

Course: Functional analysis 3		
Teacher(s): Milica Kolundžija, Dragan Rakić, Martin Ljubenović		
Course status:	Elective	
ECTS:	12	
Prerequisites:	None	
Goal		
Acquiring knowledge in special functional areas: operator matrices, partial arrangements of operators, stochastic operators and majorization.		
Outcomes		
Students acquire knowledge that enables them to independently investigate and apply existing and generate new partial arrangements on different mathematical structures.		
Contents		
Theoretical lectures		
Bounded and unbounded block operator matrices. Essential spectrum of operator matrices. Pseudospectrum and S-essential spectrum.		
Matrix decompositions and generalized inverses: types of partial orders on sets of matrices and operators.		
Stochastic operators and majorization. Majorization as partial order. Linear preservers of majorization relations. Matrix and operator inequalities.		
Recommended bibliography		
1. A. Jeribi, <i>Spectral theory and applications of linear operators and block operator matrices</i> , Springer, 2015.		
2. C. Tretter, <i>Spectral theory of block operator matrices and applications</i> , Imperial College Press, 2008.		
3. S.K. Mitra, P. Bhimasankaram, S.B. Malik, <i>Matrix Partial Orders, Shorted Operators and Applications</i> , World Scientific, 2010.		
4. A.W. Marshall, I. Olkin, I. B.C. Arnold, <i>Inequalities: Theory of Majorization and Its Applications</i> , 2nd edn. Springer, Berlin (2011).		
5. Bhatia, R.: <i>Matrix Analysis</i> . Springer, Berlin (1997).		
Number of classes per week	Theoretical: 4	Practical:
Methods of teaching		
Group, individual, interactive.		
Knowledge rating (max 100 points)		
Knowledge estimation:		
Seminars: 30 points		
Final exam: 70 points		

Табела 5.1 Спецификација предмета на студијском програму докторских студија

Назив предмета: Partial Orders and Stochastic Operators		
Наставник или наставници: Dragan Rakić, Martin Ljubenović		
Статус предмета: elective		
Број ЕСПБ: 12		
Услов: -		
Циљ предмета Acquiring knowledge in the field of partial orders based on generalized inverses in the context of matrices and operators. Students study various types of majorization relations which are close related with stochastic matrices and operators and they get acquainted with applications of majorization for obtaining matrix inequalities.		
Исход предмета Students acquire knowledge that enables them to independently research and apply existed and generate new partial orders on various mathematical structures.		
Садржај предмета <i>Теоријска настава</i> <ul style="list-style-type: none"> - Matrix decompositions and generalized inverses - Minus partial order - Star partial order - Sharp partial order - One-sided partial orders - Unified theory of partial order based on generalized inverses - Various types of majorization relations - Stochastic operators and majorization - Majorization as partial order - Linear preservers of majorization relations - Matrix inequalities <i>Практична настава</i> <ul style="list-style-type: none"> - Preparation of students for independent research of literature and scientific journals in the field of partial orders determined by generalized inverses and stochastic operators. 		
Препоручена литература <ol style="list-style-type: none"> 1. S.K. Mitra, P. Bhimasankaram, S.B. Malik, Matrix Partial Orders, Shorted Operators and Applications, World Scientific, 2010. 2. A.W. Marshall, I. Olkin, I. B.C. Arnold, Inequalities: Theory of Majorization and Its Applications, 2nd edn. Springer, Berlin (2011). 3. Bhatia, R.: Matrix Analysis. Springer, Berlin (1997). 		
Број часова наставе: 10	активне Теоријска настава: 5	Практична настава: 5
Методе извођења наставе Theoretical lectures and independent work of students during practical hours.		
Оцена знања (максимални број поена 100) 50 points on pre-exam and 50 points on oral exam		
The methods of knowledge assessment can be different: written exam, oral exam, project presentation, seminar paper, homework.		
*максимална дужна 1 страница А4 формата		