COURSE DESCRIPTION CARD - SYLLABUS

Course name
Robust design
Course

Field of study
Product Lifecycle Engineering
Area of study (specialization)

Level of study
Second-cycle studies
Form of study
full-time

Year/Semester
2/3
Profile of study
general academic
Course offered in
English
Requirements
elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	15	
Tutorials	Projects/seminars	

Number of credit points
2

Lecturers

Responsible for the course/lecturer:
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tel. 61 665 2738

Wydział Inżynierii Mechanicznej

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:
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Wydział Inżynierii Mechanicznej

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Prerequisites
Basic knowledge of mathematics and mathematical statistics. The ability to think logically and independently obtain information from various sources, as well as understanding the need for learning.

Course objective

The aim of the course is to transfer knowledge and skills in the field of design of experiments.

Course-related learning outcomes

Knowledge

Classes will cover the theory of planning and designing of experiments (DOE). Students will acquire knowledge concerning common concepts of experimenting and division of DOE methods as well as knowledge of the selection of the right experiment plan for a given problem. Classes will cover also methods of analysis and graphic presentation of data obtained from the experiment. Students will acquire basic knowledge about the principles of planning, organizing and conducting an experiment.

Skills

The student is able to define the problem, systematize it and present it in accordance with the requirements of the experiment planning methodology.

The student is able to choose the right experiment plan for a given problem, taking into account the limitations and the purpose of the research.

The student is able to plan, organize and conduct the experiment taking into account the basic principles of experimentation.

The student is able to analyze the experiment and draw the right conclusions from this analysis and propose necessary actions.

The student will acquire the ability to use a data analysis software in which he will select and design an experiment and analyze its results - the basic goal is to develop the skills of practical application of experimental planning methods in solving specific tasks and engineering problems using IT applications.

Social competences

The student can work in a group. Student is aware of the need and role of design of experiments methods in the design and improvement of products and manufacturing processes.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Credit in writing or oral on the basis of scoring questions (credit in the event of obtaining 51% of points:> 50% - dst,> 60% - dst plus,> 70% - db,> 80% - db plus,> 90% points - very good) carried out at the end of the module.

Laboratory: Credit based on reports from laboratory exercises. To get credit, all exercises must be passed.

Programme content

Classes will be conducted in blocks consisting of lectures and laboratories / projects.

Topics of classes:

The idea of experiments planning and approaches to experimenting.

Basic concepts of Design of Experiments (DOE).

Division of DOE methods. Simple comparative experiments.Factorial designs. Taguchi designs.

Analysis of the results of the experiment - ANOVA analysis.

Analysis of the results of the experiment - methods of presenting the results and their analysis.

Full factorial designs.

Fractional factorial designs.

Plackett-Burman designs.

Response surface methodology.

Teaching methods

Lecture: The lecture will be illustrated with a multimedia presentation containing the discussed program content

Laboratory: practical classes

Bibliography

Basic

1. Montgomery D.C. Design and Analysis of Experiments, Wiley, 2019

2. Mathews, Design of Experiments with MINITAB, ASQ Quality Press, 2004.

3. Montgomery D.C., Introduction to Statistical Quality Control, John Wiley&Sons, 2009.

Additional

1. Montgomery D.C., Managing, Controlling, and Improving Quality, Wiley, 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	20	1,0

1 delete or add other activities as appropriate