



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Statistics for Engineers

Course

Field of study

Mechanical Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Dr Alina Gleska

Responsible for the course/lecturer:

Institute of Mathematics, PUT

alina.gleska@put.poznan.pl

Prerequisites

Basic knowledge in mathematical analysis and algebra of sets

Course objective

The aim of this course is to give the opportunity to learn and discuss basic problems of probability theory, descriptive statistics and methods of statistical inference. Presented material should give the opportunity to solve selected engineering problems

Course-related learning outcomes

Knowledge

1. Student has a deep knowledge in mathematics, especially the elements of mathematical statistics

Skills

1. Student can find information in the literature, data bases and other sources related to mechanical engineering; is able to integrate the data, to interpret them and to write conclusions



2. Student can work individually as well as in a team; can estimate the time necessary to solve the problem; can schedule and realize the timetable of all necessary work

3. Student is able to apply the statistical methods and models to analyze and assess the work of elements of devices

Social competences

1. Student understands the need of learning, can inspire and lead other people

2. Student can collaborate and work in a team

3. Student is ready to obey the principles of professional ethics, is responsible of the quality of the data and statistical inference; becomes sensitive for possible manipulations

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures - theoretical test based on the material presented during the lectures; the student has to collect at least 50% of possible points; the test is scheduled for the last lecture in the semester

Practical course (tutorials) - test comprising application of probability theory, descriptive statistics and mathematical statistics; the student has to collect at least 50% of possible points; the test is scheduled for the last class in the semester

Programme content

Lectures:

1. Descriptive statistics

2. Basic concepts of probability: definition of probability and its properties, independence, conditional probability, total probability, Bayes' theorem

3. Discrete random variable: notation and definitions, discrete distributions, Bernoulli distribution, binomial distribution, Poisson distribution

4. Continuous random variable: notation and definitions, continuous distributions, exponential distribution, normal distribution

5. Inference about populations: statistics and their distributions, t-Student distribution, chi-square distribution

6. Statistical inference: point and interval estimation of population mean, variance and proportion

7. Statistical inference: testing hypotheses about population mean, variance and proportion

Tutorials:

1. Descriptive statistics



2. Basic concepts of probability: definition of probability and its properties, independence, conditional probability, total probability, Bayes' theorem
3. Discrete random variable: notation and definitions, discrete distributions, Bernoulli distribution, binomial distribution, Poisson distribution
4. Continuous random variable: notation and definitions, continuous distributions, exponential distribution, normal distribution
5. Inference about populations: statistics and their distributions, t-Student distribution, chi-square distribution
6. Statistical inference: point and interval estimation of population mean, variance and proportion
7. Statistical inference: testing hypotheses about population mean, variance and proportion

Teaching methods

Lectures (multimedia presentations) - presenting the theory connected with a current students' knowledge, presenting a new topic preceded by a reminder of related content known to students from other subjects

Practical course (tutorials) - solving examples on the blackboard, discussions in groups, applications of statistical methods to solve real problems in groups and individually

Lectures and tutorial can be taught remotely, if needed.

Bibliography

Basic

1. Kryszicki, W., J. Bartos, W. Dyczka, K. Królikowska i M. Wasilewski: Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, wydanie 8. PWN Warszawa, 2012
2. Bobrowski, D. i K. Maćkowiak-Łybacka: Wybrane metody wnioskowania statystycznego. Wyd. PP, Poznań, 2004
3. Wasilewska, E: Statystyka matematyczna w praktyce. Wydawnictwo Difin, 2015

Additional

1. Devore, J.L.: Probability and Statistics for Engineering and Sciences, Brooks/Cole, 2012
2. Ross, S.M.: Introductory Statistics, Elsevier, 2010



Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests) ¹	25	1,0

¹ delete or add other activities as appropriate