measurement of key parameters of the present process and the collection of relevant data. Calculation of indicators DPU, DPO, DPMO, FTY, RTY, NY, six sigma.	3

L4. A- Analyse. Data analysis to investigate and verify causal relationships. Use of selected tools: Ishikawa diagram, FMEA, graphic techniques, correlation diagram, others.	3
L5. I- Improve. Improving or optimizing the current process based on the results of data analysis. Use of selected DOE experiment planning techniques.	3
L6. C-Control. Verifying the quality of the improved process. Use of selected SPC tools.	2
L7. Summarizing test.	1

## 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	1.08
Preparation for test		12	0.48	
Contact hours with the teacher	Laboratory	15	0.6	1.08
Preparations of reports on particular tasks (laboratories).		12	0.48	
Getting acquainted with the indicated literature		13	0.52	0.52
Consultation		8	0.32	0.32
<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. George M.L. Lean Six Sigma: Combining Six Sigma Quality with Lean Speed. New York, McGraw-Hill, 2002.
2. Harver G. Lean Six Sigma For Beginners: A Quickstart Beginner's Guide To Lean Six Sigma. CreateSpace Independent Publishing Platform, 2015.
3. Agustiady T., Badiru A.B. (eds.) Sustainability Utilizing Lean Six Sigma Techniques. Boca Raton, CRC Press, 2013.

### Supplementary resources

1. Martin J.W. Lean Six Sigma for Supply Chain Management: the 10-step Solution Process. New York, McGraw-Hill, 2007.
2. Borkowski S., Knop K., Mielczarek K. The Use of Six Sigma indicators for Measurement the Process Quality of Products' Conformity Assessment in the Alternative Control. [in:] Borkowski S., Konstanciak M. (eds.) Quality Control as Process Improvement Factor. Oficyna Wydawnicza Stowarzyszenia Menedżerów Jakości i Produkcji, Częstochowa, 2012.
3. Ingaldi M. Wprowadzenie do metody Six Sigma. Zeszyty Naukowe Quality. Production. Improvement, 2019, 1(10), s. 119-130.

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

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**MATRIX OF LEARNING OUTCOMES REALISATION**

<b>Learning outcome</b>	<b>Reference of given outcome to outcomes defined for whole program (PRK)</b>	<b>Course aims</b>	<b>Course content</b>	<b>Teaching tools</b>	<b>Ways of assessment</b>
<b>EU1</b>	K_W01, K_W02, K_W07, K_W08, K_U01, K_U02, K_U04, K_U07, K_U08, K_U09, K_U10, K_K01	C1-C2	W1-W8	1,2	F1, P2
<b>EU2</b>	K_W01, K_W02, K_W07, K_W08, K_U01, K_U02, K_U04, K_U07, K_U08, K_U09, K_U10, K_K01	C1-C2	W3-W6, L2-L6	1,2	F1, P2
<b>EU3</b>	K_W01, K_W02, K_W07, K_W08, K_U01, K_U02, K_U04, K_U07, K_U08, K_U09, K_U10, K_K01	C1-C2	L2-L6	1-3	F1, P1
<b>EU4</b>	K_W01, K_W02, K_W07, K_W08, K_U01, K_U02, K_U04, K_U07, K_U08, K_U09, K_U10, K_K01	C1-C2	W1-W8	1,2	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 how to use the Six Sigma method in an enterprise.	Student knows only chosen element of how to use the Six Sigma method in an enterprise.	Student knows how to use the Six Sigma method in an enterprise.	Student knows how to use the Six Sigma method in an enterprise and comment it.
<b>EU2</b>	Student does not know the tools and methods used in Six Sigma.	Student knows only chosen tools and methods used in Six Sigma and their elements.	Student knows the tools and methods used in Six Sigma.	Student knows the tools and methods used in Six Sigma and describe their significance for the enterprise.
<b>EU3</b>	Student does not know how to perform basic DMAIC project.	Student knows how to perform only some elements or steps of the basic DMAIC project.	Student knows how to perform basic DMAIC project.	Student knows how to perform basic DMAIC project and comment 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.

