STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Descriptive statistics**	Code **1010341711010348915**

Field of study **Mathematics in Technology**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 1**

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

Cycle of study: **First-cycle studies** **(Polish Qualifications Framework level six)**	Form of study (full-time, part-time) **full-time**

No. of hours	No. of credits
Lecture: **15** Classes: **-** Laboratory: **15** Project/seminars: **-**	**2**

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 %) **2 100%** **2 100%**

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of elementary functions, algebraic operations, mathematical analysis and probability theory. – [PQF 4]
2	**Skills**	Computer skills: MS Office environment knowledge (especially MS Excel). – [PQF 4]
3	**Social competencies**	Students seriously treat the process of studying. – [PQF 4]

Assumptions and objectives of the course:

Descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data.

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

Knowledge:

1. Students understand the meaning of descriptive statistics and their applications in other sciences. - [K_W01 (P6S_WG)]

2. Students know how to use descriptive statistics methods in a making of analysis the data. - [K_W01 (P6S_WG)]

3. Students know about calculating and programming techniques involved in descriptive statistics methods and understand their boundary. - [K_W06 (P6S_WG)]

Skills:

1. Students are able to formulate the aim, the subject and the range of the statistics. - [K_U01 (P6S_UW)]

2. Students are able to present the results of the research. - [K_U07 (P6S_UW)]

3. Students are able to use the proper statistical methods in order to make the analysis of the data. - [K_U07 (P6S_UW)]

4. Students are able to make the quantitative analysis and to formulate the proper corollaries about studied phenomena. - [K_U07 (P6S_UW)]

5. Students are able to learn by themselves. - [K_U15 (P6S_UU)]

Social competencies:

1. Students understand the need of the further education and the developing of their skills. - [K_K01 (P6S_KK), K_K02 (P6S_KK)]

2. Students are able to define the priorities properly. - [K_K01 (P6S_KK), K_K02 (P6S_KK)]

3. Students understand the social aspects of the practical using of the knowledge and the connected with them responsibility. - [K_K03 (P6S_KO)]

4. Students are able to act in the enterprising way. - [K_K03 (P6S_KO)]

Assessment methods of study outcomes

Lectures:

Written final test on the last lecture.

Laboratories:

Short tests on every laboratories. Final test on the last laboratory.

Course description

APPLIED METHODS OF TEACHING: lectures - a slide show with examples written on the blackboard; laboratory - discussion on solved problems (using eg. free software).

PRELIMINARIES (populations, observations and samples, statistical characteristics and their classification, measure scales).

STATISTICAL RESEARCH STAGES (aim, subject and space of statistical research, statistical observations and samples, statistical series and their types, statistical tables, graphs - histograms, boxplot, box-and-whisker plot).

MEASURES OF CENTRAL TENDENCY (outliers, arithmetic mean (AM), geometric mean (GM), harmonic mean (HM), relationship between AM, GM and HM, mode, median, quartiles, other quantiles).

MEASURES OF DISPERSION (average deviation, variance, standard deviation, classic coefficient of variation, range, interquartile range, interquartile deviation, order coefficient of variation).

MEASURES OF SKEWNESS (negative skew, positive skew, measures of skewness, coefficient of asymmetry, order measure of skewness, order measure of asymmetry, central moments of third order, sample skewness).

MEASURES OF CONCENTRATIONS (kurtosis,excess, Gini coefficient of concentration, Lorenz curve).

MEASURES OF CORRELATION FOR TWO VARIABLES (correlation series, correlation diagram, correlation table, covariance, Pearson's correlation coefficient, Spearman's and Kendall's rank correlation coefficients).

REGRESSION ANALYSIS (linear regression model, least squares method, nonlinear regression, multiple regression).

UPDATE: 14.09.2018

Basic bibliography:

1. E. Wasilewska, Statystyka matematyczna w praktyce. Wydawnictwo Difin, 2015.

2. I. Bąk, I. Markowicz, M. Mojsiewicz, K. Wawrzyniak, Statystyka opisowa : przykłady i zadania.Wydawnictwo: CeDeWu, Warszawa 2015.

3. W. Starzyńska, Statystyka praktyczna. Wydawnictwo Naukowe PWN, Warszawa 2012.

4. M. Iwińska, B. Popowska, M. Szymkowiak, Statystyka opisowa. Wydawnictwo Politechniki Poznańskiej, 2011.

5. J. Buga, H. Kassyk-Rokicka, Podstawy statystyki opisowej. Wydawnictwo: Vizja Press & IT, Warszawa 2008.

6. M. Sobczyk, Statystyka. Wydawnictwo Naukowe PWN, Warszawa.

Additional bibliography:

1. A. Witkowska, M. Witkowski, Statystyka opisowa w przykładach i zadaniach. Wydawnictwo Uczelni Państwowej Wyższej Szkoły Zawodowej im. Prezydenta Wojciechowskiego, Kalisz 2007.

2. W. Regel, Ćwiczenia z podstaw statystyki w Excelu. Wydawnictwo Naukowe PWN, Warszawa 2007.

3. A. Aczel, Statystyka w zarządzaniu : pełny wykład (przekł.: Zbigniew Czerwiński, Wojciech Latusek). Wydawnictwo Naukowe PWN, Warszawa 2006.

Result of average student's workload

Activity	Time (working hours)
1. Lectures (15h).	15
2. Laboratories (15h).	15
3. Homeworks preparing for short tests on laboratories.	4
4. Homeworks preparing for the next laboratories.	7
5. Homeworks preparing for the final test on the last lecture.	4
6. Meetings with the lecturer.	5

Student's workload

Source of workload	hours	ECTS
Total workload	50	2
Contact hours	35	1
Practical activities	31	1