(faculty stamp)

Course description

1) Course title: MATHEMATICAL ANALYSIS AND LINEAR ALGEBRA	**2) Course code: ?**
3) Validity of course description: since 2018/2019	
4) Mode of studies: intramural studies	
5) Level of studies: BSc programme, 1st cycle of higher education	
6) Field of study: INFORMATICS	
7) Profile of studies: general academic	
8) Programme: INFORMATICS	
9) Semester: 1 and 2	
10) Faculty teaching the course: Institute of Mathematics, Faculty of Applied Mathematics	
11) Course instructor: dr inż. Roksana Słowik	
12) Course classification: common	
13) Course status: compulsory	
14) Language of instruction: English	
15) Pre-requisite qualifications: Knowledge of mathematics at the secondary school level is required.	
16) Course objectives: : providing the skills of using the basic mathematical tools on the level sufficient for further studying, and the skill of formulation and description of problems using mathematical language, as well as interpreting the obtained results.	
17) Description of learning outcomes:[1]	

No	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1	Knows definitions and basic theorems of the differentia and integral calculus.	Exam (written)	Lecture	K1A_W01, K1A_W02
2	Knows basic properties of the complex numbers.	Exam (written)	Lecture	K1A_W01
3	Has orderly knowledge in the field of linear algebra and analytic geometry.	Exam (written)	Lecture	K1A_W01
4	Performs operations on complex numbers and matrices.	Test	Class	K1A_U08 K1A_U12
5	Can evaluate derivative of a composite function, applies correctly suitable theorems to selected elements of the function examination.	Test	Class	K1A_U08 K1A_U12
6	Can evaluate integrals and knows their applications.	Test and exam	Class	K1A_U08 K1_U12
7	Evaluates partial derivatives and knows their applications.	Test	Class	K1A_U08 K1A_U12

18) Teaching modes and hours: Lecture / BA /MA Seminar / Class / Project / Laboratory

Lecture	Class	Laboratory	Project	BA/MA Seminar
60 h	60 h	-	-	-

Syllabus description:

Complex numbers: standard form, polar form, exponential form; operations; complex plane. Elementary functions and their properties. Sequences and their convergence in a metric space. Limit and continuity of a function. Asymptotes. One variable function differential calculus (derivative, derivative of the inverse and composite function, mean value theorems, the Taylor formula, extreme values, monotonicity, convexity). Indefinite integral (primitive function, properties of indefinite integral, integrating by parts and by substitution, integrating rational and selected trigonometric and "irrational" functions). Definite and improper integral; their applications. Ordinary differential equations of the first order. Matrices, determinants, systems of linear equations, eigenvalues and eigenvectors. Selected issues of analytic geometry. Several variables differentia calculus (partial derivatives, total differentia, derivative a composite and an implicite function, directional derivative, gradient, extreme values). Number series. The Laplace transformation and its application for solving some differential equations.

[1] należy wskazać ok. 5 – 8 efektów kształcenia

Lecture is led traditionally. During the lecture definitions and theorems are presented (often with proofs); all notions are illustrated by examples.
Classes: during classes the student practice contents given during the lecture, they solve (on their own or with help of the teacher) tasks proposed by the teacher.

19. Examination: Yes, after both semesters.

20. Primary sources:

B.Sikora, E.Łobos, *A First Course in Calculus*
E.Łobos, B.Sikora, *Calculus and Differential Equations in Exercises*

21. Secondary sources:

R.A. Adams, C. Essex, *Calculus. A Complete Course*
H. Anton, C. Rorres, *Elementary Linear Algebra*
J. Bird, *Higher Engineering Mathematics*
J.M. Erdman, *Exercises and Problems in Calculus*
J.K. Hunter, *An Introduction to Real Analysis*
W. Rudin, *Principles of Mathematical Analysis*
W.F. Trench, *Introdution to Real Analysis*

22. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1.	**Lecture**	60/30
2.	**Classes**	60/120
3.	**Laboratory**	/
4.	**Project**	/
5.	**BA/ MA Seminar**	/
6.	**Other** (consultations, preparation for test)	10/20
	Total number of hours:	130/170

23. Total hours:	300
24. Number of ECTS credits:	10 (6+4)
25. Number of ECTS credits allocated for contact hours:	5
26. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects):	2
27. Comments: None	

Approved:

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(date, Instructor's signature) (*date, the Director of the Faculty Unit signature)*

[1] 1 ECTS – 25-30 hours of work