

Study programme(s): Applied Mathematics (MAP)			
Course title: METRIC AND NORMED SPACES (P503)			
Lecturer(s): Ivana Vojnović			
Course status: compulsory on modules: Techno-mathematics, Mathematics of Finance			
ECTS points: 6			
Requirements: Multidimensional Analysis			
Learning Objectives			
Acquisition of knowledge related to metric and normed spaces, primarily Banach and Hilbert spaces.			
Learning Outcomes			
Students will gain an understanding of the metric structure and the norm structure, as well as become familiar with some relevant function spaces and sequence spaces.			
Syllabus			
<i>Theoretical instructions</i>			
Cardinal numbers and operations with cardinal numbers. Infinite-dimensional vector spaces. Topological spaces and basic properties: point neighborhoods, convergence, separability, continuity and sequential continuity. Metric spaces, equivalent metrics, topological properties of metric spaces, separable spaces, compactness, connectedness, completeness, completion of a metric space. Banach's fixed-point theorem. The function space $BC(X, \mathbb{R})$.			
Normed vector spaces, continuity of operations and norms, continuity of linear mappings. The function space $L(X, Y)$. Finite-dimensional normed spaces. The inverse operator theorem.			
Pre-Hilbert and Hilbert spaces, maximal and complete orthonormal systems. Separable Hilbert spaces, complete orthonormal systems and Fourier coefficients.			
<i>Practical instructions</i>			
Analysis of various function space, metrics and norms, as well as their applications.			
Literature			
1. O. Hadžić, S. Pilipović, Uvod u funkcionalnu analizu , Novi Sad, 1996.			
2. Lj. Gajić, M. Kurilić, S. Pilipović, B. Stanković, Zbirka zadataka iz funkcionalne analize , Novi Sad, 2000.			
3. John K. Hunter, Bruno Nachtergaele, Applied Analysis , World Scientific Publishing, 2001.			
Number of active classes		Lectures: 3	Exercises: 2
Teaching methods			
Lectures: exposition of theoretical basics. Exercises: analysis of various normed spaces and mappings on them through exercises, examples and problem solving tasks.			
Grading (maximum number of points 100)			
Pre-exam obligations		Points	Final exam
		Points	
colloquia		50	oral exam
			50