



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Complex analysis

Course

Field of study

Mathematics in Technology

Area of study (specialization)

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Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Faculty of Control, Robotics and Electrical

Engineering

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Responsible for the course/lecturer:

Prerequisites

Basic knowledge in domain of calculus and topology on the level of studies of the first degree. Using of basic notions of topology. Mastery of evaluation of derivatives, multiply integral, line integral and surface integral.

Course objective

Deep knowledge in complex analysis to a degree which is necessary to study mathematics. Skills for application of acquired knowledge to theoretical as well as practical problems in other subjects as chemistry, physics, engineering and mathematics.



Course-related learning outcomes

Knowledge

1. Master complex analysis with definitions, theorems and proofs.
2. Understand in subject of complex analysis open problems and problems at the stage of study.
3. Understand connections of complex analysis with other subjects of classical analysis.

Skills

1. Handle tools of complex analysis such as differential and integral calculus, elements of complex analysis and Fourier analysis.
2. Present content connected with complex analysis and verify correctness of deduction in mathematical proofs.
3. Distinguish the difference between complex analysis and real analysis.

Social competences

1. He is able to formulate a problem precisely and try to solve it.
2. He understand the need for adducing intuition to his own understanding as well as to popularization of abstract mathematics.
3. He is able search out some information In literature (also English), by oneself.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: Written final test on the last lecture.

Tutorials: One test on the last tutorial. Valuation of activity during lessons.

Programme content

Complex numbers and their properties. An application of complex numbers in the planimetry to solving problems and proving theorems. Elementary complex functions. Cauchy-Riemann equations on a derivatives of a complex function. Differentiation of elementary functions. Integral of complex function along a curve lying in complex plane. Cauchy integral formula. Liouville Theorem. Morera's Theorem. Maximum Principle for harmonic functions and Schwarz Lemma. Sequences and series of analytic functions. Power series and Taylor Theorem. Laurent series. Singularities and their classification. Calculus of residues. Residue Theorem and its application to evaluation of real definite integrals. Conformal mappings. Fourier transformation and its applications.

Teaching methods

Lecture:

- initiating discussions during lectures



- connecting new theory with current knowledge of students
- recalling connected material before introducing a new one

Tutorials:

- solving examples on a blackboard
- detailed reviewing of solutions and discussions
- initiating discussions on solutions

Bibliography

Basic

1. T. W. Gamelin, Complex Analysis, Springer Verlag 2001.
2. J.E. Marsden, Basic Complex Analysis, W.H. Freeman and Company San Francisco 1998.
3. J. Krzyż, Zbiór zadań funkcji analitycznych, Warszawa PWN 2005.
4. F. Leja, Funkcje zespolone, PWN, Warszawa 1971
5. J. Krzyż J. Ławrynowicz, Elementy analizy zespolonej, Warszawa WN-T 1981.

Additional

1. J. Chądryński, Wstę do analizy zespolonej, Warszawa PWN 1999.
2. J. Długosz, Funkcje zespolone - teoria, przykłady, zadania, Oficyna Wydawnicza GiS
3. W. Rudin, Analiza rzeczywista i zespolona, Warszawa PWN 1998.

Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for tutorials, preparation for tests) ¹	30	1,0

¹ delete or add other activities as appropriate