MODULE SPECIFICATION

Module code	
Module title in Polish	**Matematyka I**
Module title in English	**Mathematics 1**
Module running from the academic year	**2016/2017**

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	**Civil Engineering**
Level of qualification	**First cycle** *(first cycle, second cycle)*
Studies profile	**Academic** (*academic/practical*)
Mode of study	**Full-time** *(full-time / part-time)*
Specialism	
Organisational unit responsible for module delivery	The Department of Mathematics
Module co-ordinator	Monika Skóra, PhD
Approved by	**Marek Iwański, Professor**

B. MODULE OVERVIEW

Module type	**Core module** (*core/programme-specific/elective HES**)
Module status	**Compulsory module** (*compulsory / non-compulsory*)
Language of module delivery	**English**
Semester in the programme of study in which the module is taught	**Semester 1**
Semester in the academic year in which the module is taught	**Winter semester** *(winter / summer)*
Pre-requisites	**None** (*module code/module title, where appropriate*)
Examination required	**Yes** *(yes / no)*
ECTS credits	**6**

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per semester	**15**	**45**			

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

C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the module is to acquaint students with: defining mathematical models (limit, function derivative, etc.) which serve the purpose of describing physical and engineering properties, etc. as well as indicating these tools to test functions, calculate plane surface areas, length values of arches of curves, side surfaces and the volume of rotating solids.

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 can characterise function properties.	l/c	B_W01	T1A_W01 T1A_W07
W_02	A student can define function limit.	l/c	B_W01	T1A_W01 T1A_W07
W_03	A student can recognise function asymptotes.	l/c	B_W01	T1A_W01 T1A_W07
W_04	A student can define function derivative.	l/c	B_W01	T1A_W01 T1A_W07
W_05	A student can select integration methods for determined function types and indicate geometrical as well as technical applications of an integral calculus of a function with one variable.	l/c	B_W01	T1A_W01 T1A_W07
U_01	A student is able to make calculations.	c	B_U01	T1A_U08 T1A_U09
U_02	A student is capable of solving equations and inequalities.	c	B_U01	T1A_U08 T1A_U09
U_03	A student is able to calculate function limits and function derivatives.	c	B_U01	T1A_U08 T1A_U09
U_04	A student is capable of applying limits and a differential calculus to investigate a function and other technical applications.	c	B_U01	T1A_U08 T1A_U09
U_05	A student can efficiently calculate integrals of a function with one variable; a student can also apply an integral calculus for engineering applications.	c	B_U01	T1A_U08 T1A_U09
K_01	A student has the ability of the responsibility for his/her own work.	l/c	B_K02	T1A_K02 T1A_K05 T1A_K07
K_02	A student understands the necessity of continuous education and raising his/her competences as regards mathematical methods which are utilised to solve typical engineering problems.	l/c	B_K03	T1A_K01 T1A_K05 T1A_K06

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1	Functions with one real variable and their basic properties. A complex and inverse functions. Polynomials, trigonometric, circular, exponential, and logarithmic functions.	W_01 K_02
2	Function continuity and limit. Asymptotes.	W_02,W_03,K_02
3	Function derivative. Tangent to a diagram. Its application to calculate limits (de l'Hospital's theorem). Monotonicity and function extremes. Taylor's theorem.	W_04 K_02
4	Second derivative and function convexity. Investigating a function.	W_04 K_02
5	A definite integral, a plane surface area. A primitive function. Basic theorem of a differential and integral calculus. Integrating by substitution	W_04 W_05

	and by parts.	K_02
6	Integrals of rational functions. Integrals of trigonometric functions. The method of indefinite coefficients. Improper integrals.	W_05 K_02
7	Geometrical and technical applications of integrals.	W_01, W_05, K_02

2. Topics to be covered in the classes

No.	Topics	Module outcome code
1	Linear and quadratic function. Solving linear and quadratic functions.	U_01, U_02, K_01, K_02
4	Trigonometric and circular functions. Solving trigonometric equations and inequalities.	U_01, U_02, K_01, K_02
5	Examining function continuity. Calculating limits.	U_01, U_03, K_01, K_02
6	Function boundaries. Determining asymptotes.	U_01, U_03, K_01, K_02
7	Calculating function derivatives.	U_01, U_03, K_01, K_02
8	Tangent to a function diagram.	U_01, U_03, K_01, K_02
9	The application of derivatives to calculate limits.	U_01, U_03, K_01, K_02
10	Examining function monotonicity, determining extremes.	U_01, U_02, U_03, K_01, K_02
11	Examining function convexity. Determining deflection	U_01, U_02, U_03, K_01, K_02
12	Investigating a function.	U_01, U_02, U_03, K_01, K_02
13	Investigating a function.	U_01, U_02, U_03, K_01,

			K_02
14	Taylor's theorem. Approximation with polynomial functions.		U_01, U_03, K_01, K_02
15	Determining primitive functions by substitution and by parts.		U_01, U_05, K_01, K_02
16	Calculating the integrals of rational functions.		U_01, U_05, K_01, K_02
17	Calculating the integrals of rational functions.		U_01, U_05, K_01, K_02
18	Calculating the integrals of trigonometric functions.		U_01, U_05, K_01, K_02
19	Euler's substitutions.		U_01, U_05, K_01, K_02
20	The methods of indefinite coefficients.		U_01, U_05, K_01, K_02
21	Geometrical applications of a definite integral.		U_01, U_05, K_01, K_02
22	Geometrical applications of a definite integral.		U_01, U_05, K_01, K_02

3. Topics to be covered in the laboratories
4. Topics to be covered in the projects

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 test and a written examination
W_02	A written test and a written examination
W_03	A written test and a written examination
W_04	A written test and a written examination
W_05	A written test and a written examination
U_01	A written test and a written examination
U_02	A written test and a written examination
U_03	A written test and a written examination
U_04	A written test and a written examination

U_05	A written test and a written examination
K_01	Observing a student's involvement during the classes, a discussion during the classes
K_02	Observing a student's involvement during the classes, a discussion during the classes

C. 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	**45**
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	**4**
8		
9	**Number of contact hours**	**72** *(total)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**2.9**
11	Private study hours: background reading for lectures	**15**
12	Private study hours: preparation for classes	**15**
13	Private study hours: preparation for tests	**30**
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	**18**
19		
20	**Number of private study hours**	**78** *(total)*
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**3.1**
22	**Total study time**	**150**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**6**
24	**Number of practice-based hours** *Total practice-based hours*	**8**
25	**Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)*	**0.3**