STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Mathematical analysis and linear algebra	**1010331411010344953**

Field of study	Profile of study (general academic, practical)	Year /Semester
Information Engineering	**(brak)**	**1 / 1**
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: **2** Classes: **1** Laboratory: **-** Project/seminars: **-**	**4**

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 %)
technical sciences	**4 100%**
Technical sciences	**4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of secondary school math.
2	**Skills**	K_U04: he is able to prepare and present a short presentation devoted to results of realization some engineering problems.
3	**Social competencies**	K_K01: he understand the need and knows possibilities permanent education (study of the first, the second and the third degree, postgraduted study, courses) - brushing up his language, professional and social competencies.

Assumptions and objectives of the course:

A thorough familiarity with differential and integral calculus and using it to description of practical problems. Getting the competence in tools of abstract algebra and modular arithmetic. Applications of matrices to solving of practical problems. Solving of systems of linear equations.

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

Knowledge:

1. Student has a basic knowledge in mathematics, containing the algebra, calculus, mathematical logic, probability theory, elments of discrete and applied mathematics. - [K_W01]

Skills:

1. Student is able to find information in literature, data bases, and other sources. He is able to integrate found information, to interprete them, to deduce corollaries and to formulate opinion. - [K_U01]
2. Student has skills in self-education, among others in order to raising his professional competences. - [K_05]

Social competencies:

1. Student is aware of importance of professional behaviour, applying of ethical principles and respecting plurality of ideas and cultures. - [K_K03]

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 (student can use his own notes)

Systematic control of theoretical knowledge in form of short quizes.

Valuation of student answers during lessons.

Valuation of activity during lessons.

Course description

Lectures: Complex numbers and their algebraic properties. An application of complex numbers to proving of trigonometric identities and geometric problems on the plane. Sequences. Convergence, monotonicity and boundedness of real sequences. Real Series. Convergence criteria for real series. Function sequences and function series. Criteria for uniform convergence of sequences and series. Differential calculus of functions of one and many variables. Integral calculus: Define integral and indefine integral. An application of define integral. An introduction to differential equations and their applications. Groups, rings of polynomials and modular arithmetic. Matrices, determinants, systems of linear equations, Gauss elimination method.

Elements of analytical geometry. Course illustrated by many examples and counterexamples.

Classes: Programmatic contents compatible with lectures. Solving of various kind of exercises. Problems requiring individual solving of involved problems of calculus and linear algebra.

Basic bibliography:

1. G. M. Fichtenholz, Rachunek różniczkowy i całkowy, PWN, Warszawa 1986.
2. B. Gleichgewicht, Algebra, Oficyna wydawnicza GIS Wrocław 2002.
3. H. J. Musielakowie, Analiza matematyczna, Wydawnictwo Naukowe UAM 2000.

Additional bibliography:

1. S. Lang, Algebra, PWN Warszawa 1973.
2. F. Leja, Rachunek różniczkowy i całkowy, PWN, Warszawa 1971.
3. J. Rutkowski, Algebra abstrakcyjna w zadaniach, PWN, Warszawa 2002.
4. W. Swokowski, Calculus with analytic geometry, Prindle, Weber & Schmidt Publishers 1998.

Result of average student's workload

Activity	Time (working hours)
1. Attending in classes	45
2. Individual konsultation with Lecturer	1
3. Individual konsultation with Assistant	2
4. Mastering of theoretical part of the subject	52
5. Mastering of practical part of the subject	80

Student's workload

Source of workload	hours	ECTS
Total workload	180	4
Contact hours	30	0
Practical activities	15	0