Study module description form

Name of the module/subject: **Mathematical statistics**			Code: **1011102311010340139**
Fidel of study: **Engineering management**	profile: **general academic**		year/semester: **1/1**
Speciality: **Corporate management**	Przedmiot oferowany w języku: **English**		Kurs (obligatoryjny/obieralny): **obligatory**
Level of the tertiary education: **second**	Form of studies: **full-time studies**		
lectures: **15** classes: **15** laboratories: **-** seminars: **-**		hours	Liczba punktów: **3**

Status of the course in the study program: **basic** in mathematical sciences

Education areas and fields of science and art: **economical sciences** **ECTS distribution (no. & %) 3 100%**

Responsible for subject / lecturer: dr Adam Marlewski, email: adam.marlewski@put.poznan.pl, tel. (0*61) 665-2763, Wydział Elektryczny, ul. Piotrowo 3A, 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	knowledge:	basic knowledge in logics, set theory, calculus and descriptive statistics
2	skills:	calculator dominance, reading simple mathematical texts, search for material (in books, Internet)
3	social competences:	a) conscieousness that a further education is needed, b) awareness that a knowledge (incl. that in mathematics) has to be transmitted, in a clear way, to the public

Objectives of the course: Familiariziation with basic concepts in mathematical statistics, typical statistical distributions and statistical methods of data analysis

Study outcomes:

Knowledge: Orientation in methods and tools of mathematical statistics, ability to apply them to model simple processes and phenomena (in particular that occurring in management) - [K2A_W10].

Skills: Ability in using the theoretical knowledge to statistically describe and analyze the causes and processes, to correctly interprete data and outcomes involved in statistical inferrence - [K2A_U02].

Social competences: ability to transmit theoretical and practical issues involved in statistically handled data.

Assessment methods of study outcomes:
Homeworks and the test (and the second test, if the first one results with negative mark) embracing theory and exercises.

Course description (Syllabus):

1. Prerequisities (incl. mathematical induction, combinatorics, generating function and recurrence, binomial formula, binomial and Stirling coefficients, Stirling approximation to *n*!).
2. Numerical characteristics of a finite and infinite sequences (a.o., moments and centered moments).
3. The concept of a sample space and of a random variable, its mass (aka density) and cumulative distribution function.
4. Classical definition of the probability and sample problems (a.o. parenthesizing and Catalan numbers, birthday problem and pidgeonhole principle).
5. Univariate discrete finite random variables (Bernoulli and binomial distributions, uniform and triangular distributions).
6. Conditional probability and Bayes theorem.
7. Geometrical probability and Bertrand paradox.
8. Kolmogorov probability.
9. Univariate discrete infinite discrete distributions (geometric, exponential, Poisson).
10. Univariate continuous distributions (Gauss, Cauchy, arcsine, power-law Pareto).
11. Central limit theorem.
12. Point and interval estimates of parameters, hypothesis testing.
13. Correlation and regression functions.
14. Multidimensional random variables (a.o. 2-dimensional Gauss and error ellipse, max distribution, sum of squares distribution).
15. Markov processes and random walk.

Basic literature:

1. M.Dekking, C.Kraaikamp, H.P.Lopuhaä, L.E.Meester, A modern introduction to probabilisty and statistics. Understanding why and how, Springer 2005
2. Y.Dodge, The consice encyclopedia of statistics, Springer 2008
3. W.Feller, An introduction to probability theory and its applications, Vol.I, John Wiley & Sons 1968
3. M.Lovric, International encyclopedia of statistical science, Springer 2011

Additional sources: materials provided by the lecturer (incl. that via the web-page WWW.math.put.poznan.pl/~amarlew)

Average student workload in types of activity:	hours
1. Listening to lectures (mode of delivery: face-to-face)	15
2. Active participation in classes (incl. answers at the blackboard)	15
3. Preparation to classes and to the test (incl. reading materials provided by the lecturer via web-page)	30

Average student workload in form of activity:	hours	ECTS	
total	60	3	
student-to-lecturer hours	30	0	
practical activities	15	0	**2014-03-03**