Subject code	ECTS credits
MAT3002	6

Course title in Lithuanian

KOMPLEKSINIO KINTAMOJO FUNKCIJŲ TEORIJA

Course title in English

COMPLEX VARIABLES FUNCTION THEORY

Short course annotation in Lithuanian (up to 500 characters)

Kompleksiniai skaičiai ir veiksmai su jais. Kompleksinių skaičių sekos ir eilutės. Kompleksinio kintamojo funkcijos sąvoka. Funkcijos riba ir tolydumas. Elementariosios funkcijos. Analizinės funkcijos. Išvestinė. Koši ir Rymano sąlygos. Harmoninės funkcijos. Elementarieji atvaizdžiai. Integralo apibrėžimas ir savybės. Koši teorema. Sudėtinio kontūro teorema. Koši integralinės formulės. Funkcijų eilutės. Analizinės funkcijos reiškimas laipsnine eilute. Lorano eilutė. Vienareikšmės funkcijos ypatingieji taškai. Reziduumų teorijos pradmenys.

Short course annotation in English (up to 500 characters)

Complex numbers and operations with complex numbers. Sequences and series of complex numbers. Functions of a complex variable. Limits and continuity. Derivatives. Cauchy – Riemann equations. Integrals. Cauchy's theorem. Cauchy's integral formulas. Taylor series. Laurent series. Residue. Residue theorem.

Prerequisites for entering the course

Mathematical Analysis

Course aim

Course aim is to provide understanding of functions of complex variable and their properties.

Links between course outcomes, criteria of learning achievement evaluation, study methods and methods of learning achievement assessment

No	Course outcomes	Criteria of learning achievement evaluation	Study methods	Methods of learning achievement assessment
1	Perform actions with complex numbers	Student demonstrates the ability to solve given simplest computational problems	Lectures, practical works, individual work, consulting	Mid-term exam, Assessment of practical works
2	Knowledge and understanding of limits of functions of complex variables	Student demonstrates the ability to solve limit of a particular function.	Lectures, practical works, individual work, consulting	Mid-term exam, Assessment of practical works
3	Knowledge and understanding of the derivatives of analytic functions	Student recognizes differentiation rules and can differentiate a particular function.	Lectures, practical works, individual work, consulting	Final exam, assessment of practical works
4	Knowledge and understanding of the integrals of functions of complex variables	Student demonstrates the ability to calculate given integrals of functions of complex variables.	Lectures, practical works, individual work, consulting	Final exam, assessment of practical works
5	Perform the ability to formulate and prove the propositions of complex variables function theory	Student knows main propositions of this course and can to proof them.	Lectures, practical works, individual	Mid-term exam,

			work, consulting	Final exam, assessment of practical works

Links between study programme outcomes and course outcomes

Study programme outcomes	Running number of course outcome				
	1	**2**	**3**	**4**	**5**
Know and comprehend concepts and propositions of fundamental mathematical subjects, recognize and apply them solving practical/theoretical tasks	+	+	+	+	+
Identify the problem, collect and analyze real/theoretical data using various mathematical methods, tools and IT technologies	+	+	+	+	
Operating with formal mathematical symbols and terms, determine mathematical connections between various mathematical quantities; conceive mathematical propositions and logical proofs, construct and prove new statements		+	+	+	+
Think logically and analytically, evaluate alternative ways of task solving and implement optimal solutions		+	+	+	+

Content

No	Content (topics)
1.	Complex numbers and their properties.
2.	Sequences and series of complex numbers.
3.	Limits and continuity.
4.	Derivatives. Cauchy – Riemann equations.
5.	Analytic functions.
6.	Integrals.
7.	Cauchy's theorem.
8.	Cauchy's integral formulas.
9.	Laurent series.
10.	Residue. Residue theorem.

Distribution of workload for students (contact and independent work hours)

Lectures	**45 hours**
Practical work	**30 hours**
Individual students work	**85 hours**
Total:	**160 hours**

Structure of cumulative score and value of its constituent parts

Final written exam (50%), mid-term written exam (25%), assessment of practical work (25%).

Recommended reference materials

No	Publication year	Authors of publication and title	Publishing house	Number of copies in		
				University library	*Self study rooms*	*Other libraries*
Basic materials						
1	1996	Nagelė A., Papreckienė L. Kompleksinio kintamojo funkcijų teorija (Complex Variable Functio Theory)	Vilnius, Žara	8	2	

2	2009	Brown J.W., Churchil R.V. Complex Variables and Applications	McGraw-Hill. Higher Educations		1	
3	2003	Reade J.B. Calculus with Complex Numbers	Taylor & Francis		1	
Supplementary materials						
1	2006	Ponnusamy S., Silverman H. Complex Variables with Applications	Birkhäuser			

Course programme designed by

Dr. Živilė Jokšienė