STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Selected topics in Mathematics**	Code **1010601321010344271**	

Field of study **Transport**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 2**

Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**

Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **full-time**

No. of hours Lecture: **2** Classes: **1** Laboratory: **-** Project/seminars: **-**	No. of credits **3**

Status of the course in the study program (Basic, major, other) **basic**	(university-wide, from another field) **university-wide**

Education areas and fields of science and art **the sciences** **Mathematical sciences**	ECTS distribution (number and %**)** **3 100%** **3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student has a knowledge of combinatorics and probability calculus at the secondary school level. Student has a basic knowledge of Mathematics 1.
2	**Skills**	Student is able to think logically. Student is able to use a calculator.
3	**Social competencies**	Student understands the necessity of learning and usefulness of acquired knowledge.

Assumptions and objectives of the course:

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.

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

Knowledge:

1. Student knows the basic probability distributions - [K1A_W01]

2. Student knows the basic terms of mathematical statistics - [K1A_W01]

3. The student knows different methods of statistical inference. - [K1A_W01]

Skills:

1. Student is able to apply theoretical probability distributions - [K1A_U01]

2. Student is able to analyze and interpret statistical data   - [K1A_U01]

3. Student is able to apply the methods of mathematical statistics in engineering practice.   - [K1A_U01]

Social competencies:

1. Student understands the usefulness of statistical methods - [K1A_K01]

2. Student understands the need and know the possibilities of lifelong learning - [K1A_K01]

Assessment methods of study outcomes

Written exam.

Written tests.

Course description
1. Combinatorics. Evets. (Lecture)
2. Probability space. (Lecture)
3. Axiomatic definition of probability: classical probability. (Lecture and Exercise)
4. Conditional probability, Bayesian model. (Lecture and Exercise)
5. Random variable, distribution function, expected value, variance. (Lecture)
6. Discrete random variable. Discrete distributions. (Lecture and Exercise)
7. The continuous random variable. Continuous distributions. (Lecture and Exercise)
8. The two-dimensional random variable (Lecture). The independence of random variables.(Lecture)
9. Elements of descriptive statistics. (Lecture and Exercise)
10. Point estimation. (Lecture)
11. Confidence intervals. (Lecture and Exercise)
12. Tests of significance: expected value, variance, proportion (one or two populations). (Lecture and Exercise)
13. Analysis of variance. (Lecture)
14. Correlation coefficients (Pearson, Spearman, Kendall, multiple correlation). Significance test (lecture)
15. Linear regression. Testing the significance of regression. (Lecture)
16. Non-parametric tests (lecture)

Basic bibliography:

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

Additional bibliography:

1. Plucińska A., Pluciński E., Probabilistyka, Wydawnictwo WNT, Warszawa

2. R. L. Scheaffer, J. T. McClave (1995) Probability and Statistics for Engineers, Duxbury

Result of average student's workload	
Activity	**Time (working hours)**
1. udział w zajęciach wykładowych (15 x 2godz.)	30
2. udział w zajęciach ćwiczeniowych(15 x 1godz.)	15
3. udział w konsultacjach związanych z realizacją procesu kształcenia, w szczególności zajęć ćwiczeniowych (2 x 2godz)	4
4. dokończenie (w ramach pracy własnej) zadań ćwiczeniowych: (16 x 1godz).	16
5. przygotowanie do sprawdzianów	12
6. zapoznanie się ze wskazaną literaturą / materiałami dydaktycznymi (11godz)	11
7. przygotowanie do egzaminu i udział w egzaminie: (10 godz. + 2 godz.)	12

Student's workload		
Source of workload	**hours**	**ECTS**
Total workload	100	3
Contact hours	51	2
Practical activities	0	0