

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Common		
Type and level of studies		Doctoral studies		
The name of the course		Spectral graph theory		
Lecturer (for lectures)		Matejić M. Marjan		
Lecturer/associate (for exercises)				
Lecturer/associate (for OFE)				
Number of ECTS	10	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	The main aim of the course is the acquisition of knowledge and techniques of the spectral graph theory.			
Course outcomes	The student has acquired theoretical knowledge necessary for understanding the problems related to the spectral graph theory and its application in other fields of mathematics, as well as in natural and technical sciences. The student mastered the skills and methods of research in this field.			
Course outline				
Theoretical teaching	<p>Topological indices of the graph based on the degrees of vertices and edges (Zagreb indices, Randić indices, geometric-arithmetic topological index, ABC topological index, ISI, SDD, ...). Basic characteristics of topological indices, bounds, values on concrete graphs.</p> <p>Matrices associated with the graph (adjacency matrix, adjacency matrix by edges, incident matrix, Laplacian matrix, normalized Laplacian matrix, Randić matrix, signless Laplacian matrix, ...). Graph spectrums and basic properties.</p> <p>Energy of matrices and graphs. Kirchhoff indices.</p> <p>Operations with graphs and spectra.</p> <p>Regular graphs. Measures of irregularity of graphs.</p>			
Practical teaching (exercises, OFE, study and research)				
Textbooks/references				
1	D. M. Cvetković, M. Doob, H. Sachs, Spectra of graphs, Johann Ambrosius Barth, Heidelberg - Leipzig, 1995.			
2	F. R. K. Chung, Spectral graph theory, American Mathematical Society, 1997.			
3	A. E. Brouwer, W. H. Haemers, Spectra of graphs, Springer, 2012.			
4				
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
3	0	0	0	0
Teaching methods	Lectures, student seminars, consultations.			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam		Points
Activity during lectures		Written exam		
Exercises		Oral exam		50
Colloquia				
Projects	50			