STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Mathematics**			Code **1010112111010343698**
Field of study **Civil Engineering**	Profile of study (general academic, practical) **(brak)**		Year /Semester **1 / 1**
Elective path/specialty **-**	Subject offered in: **English**		Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**		
No. of hours Lecture: **30** Classes: **30** Laboratory: **-** Project/seminars: **-**			No. of credits **4**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**		
Education areas and fields of science and art **technical sciences** **Technical sciences**			ECTS distribution (number and %) **100 4%** **100 4%**

Responsible for subject / lecturer:

dr hab. inż. Katarzyna Filipiak
email: katarzyna.filipiak@put.poznan.pl
tel. 61 665 23 49
Faculty of Electrical Engineering
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge in differential and integral calculus, linear algebra and geometry and probability theory
2	**Skills**	Computing derivatives and integrals, using matrix algebra, determination of probability of random events
3	**Social competencies**	Understanding of need of competences broadening, readiness to undertaking of co-operation

Assumptions and objectives of the course:

- to understand basic notions of the theory in order to apply them to solving technics problems
- to be able to apply basic statistical methods to technical problems

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. has an advanced knowledge of mathematics, especially probability theory and mathematical statistics - [[K_W01 (T2A_W01)]

Skills:

1. can, in accordance with scientific principles and utilising appropriate research methods, formulate and carry out preliminary research work which leads to solving structural, technological and organizational problems occurring in civil engineering - [K_U17 (T2A_U08, U11, U15, U16, U17)]
2. can plan laboratory experiments which lead to a quality evaluation of materials used and an evaluation of strength of structure elements - [K_U11 (T2A_U08, U09, U10)]

Social competencies:

1. can work on a problem individually and in a team; can manage a team - [K_K01 (T2A_K04)]
2. bears responsibility for the reliability of results obtained through his/her own achievements and for the evaluation of the work done by the team he/she supervises - [K_K02 (T2A_K05)]
3. acts in accordance with ethical principles, can detect possible manipulation of statistical inference - [K_K11 (T2A_K03, K05)]
4. is aware of the necessity to advance professional and personal competencies - [K_K06 (T2A_K03)]

Assessment methods of study outcomes

Lectures ? written exam concerning theoretical and practical topics considered during lectures and classes

Classes ? two written tests concerning mainly practical skills of solving statistical problems and the direct activity during the classes (solving problem on blackboard)

Course description

1. Elements of descriptive statistics
2. Probability theory ? definition of probability and its properties, independence, conditional probability, total probability, Bayes? theorem
3. Discrete random variable ? basic definitions, probability distributions (Benoulli?s, binomial, Poisson'), cumulative distribution function, expectation and standard deviation, fraction
4. Two-dimensional discrete random variable
5. Continuous random variable - basic definitions, probability distributions (uniform, exponential, normal) cumulative distribution function, expectation and standard deviation
6. Statistical inference: statistics and their distributions, Chi-square distribution, t-Student distribution
7. Statistical inference: point and interval estimation
8. Statistical inference: hypothesis testing
9. Comparing two or more populations
9. Regression analysis
8. Nonparametric hypotheses

Basic bibliography:

1. Krysicki, W., J. Bartos, W. Dyczka, K. Królikowska i M. Wasilewski, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. II, PWN Warszawa, 1986.
2. Bobrowski D. i K. Maćkowiak- Łybacka, Wybrane metody wnioskowania statystycznego, Wyd. PP, Poznań 2004.

Additional bibliography:

1. Devore, J., Probability and Statistics for Engineering and the Sciences, Brooks/Cole, Boston, 2012.
2. Ross, S.M., Introductory Statistics (3rd ed), Academic Press, 2010.

Result of average student's workload

Activity	Time (working hours)
1. Active participation in lectures	30
2. Active participation in classes	30
3. Active participation in consultations with posing questions	2
4. Preparing to tests	6
5. Preparing to exam	12

Student's workload

Source of workload	hours	ECTS
Total workload	80	4
Contact hours	62	3
Practical activities	18	1