STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Mathematical analysis I		**1010341711010349399**
Field of study: **Mathematics in Technology**	Profile of study (general academic, practical): **(brak)**	Year /Semester: **1 / 1**
Elective path/specialty: **-**	Subject offered in: **Polish**	Course (compulsory, elective): **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time): **full-time**	
No. of hours: Lecture: **60** Classes: **60** Laboratory: **-** Project/seminars: **-**		No. of credits: **8**
Status of the course in the study program (Basic, major, other): **(brak)**	(university-wide, from another field): **(brak)**	
Education areas and fields of science and art: **the sciences**, **Mathematical sciences**		ECTS distribution (number and %): **100 8%**, **100 8%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic mathematical knowledge from secondary school.
2	**Skills**	Skills of efficient evaluating of algebraic formulas, Skills of transformation of trigonometric, logarithmic and exponential functions.
3	**Social competencies**	Understanding of limitation of own knowledge and motivation for further education.

Assumptions and objectives of the course:

Deep knowledge in mathematical logic, differential and integral calculus which is necessary to study mathematics and engineering sciences. Skills for application of acquired knowledge to theoretical as well as practical problems in other subjects as chemistry, physics, engineering, economy.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. The student understands well the weight and the significance of proofs in mathematics and the relevancy of the assumptions. - [K_W01]

2. The student understands structure of mathematical theories, he is able to use logical formalism in order to build and analyse the simple mathematical models describing phenomena of various scientific disciplines. - [K_W02]

3. The student knows the fundamentals of the single and multivariable calculus, he understands the way of using it in various areas of mathematics.He understands the role of mathematics in the development civilization and its applications. - [K_W03, K_W04]

Skills:

1. The student is able to perform correctly a mathematical reasoning, formulate theorems and definitions, use the predicate calculus and quantifiers in the intelligible way by spoken and written presentation. He also is able to tell about issues concerning the mathematics and its development with the intelligible, conversational language. - [K_U01]

2. The student is able to prove easy and average difficult facts by the mathematical induction principle. He can define functions and recurrence relations. - [K_U02]

3. The student uses the language of set theory in interpretation problems from various mathematical areas. He can operate the notions of real and complex numbers. He knows examples of irrational and transcendental numbers. - [K_U03]

4. The student can define functions, also by using the limit operations, and he is able to describe their properties by applying of various contexts of the limit and convergence. He can evaluate limits of sequences at simple and average difficulty levels. He is able to use series tests for absolute and conditional convergence. - [K_U04]

5. The student can interpret and explain functional relationships given in the form of formulas, tables, graphs, schemes and use them in practical problems. - [K_U05]

Social competencies:

1. The student can formulate questions precisely in order to deepen his own understanding of a given subject or to find the missing elements of reasoning. - [K_K02]

2. The student knows the limitations of its own knowledge and understands the need of further education. - [K_K01]

Assessment methods of study outcomes

Lecture.

Valuation of knowledge and skills during oral and written exam.

Practical Lessons.

Two large tests concerning an application of knowledge from the lectures in exercises.

Systematic control of theoretical knowledge in form of short quizes.

Valuation of student answers during lessons.

Valuation of activity during lessons.

Course description

Update 2017/2018:

Calculus of sentences and quantifiers Elements of the set theory. General theory of relations. Equivalence and ordering relations. Theory of cardinality. Infimum and supremum of sets. Sequences and their properties. Theorems on finite and infinite limits of sequences. Subsequences and problems connected with Bolzano-Weierstrass theorem. Series. Convergence tests of series. Elementary functions and their properties. Continuous functions and their properties. Function sequences and function series. Pointwise convergence and uniform convergence. Derivative of real function. Properties of derivatives. Mean value theorems. First and Second Derivative Test. D?Hospitale Theorem and its application. Taylor formula and expansion of functions into exponential series.

Applied methods of education.

Lecture:

1. Interactive lecture with formulationquestions to a group of studentsor to specific students indicated.

2. Theory presented in connection with current knowledge students.

3. The activity of the students is taken into account during the classes when giving a final grade.

Practical lessons:

1. Solving example tasks on the board.

2. Detailed review of task solutions and discussions on comments.

3. Initiate discussion on solutions.

Basic bibliography:

1. G. M. Fichtenholz, Rachunek różniczkowy i całkowy, PWN, Warszawa 2007.

2. F. Leja, Rachunek różniczkowy i całkowy, PWN, Warszawa 1971.

3. H. J. Musielakowie, Analiza matematyczna, Wydawnictwo Naukowe UAM 2000.

Additional bibliography:

1. W. Rudin, Analiza rzeczywista i zespolona, PWN, Warszawa 1998.

2. A. Sołtysiak, Analiza matematyczna? cz. I , cz. II. WN UAM, Poznań 2004.

3. W. Swokowski, Calculus with analytic geometry, Prindle, Weber & Schmidt Publishers 1998.

Result of average student's workload

Activity	Time (working hours)

1. Taking part in lectures (15x4 h.)	60
2. Taking part in practical lessons (15x4 h.)	60
3. Preparing for practical lessons	40
4. Prepating for tests	20
5. Preparing for the exam and taking part in it : (18 godz. + 2 godz)	20

Student's workload

Source of workload	hours	ECTS
Total workload	200	8
Contact hours	122	5
Practical activities	0	0