

Program		Type of studies (cycle)	Third cycle		
		Name of the program	SEE Doctoral Studies in Mathematical Sciences		
Course					
Course title		Monotone Dynamical Systems			
Course code	Semester	Course status	ECTS credits	Contact hours	
	III		10	30	
Teaching staff	Teacher	Prof. Dr. Senada Kalabušić/ Doc. Dr. Esmir Pilav			
	Other staff	Prof. Dr. Mustafa Kulenović			
Course goals	The goal of the course is to give to the students a basic knowledge about monotone dynamical systems.				
Course content/topics					
<p>Strongly Order-Preserving Semiflows: Definitions and Basic Results; Nonordering of Omega Limit Sets; The Limit Set Dichotomy; Stability in Normally Ordered Spaces; Stable Equilibria in Strongly Ordered Banach Spaces</p> <p>Ordinary Differential Equations: The Quasimonotone Condition; Strong Monotonicity; Autonomous K-Competitive and K-Cooperative Systems; Dynamics of Cooperative and Competitive Systems; Delay Differential Equations: The Quasimonotone Condition; Strong Monotonicity;</p> <p>Monotone Maps: Motivating Examples; Definitions and Basic Results; The Order Interval Trichotomy; Sublinearity and the Cone Limit Set Trichotomy;</p> <p>Smooth strongly monotone maps; Monotone Planar Maps</p> <p>Semilinear Parabolic Equations: Parabolic systems with monotone dynamics</p>					
LITERATURE		Grading			
<p>[1] M W. Hirsch, Hal Smith, Monotone maps: a review</p> <p>[2] M.W. Hirsch, Hal Smith, Monotone Dynamical Systems, An Introduction to the Theory of Competitive and Cooperative Systems, 2004</p> <p>[3] H. L. Smith, Invariant curves for mappings, SIAM J. Math. Anal. 17 (1986), 1053-1067.</p> <p>[4] H. L. Smith, Periodic competitive differential equations and the discrete dynamics of competitive maps, J. Diff. Eqns. 64 (1986), 165-194.</p> <p>[5] H. L. Smith, Periodic solutions of periodic competitive and cooperative systems, SIAM J. Math. Anal. 17 (1986), 1289-1318.</p> <p>[6] S. Walcher, On cooperative systems with respect to arbitrary orderings, J. Math. Anal. Appl. 263, 543-554 (2001).</p>			Criterion	Points	Cut-off points
		1.	Homework assignment	20	10
		2.	Project	30	15
		3	Final exam	50	30
		Total			100