COURSE DESCRIPTION CARD - SYLLABUS

Course name
Data acquisition and analysis [S2ZiIP2>AAD]

Course

Field of study
Management and Production Engineering

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

5,00

Coordinators

dr inż. Agnieszka Kujawińska
agnieszka.kujawinska@put.poznan.pl

Lecturers

Prerequisites

Basic knowledge of mathematics. Basics of using Windows and Office. Ability to think logically and independently obtain information from various sources, as well as understanding the need to learn

Course objective

Aim of the course is to provide knowledge and practical skills in the field of broadly understood data analysis using MS Excel and miniTAB packages.

Course-related learning outcomes

Knowledge:
Student has theoretically based, detailed knowledge about assessing the efficiency of production processes and the effectiveness of an enterprise's functioning
Student has theoretically grounded knowledge of assessing the quality of products and production processes
Students know the basics and assumptions of decision support systems, including risk assessment
Student has detailed knowledge of measurement systems used in production systems

Skills:
Student is able to notice and identify problems occurring in systems and production processes and select and use methods and tools appropriate to solve them
Student is able to develop an experiment plan and determine the strength and significance of the impact of production process factors on its effectiveness and efficiency
Student is able to use experimental, data analysis and simulation methods to support decisions in various areas of enterprise operation

Social competences:
Student is aware of the need to critically analyze and evaluate their ideas and actions
Student understands the need to make changes in production processes and in the company.
Student understands the need for continuous learning; can inspire and organize the learning process of team members
Student is able to think and act in a creative and entrepreneurial way

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: passing the lecture content. Completion of the lecture in writing may take the form of solving tasks/problems, multiple choice tests, or more or less extensive written answers to the questions asked. Passing the lecture if obtaining at least 50.1% correct answers. Up to 50.0% - ndst, from 50.1% to 60.0% - dst, from 60.1% to 70.0% - dst+, from 70.1 to 80 - db, from 80.1% to 90 .0% - db+, from 90.1% - very good.
Laboratory: assessment based on reports from laboratory exercises. To pass, all exercises must be approved
Project: a report containing an analysis of the planned and performed experiment.

Programme content

Development of a statistical model for the process indicated by the lecturer based on an experiment planned and performed by the student in accordance with the Design of Experiments methodology.

Course topics

Discussion of project objectives.
Presentation of the DoE methodology.
Examples of DoE applications in various processes.
Selection of a process for analysis according to the instructor's guidelines.
Identification of independent and dependent variables.
Creation of an experiment plan.
Discussion of different types of experimental designs (e.g., full factorial designs, fractional designs).
Preparation of the experiment schedule.
Instructions for conducting the experiment.
Collection of experimental data.
Documentation of the experiment procedure.
Discussion of potential problems and ways to solve them.
Basics of using Minitab.
Entering experimental data into Minitab.
Overview of basic Minitab functions related to data analysis.
Preparation of data for analysis.
Use of Minitab for descriptive statistics analysis.
Preliminary analysis of experiment results.
Discussion of results with the instructor.
Identification of key observations and trends.
Advanced data analysis in Minitab (e.g., analysis of variance, significance tests).
Use of various data analysis tools in Minitab.
Interpretation of analysis results.
Preparation of conclusions based on the analysis.
Preparation of the experiment results report.
Presentation of results to the group and the instructor.

Discussion of results and conclusions.
Feedback from the instructor and colleagues.
Project summary and final conclusions.

Teaching methods

Lecture: lecture illustrated with a multimedia presentation containing the discussed program content.
Laboratory: practical classes at the computer in IT applications: MS Excel, miniTAB.
Project: team work under the supervision of the instructor.

Bibliography

Basic:
1. Aczel A.D., Complete business statistics, PWN, Wohl Publishing, 2012
4. Larose T., Discovering Knowledge in Data: An Introduction to Data Mining, 2005, Wiley & Sons
5. Berry M.J.A., Linoff G., Mastering data mining, 2000, Wiley & Sons
6. Han J., Kamber M., Pei J., Data Mining: Concepts and Techniques, 3rd Edition, in Morgan Kaufmann Series in Data Management Systems, 2012, Elsevier
7. WALKENBACH J., Excel 2019. Biblia, Helion, Gliwice 2019.
8. WINSTON W., Microsoft Excel 2016. Analiza i modelowanie danych, Promise, Warszawa 2017.
9. BOURG J., Excel w nauce i technice. Receptury, O'Reilly/Helion, Gliwice 2006.

Additional:
7. Hamrol A., Zarządzanie jakością z przykładami, PWN Warszawa, 2008
8. Francuz P., Mackiewicz R., Liczby nie wiedzą skąd pochodzą, Wydawnictwo KUL, Lublin, 2007

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	65	2,50