STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Mathematics**		Code **1010134211010340004**
Field of study **Environmental Engineering Extramural First-**	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) **part-time**	
No. of hours Lecture: **20** Classes: **20** Laboratory: **-** Project/seminars: **-**		No. of credits **6**
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		ECTS distribution (number and %)

Responsible for subject / lecturer:

dr Marian Liskowski
email: marian.liskowski@put.poznan.pl
tel. (61)665 2842
Faculty of Electrical Engineering
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of mathematics defined by the core curriculum of mathematics education at the advanced level of secondary school
2	**Skills**	The ability to associate facts, information processing, reasoning, interpretation and ability to reflect.
3	**Social competencies**	Focus on expanding knowledge and learn new skills in order to participate more fully in life and society.

Assumptions and objectives of the course:

1). Familiarize students with the methods of mathematical analysis and education skills to apply them to the analysis of the phenomena and problems in the field of engineering.

2). Developing skills related to finding information not directly expressed, finding connections between distributed information, inference on the basis of several factors.

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

Knowledge:

1. The student knows the formulas, graphs and properties of elementary functions. - [K_W01]
2. Knowledge of the concept of limit of a function. - [K_W01]
3. Knowledge of derivative of the function, geometric meaning of derivative at the point, rules finding derivative, the concept of indefinite integrals of functions, basic methods of integration and geometric meaning of the definite integral function in the interval. - [K_W01]

Skills:

1. The student applies the concept of limit to study properties of the function at the ends of the interval of definiteness. - [K_U01, K_U02]
2. The student analyzes the properties of the function using the concepts and methods provided by the calculus. - [K_U02, K_U07]
3. The student uses calculus in the calculations resulting from the needs of engineering practice. - [K_U02, K_U07]
4. The student builds a simple mathematical models of physical phenomena and processes. - [K_U09, K_U10]
5. The student simulates, using carefully selected instruments calculus, the course of those operations, taking into account the extreme behavior. - [K_U09, K_U10]

Social competencies:

1. The sense of usefulness of mathematical competence in engineering practice. - [K_K04]
2. The ability to reflect and critically assess their own performance - [K_K02,K_K06]

Assessment methods of study outcomes

Lecture. A two-part written examination at the end of the semester:
- Sat. 1 knowledge test (3 questions)
- Sat. 2 test of skills (3 jobs).

Method of evaluation: Each of the two parts of the test is evaluated in a scoring system using a scale of 0-15 points.
Duration of test: 60 minutes.

TUTORIALS:
- 2 colloquia written during the semester (7 and 14 weeks), each rated on a scoring system,
- continuous evaluation for each course.

Course description

1). Elements of logic. Elements of set theory. The scalar function.
2). Elementary functions (formulas, graphs, properties).
3). The limit of a function and applications.
4). Differential calculus of one variable function with selected applications in engineering practice.
5). Integral calculus of one variable function with selected applications in engineering practice.
6). Series of numbers, the concept of convergence of the series. Convergence criteria.
7). Complex numbers, polynomials, algebraic equations (fundamental theorem of algebra).
8). Operations on matrices. Matrices and linear systems.
9). Vectors and solid analytic geometry (lines and planes).

Basic bibliography:

1. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 (Definicje, twierdzenia, wzory), Oficyna Wydawnicza GiS, Wrocław 2011.
2. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka dla studentów uczelni technicznych, t. I, II i III, Wydawnictwo Politechniki Poznańskiej, Poznań 2004.

Additional bibliography:

1. W. Krysicki, L. Wlodarski, Analiza matematyczna w zadaniach cz.1, Wydawnictwo Naukowe PWN, Warszawa, 2010

Result of average student's workload

Activity	Time (working hours)
1. Preparing for classes	40
2. Preparing for written tests	40
3. Studying for exam	30

Student's workload

Source of workload	hours	ECTS
Total workload	150	6
Contact hours	40	2
Practical activities	0	0