

EXPERIMENTAL DESIGN AND TECHNIQUES

Basic information

Duration (ECTS)	360 hours (10 ECTS credits)
Starting date	September, 1
Language of instruction	English level B1
Entry requirements	BSc degree in engineering or technical sciences

Course description

This course is devoted to efficient planning and analytical methods, including regression and dispersion analysis used for identification of statistically significant input factors that influence output functions. The course is based on the development of individual practical skills in experimental design and techniques.

Special Features

Except for classical theoretical problems of probability theory and mathematical statistics, applied tasks of environmental safety are studied using modern tools and methods of data processing.

Course aim

The course aims to:

- introduce students to methods of theoretical and experimental research;
- equip students with skills of mathematical planning of an experiment for physical/chemical analysis.

Course objectives

- to make student familiar with mathematical methods of experimental design for the purposes of optimization problems;
- to equip students with relevant skills, such as evaluation of possibility, parameters and factors of optimization, and implementation this knowledge on practice;
- to provide students with profound knowledge of technical systems and their components in order to develop and implement the necessary changes in their structure from the point of improving their efficiency and energy saving;
- to develop analytical skills required for interpretation of modeling results and for searching of optimal decision by using all possible methods;
- to provide students with a detailed understanding of ecological safety of technical systems and processes;

Learning outcomes

By the end of the course students will be able to compute descriptive statistics, test hypothesis, use dispersion analysis, estimate confidence interval, build a response surface and use other statistical methods for setting values to design a process or control a technical system.

Outline of the content

Week	Lectures	Practice / Assignments	Hours
1-4	Introduction to experimental design	General problems of probability theory/ Empirical distributions and static assessments, test of hypothesis	88
5-9	Introduction to Dispersion, Correlation and Regression Analysis	Building models on the basis of the least square method; building of a nonlinear model of a research object/ designing of an experiment for dispersion analysis	88
10-13	The basics of factorial experiment	A full factorial design and fractional factorial design	88
14-17	Physical fundamentals of measurements and modern methods of material studies	Physical fundamentals of measurements and modern methods of material studies	88
18		Final examination	8

Course assessment

Final examination.

Attendance policy

All tasks for self-studies and laboratory works can be found in electronic form on the course web page. A student should complete all e-course tasks and get an admission to the exam. Examination cards contain only theoretical questions. The attendance of all seminars is not a prerequisite for passing the exam.

Instructor

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