

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Complex analysis		Code 1010342611010347252
Field of study Mathematics	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: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: 30 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 technical sciences Technical sciences		ECTS distribution (number and %) 8 100% 8 100%
Responsible for subject / lecturer: Prof. dr hab. Ryszard Płuciennik email: ryszard.pluciennik@put.poznan.pl tel. 61 665 33 59 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		Responsible for subject / lecturer: Dr hab. Lucyna Rempulska, prof. nadzw. email: lucyna.rempulska@put.poznan.pl tel. 61 665 23 20 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge in domain of calculus and topology on the level of studies of the first degree.
2	Skills	Using of basic notions of topology. Mastery of evaluation of derivatives, multiply integral, line integral and surface integral.
3	Social competencies	Understanding of limitation of own knowledge and motivation for further education.
Assumptions and objectives of the course: 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.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. master complex analysis with definitions, theorems and proofs. - [K_W05]		
2. understand in subject of complex analysis open problems and problems at the stage of study. - [K_W06]		
3. understand connections of complex analysis with other subjects of classical analysis. - [K_W07]		
Skills:		
1. handle tools of complex analysis such as differential and integral calculus, elements of complex analysis and Fourier analysis. - [K_U01]		
2. present content connected with complex analysis and verify correctness of deduction in mathematical proofs. - [K_U02, K_U03, K_U04]		
3. distinguish the difference between complex analysis and real analysis. - [K_U08]		
Social competencies:		
1. He is able to formulate a problem precisely and try to solve it. - [K_K02]		
2. He understand the need for adding intuition to his own understanding as well as to popularization of abstract mathematics. - [K_K05]		
3. He is able search out some information in literature (also English), by oneself. - [K_K06]		

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 quizzes. Valuation of student answers during lessons. Valuation of activity during lessons.		
Course description		
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? Theorem. Maximum Principle for harmonic functions and Schwarz Lemma. Sequences and series of analytic functions. Power series and Taylor?s 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.		
Basic bibliography: 1. T. W. Gamelin, Complex Analysis, Springer Verlag 2001. 2. J. Krzyż, J. Ławrynowicz, Elementy analizy zespolonej, Warszawa WN-T 1981. 3. J. Krzyż, Zbior zadań z funkcji analitycznych, Warszawa PWN 2005. 4. J.E. Marsden, Basic Complex Analysis, W.H. Freeman and Company San Francisco 1998.		
Additional bibliography: 1. J. Chądryński, Wstęp 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.		
Result of average student's workload		
Activity	Time (working hours)	
Student's workload		
Source of workload	hours	ECTS
Total workload	210	8
Contact hours	60	6
Practical activities	40	2