



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Statistics [S2LiK1>STAT]

Course

Field of study

Aerospace Engineering

Year/Semester

1/2

Area of study (specialization)

Civil Aviation

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

0

Other

0

Tutorials

15

Projects/seminars

0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The student has basic knowledge of combinatorics and probability calculus resulting from the secondary school curriculum and the basics of descriptive statistics and estimation of parameters obtained during the first level of studies. The student has basic knowledge of mathematical analysis (differential calculus of functions of one variable, differential calculus of functions of many variables, integral calculus of functions of one variable and basics of matrix algebra). He can operate a computer. He can think logically. The student is aware of the learning purpose. The student is able to apply the language of mathematics (differential and integral calculus) to describe simple problems in technology. The student has the ability to self-study using modern teaching tools. Is able to obtain information from literature.

Course objective

The aim of the course is to familiarize students with selected problems of probability and mathematical statistics. Students acquire the ability to use probabilistic and statistical methods to describe technical issues.

Course-related learning outcomes

Knowledge:

The student knows the basic distributions of statistics from the sample. Has basic knowledge of statistical inference: the theory of estimation, the theory of statistical hypothesis testing, the theory of regression analysis. The student knows the assumptions and the method of creating a regression model for the studied phenomenon. Has extensive knowledge of mathematical modeling. He knows the methods of applying the known statistical methods in technical sciences.

The student has ordered knowledge of terminology in the field of statistics. Has knowledge in mathematics necessary for statistical analysis

Skills:

Student can communicate using various techniques in a professional environment using formal statistical notation and concepts and definitions in the field of mathematical statistics

Student has the ability to self-study using modern teaching tools, such as remote lectures, websites and databases.

Student can obtain information from literature, the Internet, databases and other sources. He is able to obtain information in the field of statistics and data analysis, interpret and draw conclusions from them and create and justify opinions

Student can use statistical formulas and tables.

Social competences:

Student understands the need to learn throughout life; can inspire the learning process of other people.

Student is ready to critically evaluate his knowledge and content, recognize the importance of knowledge in solving cognitive and practical problems

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Assessment of knowledge and skills acquired during the lecture is verified based on a written test.

Exercises: The assessment of knowledge and skills acquired during the exercises is verified on the basis of written tests (work performed on a computer)

Programme content

Random variable

Two-dimensional random variable

Statistics and their distributions

Parametric tests (one and two populations)

Correlation coefficients: Pearson, Spearman, Kendall

Two-dimensional data from a sample

Linear regression. Multiple regression

Analysis of variance

Course topics

LECTURE

1. Continuous random variable. Continuous distributions.
2. Two-dimensional random variable random. Two-dimensional data from a sample
3. Statistics and their distributions
4. Hypothesis testing one population and two populations
5. Correlations (Pearson, Spearman, Kendall)
6. Linear regression. Multiple regression.
7. Analysis of variance
8. Exam of the lecture

Exercises

1. Introduction to R. Continuous variable.
2. Two-dimensional data from a sample
3. Hypothesis testing one population.
4. Hypothesis testing two populations.
5. Correlations (Pearson, Spearman, Kendall)
6. Linear regression. Multiple regression.

7. Colloquium
 8. Analysis of variance (optional)
- All tasks solved in the R environment (RStudio)

Teaching methods

The lecture conducted with a multimedia presentation supplemented with examples given on the board. The lecture was conducted in an interactive way with the formulation of current questions to a group of students.

Students actively participate in the lecture. Each presentation of a new topic is

preceded by a reminder of content related to the issue (content known to students in other subjects).

Tutorials: Students receive electronically a list of tasks that are solved in the tutorials. The theory, formulas and charts they need are provided electronically. Tasks are solved by students.

Bibliography

Basic

1. D. Bobrowski, (1986) Probabilistyka w zastosowaniach technicznych, Wydawnictwo Naukowo Techniczne.
2. D. Bobrowski, K. Maćkowiak-Łybacka, (2006) Wybrane metody wnioskowania statystycznego, Wydawnictwo Politechniki Poznańskiej.
3. J. Koronacki, J. Melniczuk (2001) Statystyka dla studentów kierunków technicznych i przyrodniczych. WNT, Warszawa.
4. W. Kordecki (2010) Rachunek prawdopodobieństwa i statystyka matematyczna, Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS.
5. H. Jasiulewicz, W. Kordecki, (2003) Rachunek prawdopodobieństwa i statystyka matematyczna, Przykłady i zadania Oficyna Wydawnicza GiS
6. T. Górecki (2011), Podstawy statystyki z przykładami w R, Wydawnictwo BTC

Complementary

1. Plucińska A., Pluciński E., Probabilistyka, Wydawnictwo WNT, Warszawa
2. R. L. Scheaffer, J. T. McClave (1995) Probability and Statistics for Engineers, Duxbury

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00