



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Improving production processes

### Course

Field of study

Management and Production Engineering

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

12

Laboratory classes

Tutorials

8

Projects/seminars

10

Other (e.g. online)

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

prof. Adam Hamrol

Responsible for the course/lecturer:

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Piotrowo 3, 60-965 Poznań

### Prerequisites

Has knowledge of: basics of management, production management and organization, manufacturing techniques, quality management, mathematical statistics, cost accounting

Is aware of the responsibility of the company and its employees for meeting the requirements of its stakeholders.

### Course objective

Learning, understanding and acquiring the ability to implement and apply strategies, principles, methodologies, methods and tools in practice, improving production processes



## Course-related learning outcomes

### Knowledge

Has knowledge of the basic goals, principles and strategies for improving production processes: limiting variability, identifying constraints, eliminating waste, TQM, Kaizen, Lean Manufacturing, Six Sigma, Constraints Management

Has knowledge of process improvement methodologies (PDCA, DMAIC), principles (pull or push), methods and tools (FMEA, Pareto analysis, Ishikawa Diagram, 5 Why, value stream mapping, planning and conducting experiments, quick retooling of processes -SMED , flow control - Kanban, one piece flow)

Has knowledge of process efficiency and effectiveness measures: shortage fraction, DPU, DPO, DPMO, ppm, Cp, Cpk, OEE, MTBF, Led Time; Cycle Time, participation in the value-giving operation process (VA

### Skills

He can practically introduce rules and apply methods and tools for process improvement

Is able to define the measures of effectiveness and efficiency of processes, collect data needed to determine them, analyze the obtained results

Is able to prepare and carry out a process improvement project (according to the DMAIC methodology) in terms of meeting the requirements related to the quality of products

Can prepare and carry out a production flow improvement project.

### Social competences

Understands the importance of production improvement for the efficiency of production processes

Is aware of the importance of continuous process improvement in maintaining or gaining the company's competitiveness

Can independently develop knowledge and skills related to the continuous improvement of production processes

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

### Lecture

Based on a multiple-choice test. The test contains 30 questions. Minimum for passing the exam: 60% correct answers. An exam at the end of the semester

### Exercises

Based on the developed projects

## Programme content

### Lecture:

Necessity, importance and goals of continuous improvement of production processes and resources. Principles and goals of improving production processes and resources (limiting variability, identifying constraints; eliminating waste, striving for the flow of one piece, Just in Time....). Measures of excellence



(effectiveness and efficiency) of production processes and resources (fraction of defects, DPU, DPO, DPMO, ppm, Cp, Cpk, OEE, MTBF, Led Time; Cycle Time, participation in the process of operations with added value (VA) ... Strategies for improvement processes and production resources (TQM, Kaizen, Lean Manufacturing; Six Sigma, theory of constraints). Practices, methods and tools for process improvement: Pareto analysis, Ishikawa Diagram, 5 Why, FMEA, Design of Experiments, Value Stream Mapping), quick changeover (SMED), flow control and leveling (Kanban, supermarket,...) Improvement methodologies (PDCA; DMAIC, 8D)

#### Exercise

Value stream mapping - simulation of the production process; analysis of the functioning of the production system on the basis of value stream maps

Improving the production flow - continuous flow - activities in the form of simulating the production process; process stimulator, suction system, one piece flow, production leveling

Planning and conducting experiments (DoE): determining the values of settings ensuring the optimal value of the response of the tested object and minimizing the variance of the tested object

#### Teaching methods

Lecture: multimedia presentation illustrated with examples, solving problems.

Exercises: projects, performing experiments, discussion, team work.

#### Bibliography

##### Basic

Hamrol A.:Strategie i praktyki sprawnego działania. Lea, Six Sigma I inne. Wydawnictwo Naukowe PWN, Warszawa 2017

Mike Rother, John Shook. Naucz się widzieć. Wydawnictwo Lean Enterprise Institute Polska.

Mike Rother, Rick Harris. Tworzenie ciągłego przepływu. Wydawnictwo Lean Enterprise Institute Polska.

##### Additional

Goldratt E.: Cel I: Doskonałość w produkcji, Mint Books, 2006

Montgomery D. C., Design and Analysis of Experiments, John Wiley & Sons, 2008

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for classes, preparation for exam, project preparation) <sup>1</sup>	45	1,5

<sup>1</sup> delete or add other activities as appropriate