MODULE SPECIFICATION

Module code	
Module title in Polish	**Matematyka stosowana w geomatyce**
Module title in English	**Applied Mathematics in Geomatics**
Module running from the academic year	**2016/2017**

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	**Surveying and Cartography**
Level of qualification	**first cycle** (first cycle, second cycle)
Programme type	**academic** (academic/practical)
Mode of study	**full-time** (full-time/part-time)
Specialism	**all**
Organisational unit responsible for module delivery	**The Department of Mathematics**
Module co-ordinator	**Małgorzata Sokała, PhD**
Approved by:	

B. MODULE OVERVIEW

Module type	**core module** (core/programme-specific/elective HES*)
Module status	**compulsory module** (compulsory/optional)
Language of module delivery	**English**
Semester in the programme of study in which the module is taught	**semester 3**
Semester in the academic year in which the module is taught	**winter semester** (winter semester/summer semester)
Pre-requisites	**None** (module code/module title, where appropriate)
Examination required	**Yes** (Yes/No)
ECTS credits	**2**

* elective HES − elective modules in the Humanities and Economic and Social Sciences

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per	**15**	**15**			

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semester					

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C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the module is to familiarise students with the elements of descriptive statistics and combinatorics together with their applications with respect to geomatics.

Module outcome code	Module learning outcomes	Mode of instruction (l/c/lab/p/ others)	Corresponding programme outcome code	Corresponding discipline-specific outcome code
W_01	A student knows basic notions of the probability calculus and statistics.	l/c	GiK_W01 GiK_W03	T1A_W01 T1A_W04 T1A_W07
W_02	A student knows basic principles of partial tests; a student also understands the accompanying mistakes.	l/c	GiK_W01 GiK_W03	T1A_W01 T1A_W04 T1A_W07
W_03	A student understands the variability of processes; a student can also describe it and reduce with the use of statistical tools.	l/c	GiK_W01 GiK_W03	T1A_W01 T1A_W04 T1A_W07
U_01	A student can use various data visualisation tools; moreover, a student has sufficient computational capability as regards determining basic values of statistical parameters; finally, a student can correctly interpret the obtained results.	l/c	GiK_U03 GiK_U15	T1A_U01, T1A_U05 T1A_U08, T1A_U09
U_02	A student can test cause and effect relationships; a student can conduct the interdependence relationship of a couple of statistical features.	l/c	GiK_U03 GiK_U15	T1A_U01, T1A_U05 T1A_U08, T1A_U09
U_03	A student can select the appropriate confidence interval or a statistical test; moreover, a student can assess and interpret errors connected with statistical inference.	l/c	GiK_U03 GiK_U15	T1A_U01, T1A_U05 T1A_U08, T1A_U09
U_04	A student can present his/her reasoning method while solving statistical tasks (and also justify it).	l/c	GiK_U03 GiK_U15	T1A_U01, T1A_U05 T1A_U08, T1A_U09
K_01	A student understands the necessity of continuous education and raising his/her competences as regards mathematical methods used to solve typical engineering problems.	l/c	GiK _K01	T1A_K01

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1-2	The elements of descriptive statistics: the concept of population and a random sample. The methods of presenting data (a simple series, frequency distribution, a histogram, and frequency broken line). The measures of central tendency: p-order quantile, a median, a dominant, and a mean. Distribution measures: a range, a variance, and a standard deviation. Relative distribution measure (the coefficient of variability).	W_01 W_02 W_03 U_01 U_02 U_04 K_01
3	Basic notions of the probability calculus: a simple event, the space of simple events, and	W_01

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	events. Event probability and its properties. A conditional and total probability. The independence of events.	W_02 W_03 U_01 U_02 U_04 K_01
4	The notion of a random variable. A discrete random variable and its distribution. A distribution function and its properties. The examples of discrete random variables. The parameters of a discrete random variable: the expected value, a variance, and a standard deviation.	W_01 W_02 W_03 U_01 U_02 U_04 K_01
5	Continuous random variables and their numerical characteristics: the expected value, a variance, a standard deviation, a p-order quantile, and a median. A standard distribution, x2, and a student's distribution. Central limit theorem.	W_01 W_02 W_03 U_01 U_02 U_04 K_01
6-8	Basic notions of statistics: the methods of taking samples, the statistics of a sample as estimators, distributions from a sample. Point and interval estimation. Confidence intervals for a mean and variance.	W_01 W_02 W_03 U_01 U_02 U_03 U_04 K_01

2. Topics to be covered in the classes

No.	Topics	Module outcome code
1-2	Practice concerning statistical data: creating distributive series, bar graphs, and frequency polygons. Data analysis (calculating a mean and a variance). Determining numeral/numerical characteristics: a p-order quantile, a median, a dominant, a range, and the coefficient of variability.	W_01 W_02 W_03 U_01 U_02 U_04 K_01
3	Calculating event probability with the use of combinatorics, the formula for geometrical and total probability.	W_01 W_02 W_03 U_01 U_02 U_04 K_01
4	Determining the distribution of discrete random variables. Calculating characteristic parameters as regards these variables.	W_01 W_02 W_03 U_01 U_02 U_04

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		K_01
5	Solving tasks with the use of normal distribution and central limit theorem.	W_01 W_02 W_03 U_01 U_02 U_04 K_01
6-8	Determining confidence intervals for a meand and a variance.	W_01 W_02 W_03 U_01 U_02 U_03 U_04 K_01

Assessment methods

Module outcome code	Assessment methods *(Method of assessment; for module skills − reference to specific project, laboratory and similar tasks)*
W_01	A written examination and tests
W_02	A written examination and tests
W_03	A written examination and tests
W_04	A written examination and tests
W_05	A written examination and tests
W_06	A written examination and tests
U_01	A written examination and tests
U_02	A written examination and tests
U_03	A written examination and tests
U_04	A written examination and tests
U_05	A written examination and tests
U_06	A written examination and tests
K_01	Observing a student's involvement during the classes and a discussion during the classes

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D. STUDENT LEARNING ACTIVITIES

	ECTS summary	
	Type of learning activity	**Study time/ credits**
1	Contact hours: participation in lectures	**15**
2	Contact hours: participation in classes	**15**
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	**4**
5	Contact hours: participation in project-based classes	
6	Contact hours: meetings with a project module leader	
7	Contact hours: attendance at an examination	**2**
8		
9	**Number of contact hours**	**36** *(sum)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**1.44**
11	Private study hours: background reading for lectures	**2**
12	Private study hours: preparation for classes	**2**
13	Private study hours: preparation for tests	**5**
14	Private study hours: preparation for laboratories	
15	Private study hours: writing reports	
16	Private study hours: preparation for a final test in laboratories	
17	Private study hours: preparation of a project/a design specification	
18	Private study hours: preparation for an examination	**5**
19		
20	**Number of private study hours**	**14** *(sum)*
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**0.56**
22	**Total study time**	**50**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**2**
24	**Number of practice-based hours** *Total practice-based hours*	**0**
25	**Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)*	**0**

E. READING LIST

References	
Module website	

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