COURSE DESCRIPTION CARD - SYLLABUS

Course name
Quality Control and Planning [N2ZiIP2-IiZJ>PKiSJ]

Course

Field of study
Management and Production Engineering

Year/Semester
2/3

Area of study (specialization)
Quality Engineering and Management

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
16

Laboratory classes
16

Other
0

Tutorials
0

Projects/seminars
8

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

Knowledge of issues related to the basics of business management, knowledge of the basics of statistical engineering. Student has IT skills - knowledge of MS Office. The student has the skills of logical thinking, the use of information obtained from the library and the Internet. Social competences - the student understands the need to learn and acquire new knowledge; can work in a team; recognizes the possibilities of continuous improvement in various areas of life, including the activities of organizations, with particular emphasis on manufacturing enterprises.

Course objective

To familiarize the student with the methodology of product and process quality planning, analysis and assessment of the quality of manufacturing processes and products, as well as industrial control and measurement systems.

Course-related learning outcomes

Knowledge:
The student knows the methodology of product quality planning, knows the basic methods of analysis and evaluation of manufacturing processes and product quality control. The student knows what the

quality capability of the machine, process and measuring device is, understands the provisions of control plans, knows what repeatability and reproducibility is, and the level of agreement of the assessments.

Skills:
The student is able to prepare and conduct research and interpret the results of assessing the quality of the manufacturing process and the suitability of the control and measurement system, and is able to develop process control charts. The student is able to develop operational/station control instructions and an control plan. The student knows how to prepare and conduct a study test and interpret the results of the control and measurement system analysis.

Social competences:
The student is aware of the effects of engineering activities in both technical and non-technical areas. The student is aware of the effects of decisions and responsibility for decisions.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formulation assessment:
a) Lecture - Evaluation based on answers to questions about the material discussed in the previous lectures.
b) Laboratory - Evaluation based on assessment of current progress of tasks.
c) Project - Evaluation based on assessment of current progress of tasks.
Summary assessment:
a) Lecture - Examination on the basis of an exam - pass on the basis of a test consisting of 30 closed questions (pass in case of correct answer to at least 16 questions: <16 correct answers - grade ndst/unsatisfactory (2.0), 16-18 - dst/satisfactory (3.0), 19-21 - dst+/satisfactory+ (3.5), 22-24 - db/good (4.0), 25-27 - db+/good+ (4.5), 28-30 - bdb/very good (5.0); test conducted at the end of the semester. Discussion of the exam assessment results.
b) Laboratory exercises: performing a set of tasks during the semester checking the knowledge of selected selected methods and issues regarding the assessment of product quality, the manufacturing process and the control process. Assessment at the end of the semester.
c) Project: participation in study visits (optional); completing a set of tasks during the semester based on a case study, checking knowledge of selected methods and issues regarding the assessment of product quality, the manufacturing process and the control process. Assessment at the end of the semester.
Assignment of grades to percentage ranges of results: <90–100> very good; <80–90) good plus; <70–80) good; <60–70) satisfactory plus; <50–60) satisfactory; <0–50) unsatisfactory.

Programme content

1. Quality of measurements and decisions in organization.
2. Measurement Systems Analysis (MSA) - essence.
3. MSA for measurable features.
4. MSA for unmeasurable features.
5. Product quality planning and control plan (APQP).
6. Quality control - basics of effective and efficient control, control planning.
7. Visual inspection.
8. Statistical process control.
9. Product characteristics and process quantities.
10. Assessment of quality of the product and the manufacturing process based on a case study.

Course topics

a) Lecture:
1. Quality of measurements and decisions in organization - introduction.
2. Measurement Systems Analysis (MSA) - essence. The usability of measuring and control devices/instruments.
3. MSA: MSA for measurable features - ARM method (analytical and graphical analysis); MSA for unmeasurable features - cross tab method (KAPPA).
4. Product quality planning and control plan (APQP).
5. Quality control - basics of effective and efficient control, control planning.

6. Product photography in quality control.
7. Visual inspection - basics of visual inspection, possible applications.
8. Statistical process control - quality capability indicators, process control charts.
9. Product characteristics and process quantities.
b) Laboratory - developing a quality control program plan for a selected product; organization and conduct of MSA testing for measurable characteristics (diameter, mass), measurement, analysis of results, interpretation of results; organization and conduct of the MSA test for an alternatively assessed feature (good product - bad product), assesment, analysis of results, interpretation of results;
development of an electronic catalog of errors and product defects.
c) Project - assessment the quality of the product and manufacturing process based on a case study:
- developing a map of the production process of a selected product (oprional - based on plants site viists)
- defining process quantities, product characteristics, environmental factors; defining special/key characteristics
- testing the usability of the control and measurement system
- testing the quality capacity of machines
- testing the quality capacity of the manufacturing process
- development of an control plan.

Teaching methods

Lecture: multimedia presentation illustrated with examples given on the board, discussion.
Laboratory exercises: discussion in teams and performing problem-solving tasks using MS Office and dedicated software.
Project: Plants site visits; case study - teamwork.

Bibliography

Basic:
1. Advanced Product Quality Planing and Control Plan, 2nd ed., Reference manual, AIAG-Work Group, Daimler Chrysler Corporation, Ford Motor Company, General Motors Corporation, 2008.
2. Statistical Process Control, Reference manual, AIAG-Work Group, Daimler Chrysler Corporation, Ford Motor Company, General Motors Corporation, 2006.
3. Measurement Systems Analysis, 4th ed., Reference manual, AIAG-Work Group, Daimler Chrysler Corporation, Ford Motor Company, General Motors Corporation, 2010.

Additional:
4. Adam Hamrol, Strategie i praktyki sprawnego działania, Wyd. PWN, Warszawa 2015.
5. Adam Hamrol, Zarządzanie i inżynieria jakości. Ze spojrzeniem w rzeczywistość 4.0, Wyd. PWN, Warszawa 2023.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	42	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	108	4,50