# STUDY MODULE DESCRIPTION FORM

| Name of the module/subject | | Code |
|---|---|---|
| **Mathematics** | | **1010324311010340025** |
| Field of study: **Electrical Engineering** | 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: **30** Classes: **26** Laboratory: **-** Project/seminars: **-** | | No. of credits: **5** |
| 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** | | ECTS distribution (number and %): **5 100%** |

**Responsible for subject / lecturer:**

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**Responsible for subject / lecturer:**

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## Prerequisites in terms of knowledge, skills and social competencies:

| | | |
|---|---|---|
| 1 | **Knowledge** | Basic knowledge of elementary functions, algebraic operations, analytical geometry, trigonometry and mathematical analysis. [K1_W01 (P6S_WG)] |
| 2 | **Skills** | Students should be able to solve simple rational equations and inequalities, to give domains of elementary functions and to know their curves. [K1_U10 (P6S_UW)] |
| 3 | **Social competencies** | Students seriously treat the process of studying. [K1_K01 (P6S_KK)] |

## Assumptions and objectives of the course:

The aim of subject is introduction to complex numbers and their some practical applications. Differential and integral calculus of one variable are presented together with their applications in mathematics and physics. The foundations of linear algebra like matrix calculus (with determinants) and solving of systems of algebraic linear equations are studied.

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

### Knowledge:

1. Students have the knowledge about foundations of linear algebra and complex numbers, which are necessary to describe electrical phenomena. - [K1_W01 (P6S_WG)]
2. Students have the knowledge about differential and integral calculus. - [K1_W01 (P6S_WG)]

### Skills:

1. Students are able to solve equations with complex coefficients. - [K1_U10 (P6S_UW)]
2. Students know first derivatives of functions and their geometric interpretations. - [K1_U10 (P6S_UW)]
3. Students can calculate the integrals of elementary functions and use them in important applications. - [K1_U10 (P6S_UW)]
4. Students are able to solve systems of algebraic linear equations. - [K1_U10 (P6S_UW)]
5. Students are able to formulate mathematical models descibing technical phenomena. - [K1_U10 (P6S_UW)]

### Social competencies:

1. Students understand the importance of effective using of mathematics in other areas of science. - [K1_K01 (P6S_KK)]

## Assessment methods of study outcomes

Lecture - written final test.

Short tests during the term (50%) and final test at the end of the term (50%) (additional points for activity)

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## Course description

Applied methods of teaching: lectures on the blackboard; tutorials - solving problems on the blackboard and discussing solutions.

The elements of mathematical logics. Complex numbers in algebraic, trigonometric and exponential forms. Operations on complex numbers. Solving systems with complex coefficients. The concept of limits of real numbers sequences. The investigation of monotonicity and boundedness of sequences, the setting of their limits. Euler constant. The concept of functions: domains, qualitative properties, the review of elementary functions, the concept of limits and continuity of functions. The differential calculus of functions of one variable: the derivative and its applications, the intermediate value theorems for derivatives, the de l?Hospital?s rule. The integral calculus: the Riemann integral of a bounded function on a finite interval [a,b] and its applications. Improper integrals.

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## Basic bibliography:

1. W. Żakowski, Matematyka, T.1 i T.2, WNT, Warszawa 2003.
2. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 ( Definicje, twierdzenia, wzory), GiS, Wrocław 2011.
3. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 ( Przykłady i zadania), GiS, Wrocław 2011.
4. T. Jurlewicz, Z. Skoczylas, Algebra i geometria analityczna 1, ( Definicje, twierdzenia, wzory), GiS, Wrocław 2007.
5. T. Jurlewicz, Z. Skoczylas, Algebra i geometria analityczna 1, ( Przykłady i zadania), GiS, Wrocław 2007.

## Additional bibliography:

1. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, T.1, T.2, PWN, Warszawa 2011.
2. M. Grzesiak, Liczby zespolone i algebra liniowa, Wydawnictwo PP, Poznań 1999.

## Result of average student's workload

| Activity | Time (working hours) |
|---|---|
| 1. Lectures | 30 |
| 2. Tutorials | 26 |
| 3. Homeworks preparing for the tests on tutorials | 30 |
| 4. Homeworks preparing for the last test on the last tutorial | 20 |
| 5. Meetings with the lecturer | 10 |
| 6. Homeworks preparing for the final test on the last lecture | 20 |
| 7. Final written test on the last tutorial | 2 |
| 8. Written final test on the last lecture | 2 |

## Student’s workload

| Source of workload | hours | ECTS |
|---|---|---|
| Total workload | 140 | 5 |
| Contact hours | 70 | 3 |
| Practical activities | 26 | 1 |

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