COURSE DESCRIPTION CARD - SYLLABUS

Course name
Chemometrics and fundamentals of statistics

Course

Field of study
Chemical Technology

Year/Semester
2/4

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes

Other (e.g. online)

Tutorials
30

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

The student starting this course should have basic knowledge of mathematics needed to solve problems related to statistics and chemometrics. He should also have the ability to obtain information from the indicated sources (literature, databases) and the ability to interpret it, draw conclusions and formulate opinions. The student should also have a basic understanding of the Excel spreadsheet.

Course objective

Provide students with basic knowledge in the field of reading, processing and presenting statistical data, with particular emphasis on data obtained in a chemical laboratory.

Course-related learning outcomes

Knowledge

1. K_W01 A student has the necessary knowledge of mathematics in terms of the use of mathematical

methods to describe the problems and processes of chemistry, and to perform calculations needed in engineering.

2. K_W15 The student knows the basic methods, techniques, tools and materials used to solve simple tasks in the field of technology and chemical engineering.

Skills

1. K_U01 The student is able to obtain the necessary information from literature, databases and other sources regarding chemical sciences, properly interprets them, draws conclusions, formulates and justifies opinions.

2. K_U07 The graduate can use computer programs that support engineering, plan chemical experiments, examine the course of chemical processes and properly interpret the results obtained.

3. K_U08 The graduate can use mathematical knowledge to simulate, design, optimize and characterize simple chemical processes and unit operations.al processes and unit operations.

Social competences

1. K_K01 The graduate understands the need to develop and improve their professional, personal and social competences.

2. K_K02 The student is aware of the importance and understanding of the non-technical aspects and effects of engineering activities, including their impact on the environment and the associated responsibility for the decisions made.

3. K_K04 The graduate can appropriately determine the priorities for accomplishing the assigned task.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired as part of each subsequent lecture is verified in the form of a multiple-choice test conducted on the eCourses platform within 6 days, starting from the next day after the lecture, preceding the next lecture. The test consists of 10-15 questions (open and closed) scored differently. Passing threshold: 51% of the total number of points. The final grade of the lecture will be issued according to the following criteria: 51%-60% (3.0), 60%-72% (3.5); 72%-85% (4,0), 85%-93% (4,5), 93%-100% (5,0). The issues on the basis of which the questions are developed will be presented to students during the lecture.

The knowledge acquired during the exercises is verified by means of two 60-minute colloquia carried out during 7 and 15 classes. Each colloquium includes a solution of 4 - 5 tasks scored differently. Colloquia will be carried out either in a stationary system or in the form of a test with open questions on the eCourses platform. The credit issues on the basis of which the questions are developed will be passed on to students during the classes.

The final assessment of the exercises will be issued on the basis of the score obtained from the tests from the lectures and the colloquia from the tasks. The share of individual scores in the final assessment will be as follows: lecture test - 40% colloquia from tasks - 60%. Passing threshold: 51% of the total number of points. The final evaluation of the project will be issued according to the following criteria: 51%-60% (3.0), 60%-72% (3.5); 72%-85% (4,0), 85%-93% (4,5), 93%-100% (5,0).

Programme content

1. Basic concepts of the probability theory.

2. Randome variables.

3. Basic concepts of mathematical statistics (descriptive statistics).

4. Point and interval estimation.

5. Statistical hypothesis.

6. Simple linear regression.

7. Uncertainty of measurements.

Teaching methods

Lecture: a multimedia presentation.

Tutorials: solving problems illustrating the various issues.

Bibliography

Basic

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying E. Ye, Probability & Statistics for Engineers & Scientists, Global Edition, 9/E, Pearson 2016, 816 pp. ISBN-10: 1292161361 • ISBN -13: 9781292161365.

2. John R. Taylor, An Introduction to Error Analysis. The Study to Uncertainties in Physical Measurements, 2 ed. University Science Books, Sausalito, California, 1997.

Additional

2. Aviva Petrie, Caroline Sabin, Medical Statistics at a Glance Text and Workbook, Wiley Blackwell, 2013, 288 pp, ISBN: 978-1-118-50335-5.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	4,0
Classes requiring direct contact with the teacher	45	2,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1,5

[1] delete or add other activities as appropriate