

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		Special functions		
Lecturer (for lectures)		Marinković D. Slađana, Rančić Z. Lidija		
Lecturer/associate (for exercises)				
Lecturer/associate (for OFE)				
Number of ECTS	10	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	Gaining competences within the framework of the theory of special functions and its application in professional and scientific research in mathematical or engineering disciplines.			
Course outcomes	Solid theoretical knowledge of different classes of special functions and the ability to apply them in research in mathematics or related fields. Students' ability to critically identify and evaluate contemporary literature as a prerequisite for independent research work.			
Course outline				
Theoretical teaching	Hypergeometric functions: definition, recursive and transformation formulas, differential equation. Functions defined by integrals: Gamma function, Beta function, Bessel functions. Orthogonality in Hilbert space. Orthogonal polynomials: zeros, differential equation, three-term recurrence relation, generating function, hypergeometric representation. Construction of orthogonal polynomials. Classical orthogonal polynomials. Orthogonal polynomials with non-classical weights. Elements of fractional calculus. Fractional integral. Fractional derivative of Riemann-Liouville and Caputo type. Mittag-Leffler function.			
Practical teaching (exercises, OFE, study and research)				
Textbooks/references				
1	Gradimir V. Milovanović, Numerical Analysis I, Naučna knjiga, Belgrade, 1985. (Serbian)			
2	G.E. Andrews, R. Askey, R. Roy, Special Functions, Encyclopedia of Mathematics and its Applications, Cambridge University Press, Cambridge, 1999.			
3	Dragoslav S. Mitrinović, Introduction to special functions, Gradjevinska knjiga, Belgrade, 1986.(Serbian)			
4	I. Podlubni, Fractional Differential Equations, volume 198 of Mathematics in Science and engineering, Academic Press, San Diego, 1999.			
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, mentoring work			
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			