



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of statistics [N1Bud1>PS]

### Course

Field of study

Civil Engineering

Year/Semester

1/2

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

polish

Form of study

part-time

Requirements

compulsory

### Number of hours

Lecture

10

Laboratory classes

10

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

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### Lecturers

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### Prerequisites

Student starting this course has an basic knowledge of probability and statistics, which was acquired in high school in accordance with the current core curriculum. The student has a basic knowledge of mathematics, characterized by logical thinking. The student can operate a computer.

## Course objective

**Lecture:** The aim of the lecture is to present and familiarize students with theoretical issues in the field of probability and statistics. Student is given the opportunity to use statistical methods to describe experiments. Student acquires knowledge and tools in the field of random variables (discrete and continuous) along with the distributions. Can use descriptive statistics to explain experiments. They acquire knowledge that allows them to make statistical inferences concerning technical issues. Student is able to estimate unknown characteristics and test them. **Lab:** The aim of the laboratory is to present and familiarize with the theoretical content presented during the lecture in a practical way. The student is able to use specialized computer software to solve and analyze statistical problems. Student uses the R software language to describe technical problems. Student acquires practical knowledge in the field of random variables (discrete and continuous) along with characteristic distributions. Uses a computer for efficient statistical analysis and statistical inference.

## Course-related learning outcomes

### Knowledge:

The student is able to use the methods and tools of mathematical statistics and R software in engineering practice, in solving technical problems. KB\_U07, P6S\_UW (I), P6S\_UK (O)

### Skills:

The student has basic general knowledge of statistics. He knows various methods of statistical inference. He knows how to use them in solving technical problems, including those related to construction. Has structured and theoretically based knowledge in the field of statistical analyzes supported by computer software: knows the basics of software used for statistical calculations (R program). KB\_W01, P6S\_WG (O)

### Social competences:

The student is responsible for the reliability of the results of his work and their interpretation KB\_K02, P6S\_KK (O)

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

### Lecture:

The final grade is determined on the basis of a written test.

### Lab

The final grade is determined on the basis of a written test using a computer (RStudio software) and active participation in classes.

Obtaining a minimum of 50% of the points on each of the tests is tantamount to obtaining a course credit.

## Programme content

### Lecture (10 hours)

1. Discrete random variable and distributions of discrete random variables.
2. Continuous random variable and distributions of continuous random variables.
3. Descriptive statistics. Measures of position and dispersion, covariance and linear correlation coefficient from the sample.
4. Point estimation. Interval estimation.
5. Hypothesis testing.

### Laboratory (10 hours)

1. Introduction to the R programming language and the RStudio program.
2. Discrete random variable and distributions of discrete random variables.
3. Continuous random variable and distributions of continuous random variables.
4. Descriptive statistics. Measures of position and dispersion, covariance and linear correlation coefficient from the sample.
5. Point estimation. Interval estimation.

## 6. Hypothesis testing.

### Teaching methods

#### Lecture

The lecture is conducted with the use of a multimedia presentation, along with comments and presentation of examples of tasks related to the considered issue. Lecture conducted with the possibility of active participation of Students with interactive questions. The theory presented in the lectures is consistent with the current knowledge of Students.

#### Laboratory

Before classes, students receive a list of tasks from a given topic, which are solved in laboratories. The required theory to solve the tasks was presented in lectures and reminded during practical classes. Tasks are solved using a computer and the R programming language with the active participation of Students.

### Bibliography

#### Basic:

1. Bobrowski, D.: Probabilistyka w zastosowaniach technicznych, Wydawnictwo Naukowo Techniczne, 1986.
2. Kryszicki, W., J. Bartos, W. Dyczka, K. Królikowska i M. Wasilewski: Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, wydanie 8. PWN, 2012
3. Bobrowski, D. i K. Maćkowiak-Łybacka: Wybrane metody wnioskowania statystycznego. Wyd. PP, 2004
4. Kordecki, W.: Rachunek prawdopodobieństwa i statystyka matematyczna, Definicje, twierdzenia, wzory, GiS, 2010
5. Górecki, T.: Podstawy statystyki z przykładami w R, Wydawnictwo BTC, 2011

#### Additional:

1. Devore, J.L.: Probability and Statistics for Engineering and Sciences, Brooks/Cole, 2012
2. Ross, S.M.: Introductory Statistics, Elsevier, 2010
3. Plucińska, A., E. Pluciński, Probabilistyka, Wydawnictwo WNT, 2006

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00