Study programmes: BACHELOR STUDIES – Mathematics (module ML)	
Course name: Selected Topics of Analysis B	
Lecturers: Miodrag Mateljević, Miljan Knežević, Vladimir Božin	
Status: Optional	
ECTS: 6	
Attendance prerequisites: Analysis 1, Analysis 2, Introduction to Complex Analysis	
Course aims: Expanding and deepening knowledge from complex analysis and its applications.	
Course outcome: The student should master special knowledge and acquire a substantially understanding of the learned mathematical content.	

Course content:

1. **Complex numbers and geometry.** History of complex numbers. Cubic equation. Euler's formula. Applications of complex numbers in trigonometry, geometry, analysis and algebra.
2. **Complex functions as geometric transformations.** Polynomials. Power series. The exponentional functions. Cosine and sine. Multifunctions. The logarithm function. Applications.
3. **Möbius transformation and inversion.** The Riemann sphere. Definition and decomposition of Möbius transformation on simple transformations. Inversion. Preservation of circles, angles and symmetry. The cross-ratio. Determination of Möbius transformation. Fixed points of Möbius transformations. Möbius transformations as matrices. Visualization and classification of Möbius transformations.
4. **Conformal isomorphisms and automorphisms.** The Schwarz lemma. Groups Aut(U) and Aut (H). The Riemann mapping theorem.
5. **Applications in hyperbolic geometry.** The Poincaré disk model and the Poincaré half-plane model. The hyperbolic density, the hyperbolic distance and hyperbolic length on disk and half-plane. Classification of isometries of the hyperbolic plane.

Literature:

1. T. Needham, Visual Complex Analysis, Clarendon press Oxford, 1997.
2. M. Mateljević, Kompleksna analiza 2, Zavod za udžbenike, Beograd 2012.

Number of hours: 5	**Lectures**: 3	**Tutorials**: 2	**Laboratory**: -	**Research**: -

Teaching and learning methods: Frontal / Tutorial

Assessment (maximal 100 points)			
Course assignments	**points**	**Final exam**	**points**
Lectures	10	Written exam	40
Exercises / Tutorials	-	Oral exam	30
Colloquia	-	Written-oral exam	-
Essay / Project	20		