MODULE DESCRIPTION

Module code	**Z-0476z**
Module name	**Analiza Matematyczna I**
Module name in English	**Calculus 1**
Valid from academic year	**2016/2017**

A. MODULE PLACEMENT IN THE SYLLABUS

Field of study	**Management and Production Engineering**
Level of education	**1st degree** *(1st degree / 2nd degree)*
Studies profile	**General** *(general / practical)*
Form and method of conducting classes	**Full-time** *(full-time / part-time)*
Specialisation	**All**
Unit conducting the module	**Department of Applied Computer Science and Applied Mathematics**
Module co-ordinator	**Leszek Hożejowski, PhD**
Approved by:	

B. MODULE OVERVIEW

Type of subject/group of subjects	**Basic** *(basic / major / specialist subject / conjoint / other HES)*
Module status	**Compulsory** *(compulsory / non-compulsory)*
Language of conducting classes	**English**
Module placement in the syllabus - semester	**1st semester**
Subject realisation in the academic year	**Winter semester** *(winter semester/ summer)*
Initial requirements	**No requirements** *(module codes / module names)*
Examination	**No** *(yes / no)*
Number of ECTS credit points	**4**

Method of conducting classes	Lecture	Classes	Laboratory	Project	Other
Per semester	**20**	**20**			

C. TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Module target	The aim of the module is to get students familiar with foundations of single-variable Calculus. Examining the behaviour of a function.

Effect symbol	Teaching results	Teaching methods *(l/c/lab/p/other)*	Reference to subject effects	Reference to effects of a field of study
W_01	A student knows the concept and the properties of a function.	l/c	K_W01	T1A_W01
W_02	A student knows fundamental concepts in Calculus.	l/c	K_W01	T1A_W01
W_03	A student knows how to examine the behavior of a function.	l/c	K_W01	T1A_W01
U_01	A student can find the domain of a function, find the inverse of a function and superposition of functions. He can evaluate the limits and find the asymptotes of a rational function.	l/c	K_U01 K_U14	T1A_U01
U_02	A student understands the notion of derivative and knows its physical and geometrical interpretation. He knows differentiation rules and can differentiate (including higher-order derivatives) composite functions.	c	K_U01	T1A_U02
U_03	A student can apply derivatives for finding extrema, concavity and points of inflation.	c	K_U01	T1A_W01
K_01	A student is aware of the need of broadening his knowledge of mathematical methods when it is needed in his job.	l/c	K_K01	T1A_K01
K_02	A student understands the importance of the links between mathematics and engineering and other areas beyond engineering practice.	l/c	K_K02	T1A_K02

Teaching contents:

1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	Functions of one variable. Natural domain. Properties of a function. Monotonic functions. Graphs of elementary functions.	W_01 U_01 K_01 K_02
2	Composition of functions. Inverse function. One-to-one functions. Inverse trigonometric functions.	W_01 U_01 K_01 K_02
3	Limit of an infinite sequence. Evaluating limits of sequences.	W_01 U_01 K_01 K_02
4	Limit of a function. One-sided limits. Continuous functions. Asymptotes of a curve.	W_01 U_01 K_01 K_02
5	Rate of change. Derivative of a function of one variable. Geometrical and physical interpretation of the derivative.	W_02 U_02

		K_01 K_02
6	Differentiation - basic rules. Derivatives of elementary functions. Derivative of a composite function. Exact differential.	W_02 U_02 K_01 K_02
7	Higher-order derivatives. Taylor's theorem. L'Hospital's Rule.	W_02 U_02 K_01 K_02
8	Applications of derivatives to problems in geometry and physics.	W_02 U_02 K_01 K_02
9	First derivative test – stationary points, intervals of increase/decrease. Relative and absolute extrema.	W_03 U_03 K_01 K_02
10	First and second derivative test. Relative extrema. Concavity and inflation points. Sketching the graph of a function.	W_03 U_03 K_01 K_02

2. Teaching contents as regards classes

Class number	Teaching contents	Reference to teaching results for a module
1	Natural domain of a function. Even and monotonic functions. Sketching graphs of functions. Transformation of graphs.	W_01 U_01 K_01 K_02
2	Finding composite functions and inverse functions. Sketching inverse functions and finding its domain.	W_01 U_01 K_01 K_02
3	Evaluating limits of sequeces.	W_01 U_01 K_01 K_02
4	Evaluating limits and one-sided limits of functions. Checking continuity of functions.	W_01 U_01 K_01 K_02
5	One-sided limits of functions. Finding asymptotes of a function.	W_01 U_01
6	Finding derivatives using the definition. Finding derivatives using derivative rules.	W_02 U_02 K_01 K_02
7	Finding derivatives of composite functions. Finding higher-order derivatives.	W_02 U_02 K_01 K_02
8	Using L'Hospital Rule to evaluate limits. Taylor approximation of a function.	W_03 U_03 K_01 K_02
9	First and second derivative test for examining the behavior of a function Finding relative and absolute extrema. Finding intervals of increase and	W_03 U_03

	decrease, concavity and points of inflation.	K_01 K_02
10	Written test.	

3. Teaching contents as regards laboratory classes

Laboratory class number	Teaching contents	Reference to teaching results for a module

4. The characteristics of project assignments

The methods of assessing teaching results

Effect symbol	Methods of assessing teaching results *(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)*
W_01	A written test; observing a student's involvement during the classes.
W_02	A written test; observing a student's involvement during the classes.
W_03	A written test; observing a student's involvement during the classes.
W_04	A written test; observing a student's involvement during the classes.
U_01	A written test; observing a student's involvement during the classes.
U_02	A written test; observing a student's involvement during the classes.
U_03	A written test; observing a student's involvement during the classes.
U_04	A written test; observing a student's involvement during the classes.
K_01	Observing a student's involvement during the classes; discussions during the classes.
K_02	Observing a student's involvement during the classes; discussions during the classes.

D. STUDENT'S INPUT

ECTS credit points		
	Type of student's activity	**Student's workload**
1	Participation in lectures	**20**
2	Participation in classes	**20**
3	Participation in laboratories	
4	Participation in tutorials (2-3 times per semester)	**8**
5	Participation in project classes	
6	Project tutorials	
7	Participation in an examination	
8		
9	**Number of hours requiring a lecturer's assistance**	**50** *(sum)*
10	**Number of ECTS credit points which are allocated for assisted work** *(1 ECTS point=25-30 hours)*	**2**
11	Unassisted study of lecture subjects	**15**
12	Unassisted preparation for classes	**15**
13	Unassisted preparation for tests	**10**
14	Unassisted preparation for laboratories	
15	Preparing reports	
15	Preparing for a final laboratory test	
17	Preparing a project or documentation	
18	Preparing for an examination	**10**
19		
20	**Number of hours of a student's unassisted work**	**50** *(sum)*
21	**Number of ECTS credit points which a student receives for unassisted work** *(1 ECTS point=25-30 hours)*	**2**
22	**Total number of hours of a student's work**	**100**
23	**ECTS points per module** *1 ECTS point=25-30 hours*	**4**
24	**Work input connected with practical classes** *Total number of hours connected with practical classes*	**40**
25	**Number of ECTS credit points which a student receives for practical classes** (1 ECTS point=25-30 hours)	**2.3**

E. LITERATURE

Literature list	1. Hożejowska S., Hożejowski L., Maciąg A., *Matematyka w zadaniach dla studiów ekonomiczno-technicznych*, Politechnika Świętokrzyska, Kielce 2003. 2. Żakowski W., Decewicz G., *Matematyka, Analiza matematyczna, część I*, WN-T, Warszawa 2003. 3. Żakowski W., Kołodziej W., *Matematyka, Analiza matematyczna, część II*, WN-T, Warszawa 2003. 4. Płoski A., *Wstęp do analizy matematycznej*, Politechnika Świętokrzyska, Kielce1997.
Module website	