STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Mathematics**		Code **1010101221010340004**

Field of study **Environmental Engineering First-cycle Studies**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 2**

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: **30** Classes: **15** Laboratory: **-** Project/seminars: **-**	No. of credits **4**

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 **technical sciences**	ECTS distribution (number and %**)** **4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of real function calculus.
2	**Skills**	Calculations of derivatives and integrals of one variable functions.
3	**Social competencies**	Student understands the need and cnows the possibility of studying, improving language skills, professional, personal and social skills.

Assumptions and objectives of the course:

-The recognizing methods and applications of analytical geometry (vectors, lines in space, planes), mathematical analysis (calculus of funtions of several variables)and differential equations.

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

Knowledge:

1. Methods of calculation and applications of multiple and line integrals to describe and analyze selected physical phenomenons. - [K_W01]

2. Methods of solving differential equations. - [K_W01]

3. The student explains the basic mathematical laws and explains conditions for their application. - [K_W02]

Skills:

1. The student uses the literature and also other sources of knowledge. - [K_U01]

2. The student learns to calculate and apply multiple and line integrals to describe and analyze selected physical phenomenons. - [K_U10]

Social competencies:

1. The sens of usefulness of mathematical competence in engineering practice. - [K_K01]

2. The ability to work in a team. - [K_K03]

Assessment methods of study outcomes

-LECTURE. A two-part written examination at the and of the semestr:

-sat.1 theoretic knowledge (30%);

-sat.2 applications in practical exercises (70%).

Duration of test: 90 minutes.

Classes: tests during the semestr (5x15 or 6x15 minutes).

Course description

Revision 2017

Applied methods of education: lectures and practical lessons.

Lecture with presentation supplemented by examples given on the board. Interactive lectures with problems and questions for students. The activity of students is taken into account in valuation of them. Discussion during lectures is expected.

Connections with others mathematical subjects are indicated.

Practical lessons. Solving of exemplary exercises on a blackboard. Discussion of solutions with relative comments.

-Vectors, the dot product, the vector product. Lines in space, planes, the paraboloid of revolution, cylinders and the axis of the cone.

-Gradient, directional derivative, tangent planes and normal lines to surfaces.

-Multiple integrals with applications.

-Ordinary differential equations (separable, exact, homogeneous, Bernoulli, first-order and second-order linear).

-Number series and power series.

Basic bibliography:

1. W. Stankiewicz, J. Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, PWN, część pierwsza i druga, Warszawa.

2. M. Gewert, Z.Skoczylas, Analiza matematyczna 2. Definicje, twierdzenia, wzory. Oficyna Wydawnicza GiS.

Additional bibliography:

1. E. Swokowski, Calculus with analytic geometry, Prindle, Weber &#38;#38;#38;#38; Schmidt, Boston, Massachusetts

2. Dennis G.Zill, A first course in differential equations with applications, Prindle, Weber &#38;#38;#38;#38; Schmidt, Boston.

3. W. Krysicki, L.Włodarski, Analiza matematyczna w zadaniach, PWN, Warszawa.

Result of average student's workload

Activity	Time (working hours)
1. Share in lectures	30
2. Share in classes	15
3. Preparing for classes and for written tests	30
4. Preparing for examination	30
5. Share in consultations. Examination period	10

Student's workload

Source of workload	hours	ECTS
Total workload	115	4
Contact hours	55	2
Practical activities	0	0