MODULE SPECIFICATION

Module code	
Module title in Polish	**Matematyka II**
Module title in English	**Mathematics 2**
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 2**
Semester in the academic year in which the module is taught	**Summer semester** (winter semester/summer semester)
Pre-requisites	**No requirements** *(module codes / module names)*
Examination required	**Yes** *(yes / no)*
ECTS credits	**5**

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

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per	30	30			

semester					

C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aims of the module include the following: analytical geometry in 3D space; familiarising students with basic applications of the integral calculus with one and several variables (for calculating surface areas, the volumes of lathed shapes and arch lengths); presenting the concept of an ordinary differential equation together with the selected methods of solving these equations; presenting the fundamentals of analysing statistical data.

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 is knowledgeable about the notions of analytical geometry.	l/c	GiK_W01	T1A_W01
W_02	A student knows geometrical and physical application of a definite integral.	l/c	GiK_W01	T1A_W01
W_03	A student knows the fundamentals of a differential and integral calculus of functions with several variables.	l/c	GiK_W01	T1A_W01
W_04	A student knows the systems of cylindrical and spherical coordinates.	l/c	GiK_W01	T1A_W01
W_05	A student has fundamental knowledge on differential equations.	l/c	GiK_W01	T1A_W01
W_06	A student is acquainted with the fundamentals of statistical data analysis.	l/c	GiK_W01 GiK _W03	T1A_W01, T1A_W04, T1A_W07
U_01	A student can solve simple analytical geometry tasks.	l/c	GiK _U03	T1A_U01, T1A_U05,
U_02	A student can calculate the selected geometrical and technical application with a definite integral.	l/c	GiK _U03	T1A_U01, T1A_U05,
U_03	A student can use a differential and integral calculus of a function with several variables.	l/c	GiK _U03	T1A_U01, T1A_U05,
U_04	A student can change the coordinate system.	l/c	GiK _U03	T1A_U01, T1A_U05,
U_05	A student can solve the selected differential equations.	l/c	GiK _U03	T1A_U01, T1A_U05,
U_06	A student can make and elementary statistical analysis of data.	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 utilised to solve typical engineering problems.	l/c	GiK _K01	T1A_K01

Module content:

1. Topics to be covered in the lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	The equations of straight lines and planes. Second-order curves and quadrics.	W_01 U_01 K_01
2-3	Geometrical and physical application of definite integrals of functions with one variables. Improper integrals.	W_01 W_02 U_02 K_01

4-5	A differential equation of a function with several variables (a domain, partial and directional variables, a gradient, and function extremes). Implicit functions and their extremes.	W_03 U_03 K_01
6	First-order ordinary differential equations (a general solution, the Cauchy theorem).	W_05 U_05 K_01
7	Linear differential equations with constant coefficients.	W_05 U_05 K_01
8-10	Multiple integrals. Cylindrical and spherical coordinates.	W_01 W_03 W_04 U_03 U_04 K_01
11	The stages of a statistical test, sample selection. The measures of positioning and differentiating a quantitative feature.	W_06 U_06 K_01
12	Analysing the correlation of phenomena. Analysing the correlation of qualitative features. A fourfold table. The coefficient of contingency. Analysing the correlation of quantitative feature pairs. A correlation table. The coefficient of correlation and regression.	W_06 U_06 K_01
13	The distribution of a random variable (a random experiment result). Cumulative distribution function and density. The expected value and a variant of a random variable. Basic theoretical distributions.	W_06 U_06 K_01
14	Estimating feature parameters in a group on the basis of a sample. Point and interval estimation.	W_06 U_06 K_01
15	Basic stages in the process of verifying statistical hypotheses. Error types.	W_06 U_06 K_01

2. Topics to be covered in the classes

No.	Topics	Module outcome code
1	The equations of straight lines and planes. Second-order curves and quadrics.	W_01 U_01 K_01
2-3	Geometrical and physical application of definite integrals of functions with one variable. Improper integrals.	W_01 W_02 U_02 K_01
4-5	A differential equation of a function with several variables (a domain, partial and directional variables, a gradient, and function extremes). Implicit functions and their extremes.	W_03 U_03 K_01
6	First-order ordinary differential equations (a general solution, the Cauchy theorem).	W_05 U_05 K_01
7	Linear differential equations with constant coefficients.	W_05 U_05 K_01
8-10	Multiple integrals. Cylindrical and spherical coordinates.	W_01 W_03 W_04 U_03 U_04 K_01
11	The stages of a statistical test, sample selection. The measures of positioning and differentiating a quantitative feature.	W_06 U_06 K_01
12	Analysing the correlation of phenomena. Analysing the correlation of qualitative features. A fourfold table. The coefficient of contingency. Analysing the correlation	W_06 U_06 K_01

	of quantitative feature pairs. A correlation table. The coefficient of correlation and regression.	
13	The distribution of a random variable (a random experiment result). Cumulative distribution function and density. The expected value and a variant of a random variable. Basic theoretical distributions.	W_06 U_06 K_01
14	Estimating feature parameters in a group on the basis of a sample. Point and interval estimation.	W_06 U_06 K_01
15	Basic stages in the process of verifying statistical hypotheses. Error types.	W_06 U_06 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, discussions during the classes

D. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	**Study time/ credits**
1	Contact hours: participation in lectures	**30**
2	Contact hours: participation in classes	**30**
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	**8**
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**	**70** *(sum)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**2.8**
11	Private study hours: background reading for lectures	**10**
12	Private study hours: preparation for classes	**15**
13	Private study hours: preparation for tests	**15**
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	**15**
19		
20	**Number of private study hours**	**55** *(sum)*
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**2.2**
22	**Total study time**	**125**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**5**
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	