STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Mathematics		**1010321321010340025**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**(brak)**	**1 / 2**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours				No. of credits
Lecture: **45**	Classes: **30**	Laboratory: **-**	Project/seminars: **-**	**6**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of real function calculus. Equations of selected curves on the plane.
2	**Skills**	Calculation of the function limits, the calculation of derivatives and integrals of one variable functions.
3	**Social competencies**	Focus on expanding knowledge and learn new skills in order to participate more fully in professional and social life.

Assumptions and objectives of the course:

1). Understanding the key concepts and applications of calculus of functions of several variables.

2). Knowledge of methods of solving equations and systems of ordinary differential equations.

3). Understanding the elements of the series theory, in particular the power series and Fourier series.

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

Knowledge:

1. The student obtains a basic knowledge of the partial derivatives and the total differential of functions of several variables. - [K_W01]

2. The student has knowledge about the methods of calculation and applications of multiple and curved integrals to describe and analyze physical phenomena. - [K_W01]

3. He has knowledge of power series representation and Fourier series representations of functions. - [K_W01]

4. He has knowledge about methods of solving differential equations and systems of ordinary differential equations. - [K_W01]

Skills:

1. The student can apply partial derivatives to study local extremes and to indicate the direction of the fastest growth of the two variable function - [K_U10]

2. The student can use a total differential of a function in approximate calculations. - [K_U10]

3. The student can calculate and apply multiple and curvilinear integrals to describe and analyze selected physical phenomenons. - [K_U10]

4. The student can solve simple ordinary differential equations of the first, second and higher order. - [K_U10]

Social competencies:

1. The student is aware of the usefulness of mathematical competence in engineering practice. - [K_K01]

2. The student is able to reflect and critically assess their own achievements. - [K_K03]

Assessment methods of study outcomes

Lecture. A six-part written examination at the end of the semester.

Method of evaluation: each of parts of the test is evaluated in a scoring system using a scale of 0-5 points.

Duration of test: 60 minutes.

Practical lessons:

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

Course description

Update 2017/2018:

1). The concept of a function of several variables, field, graph, limit of a function at a point.

2). Differential calculus of functions of several variables with selected applications in engineering practice (directional derivative, differential complete, local extremes).

3). Integral calculus of functions of several variables with selected applications in engineering practice.

4). Curvilinear integrals with applications in engineering practice.

5). Power series, the concept of convergence of the series, the study of convergence. Fourier series. The development of selected types of functions in power series or Fourier series.

Applied methods of education.

Lecture.

1. Interactive lecture with formulation questions to a group of students or 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. W. Żakowski, Matematyka, T.2, WNT, Warszawa 2003
2. W. Leksiński, W. Żakowski, Matematyka T. 4, WNT, Warszawa 2003
3. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, T.1, T.2, PWN, Warszawa 2011
4. M. Gewert, Z. Skoczylas, Analiza matematyczna 2 (definicje, twierdzenia, wzory), Wydawnictwo GiS, Wrocław 2007

Additional bibliography:

1. W. Stankiewicz, J. Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, t.1 i t.2, PWN, Warszawa 2001
2. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka dla studentów uczelni technicznych, t.II i III, Wydawnictwo Politechniki Poznańskiej, Poznań 2004
3. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne (teoria, przykłady, zadania), Wydawnictwo GiS, Wrocław 2006

Result of average student's workload

Activity	Time (working hours)
1. Taking part in practical lessons (15x2 h)	30
2. Taking part in lectures (15x3 h)	45
3. Preparing for practical lessons	25
4. Preparing for written tests	25
5. Preaparing for the exam and taking part in it.	25

Student's workload

Source of workload	hours	ECTS
Total workload	150	6
Contact hours	77	3
Practical activities	0	0