

Study program		Level of studies			Third cycle			
		Title of the study program			Science and mathematics education			
<b>COURSE</b>								
Course title		<b>Chaos Theory</b>						
Course ID	Semester	Course status	ECTS credits	Contact hours				
AMAT 651	II	Elective	10	60				
Lecturers	Lecturer in charge							
	Other lecturers							
Course aims	The aim of the course is to provide students with basic knowledge in dynamic systems theory and qualitative theories of differential equations.							
<b>CONTENT</b>								
#	Teaching units			Contact hours				
				L	E/S	C		
	<ul style="list-style-type: none"> <li>- Symbolic dynamics,</li> <li>- Smale Horseshoe mapping,</li> <li>- Invariant assembly. Shift mapping.</li> <li>- Spaces in symbolic dynamics.</li> <li>- Conley- Moser's conditions for chaos.</li> <li>- Liapun superscripts.</li> <li>- Susceptibility to initial conditions, topological transitivity</li> <li>- Density of periodic orbits</li> <li>- Chaos and "weird" attractors</li> <li>- Connecting periodic orbits. Examples.</li> <li>- Synchronization. Pairing two dynamic systems.</li> </ul>			30	30			
<b>LITERATURE</b>				<b>ASSESSMENT OF LEARNING</b>				
[1] K.T. Alligood, T.D. Sauer, J.A. Yorke, Chaos (An Introduction to Dynamical Systems), Springer, 1996. [2] V. I. Arnold, "Ordinary differential equations", various editions. [3] Robert L. Devaney, An Introduction to Chaotic Dynamical Systems, 2nd edition, 2003. [4] Saber N. Elaydi, Discrete Chaos, Chapman Hall/CRC, 2000. [5] J. Guckenheimer, P. Holmes, Nonlinear Oscillations, Dynamical Systems, and Bifurcations of Vector Fields, Springer, 1983. [6] M. Hirsh, S. Smale, R. Devaney, Differential equations, dynamical systems and an introduction to chaos, Elsevier, 2004. [7] M.R.S. Kulenovic, O. Merino, Discrete Dynamical Systems and Difference Equations with Mathematica, Chapman-Hall/CRC, 2002. 9. S. Lynch, Dynamical systems with applications using Mathematica, BirkhÅuser, 2007. [8] C. Robinson, Dynamical Systems, CRC, 2nd edition, 1999. [9] G. Teschl, Ordinary Differential Equations and Dynamical Systems, Springer, 2009 [10] S. Wiggins, Introduction to applied nonlinear dynamical systems and chaos, Springer, 2003.				Assessment method	Points	Threshold		
				1.	Partial exams	25	13	
				2.	Seminar papers	25	12	
				3	Final exam	50	30	
				4.				
				Total		100	55	