

Pro-quality design - course description

General information	
Course name	Pro-quality design
Course ID	06.9-WM-ZiIP-IJ-ANG-D-21_20
Faculty	Faculty of Mechanical Engineering
Field of study	Management and Production Engineering
Education profile	academic
Level of studies	Second-cycle studies leading to MSc degree
Beginning semester	winter term 2023/2024

Course information	
Semester	3
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	<ul style="list-style-type: none">dr inż. Julian Jakubowski, prof. UZ

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Project	45	3	-	-	Credit with grade

Aim of the course

The aim of the course is to familiarise students with designing methods for quality, in the life cycle of the product, ways to identify factors that have the strongest impact on the quality of the product or process and use them in designing a product or process resistant to interference, which may reduce quality, ensure the achievement of quality as the best design quality and quality control of the product during production and operation.

Prerequisites

Production techniques, mathematical statistics, basics of designing

Scope

Structure of the design process. Designing methods for quality. Experimental methods in product and in the design process (Shainin method, Taguchi method). Analysis of causes and effects of defects (FMEA). Analysis of the Fault Tree (FTA). QFD method. Designing quality in terms of Deming's model. The cycle of project quality improvement. The quality of the design process. Control methods including statistical control techniques. Statistical acceptance control. Statistical process control. Methods of teamwork: brainstorming, the incompetence method, the *'for and against'* method, quality circles. Selected techniques supporting quality: 8D Report, 5S Method, the *'5-Why'* Method. The concept of technology, criteria and principles for the selection of the optimal technological process. Requirements to be met in the product design process, in order to achieve producibility of the structure. Current development trends in manufacturing techniques with particular emphasis on factors affecting a reduction in production costs (reduction of energy consumption and consumption of materials, automation) while simultaneously improving the quality of products.

As part of the project, the following issues are developed:

- designing assumptions for a machine part or sub-assembly, taking into account the conditions of use,
- development of a detailed, teamwork plan based on seven steps,

Selection of adequate designing methods for quality for the selected product.

Teaching methods

Project: seminar consultations, teamwork and working with a source document

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
The student is able to choose the method for support in decision-making in management and quality control.	<ul style="list-style-type: none">K_U26	<ul style="list-style-type: none">a project	<ul style="list-style-type: none">Project
The student is able to interact and work in a group accepting various roles	<ul style="list-style-type: none">K_K03	<ul style="list-style-type: none">an ongoing monitoring during classes	<ul style="list-style-type: none">Project
The student is able to propose solutions aimed at improving and/or modifying existing technical processes and is also able to estimate the usefulness of new methods and techniques, related to quality management and the improvement of processes.	<ul style="list-style-type: none">K_U29	<ul style="list-style-type: none">a project	<ul style="list-style-type: none">Project

Outcome description	Outcome symbols	Methods of verification	The class form
The student has a thoroughly extensive knowledge of the application of mathematical methods, in order to be able to formulate and solve complex tasks, related to Management and Production Engineering.	• K_W01	• a project	• Project
The student understands the importance of the non-technical aspects and effects of engineering, including their impact on the environment; the student is aware of the responsibilities resulting from decisions taken in this regard.	• K_K02	• an ongoing monitoring during classes	• Project
The student is able to obtain information from literature, databases and other sources and is able to integrate, interpret and critically evaluate it, as well as draw conclusions, therefrom, both formulating it and sufficiently justify opinions on it.	• K_U01	• a preparation of a project • activity during the classes	• Project

Assignment conditions

Lecture- the condition for passing the lecture part is to obtain a positive grade from the test, covering verification of a knowledge of the basic issues. The student will have 5 questions, regarding the subject matter. The exam grade consists of marks from 5 exam questions. An average grade of 5 questions is entered.

Project - the condition for passing the project is obtaining a positive assessment of the project, submitted electronically, as well as substantive justification of the solutions adopted. The assessment is based on the *skills assessment* component related to the implementation of the project tasks.

Passing the course: The final mark for passing the subject is the arithmetical average of grades for individual classes.

Recommended reading

1. Hamrol A.: Zarządzanie jakością z przykładami. PWN, Warszawa 2008.
2. Dietrich E., Schulze A.: Metody statystyczne w kwalifikacji środków pomiarowych maszyn i procesów produkcyjnych, Notika System, Warszawa 2000.
3. Grudowski P.: Projektowanie, nadzorowanie i doskonalenie systemu jakości. Wyd. ODIDK, Gdańsk 2010.
4. Grzenkowicz N., i inni: Zarządzanie jakością – metody i instrumenty controllingu jakości. Wyd. Wydziału Zarządzania Uniwersytetu Warszawskiego, Warszawa 2009.
5. Sałaciński T.: SPC Statystyczne sterowanie procesami produkcji. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2009.
6. Łańcucki J. (red): Zarządzanie jakością w przedsiębiorstwie. Wyd. TNOiK, Bydgoszcz 1997.
7. Skarbiński M., Skarbiński J.: Technologiczność konstrukcji maszyn, WNT, Warszawa 1987.
8. Sęp J., Perłowski R., Pacana A.: Techniki wspomagania zarządzania jakością. Wyd. Pol. Rzeszowskiej, Rzeszów 2006.
9. Juran J.M., Gryna F.M.:Jakość. Projektowanie i analiza. WNT, Warszawa 1974.

Further reading

1. Kidlarski E.: Jakość wyrobów, PWN, Warszawa 1988.
2. Miracki W.: Koszty przygotowania produkcji, PWE, Warszawa 1985.
3. Crum L.W.: Analiza wartości, PWE, Warszawa 1973.

Notes

Modified by dr inż. Tomasz Belica (last modification: 12-04-2023 23:05)

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