Program	Level	Second cycle
	Name of the program	Applied mathematics, Mathematics Education

COURSE

Course title	**Difference Equations and Discrete Dynamical Systems**			
Course code	Semester	Course status	ECTS	Contact hours (L+AE+LE)
AMAT 440	I/III	Mandatory course	7	3+2+0
Lecturer				

Course Goals	In this course, the student will get acquainted with relevant topics from the theory of difference equations and discrete dynamical systems. This is currently a mathematical area of particular interest, both for its theoretical contents' richness and beauty and usefulness in applied sciences.
Learning Outcomes	After completion of this course the student will be able to: - understand the notion of difference equations and discrete dynamical system - understand how to model some population dynamics phenomena using discrete dynamical systems - understand the basic properties of linear dynamics and how to use it to understand the local behaviour of non-linear systems - get some elementary knowledge of chaos theory - learn how to use a computer to extract some relevant information from a discrete dynamical system.

COURSE CONTENT

.Difference equations (introduction, basic notations, solutions). The Stability of One-Dimensional Maps. Attraction and Bifurcation. Chaos in One Dimension. Stability of Two-Dimensional Maps. Bifurcation in two dimensions. Applications in mathematical biology.

LITERATURE

[1] Saber N. Elaydi: Discrete Chaos, Chapman & Hall/CRC 1999.
[2] Saber N. Elaydi: An Introduction to Difference Equations, Springer 1999.
[3] Morris W. Hirsch, Stephen Smale, Robert L. Devaney: Differential Equations, Dynamical Systems & An Introduction to Chaos, Elsevier Academic Press 2003.
[4] Mustafa R.S. Kulenović, Orlando Merino: Discrete Dynamical Systems and
[5] Difference Equations with Mathematica, Chapman & Hall/CRC 2002.
[6] Ronald E. Mickens: Difference Equations Theory and Applications, Chapman & Hall/CRC, 2nd ed., 1998.
[7] C. Robinson: Dynamical Systems, Stability, Symbolic Dynamics and Chaos, CRC Press, 1999.

STUDENT WORKLOAD (hours in a semester)

Lectures	45	Tutorial	30	Individual work	125	T o t a l	200

GRADING

Criterion	Maximum points	Minimum points
Midterm exams	50	25
Homework assignment	-	-
Project	-	-
Laboratory assignments	-	-
Final exam	50	30
T o t a l	100	55

REMARKS

Midterm exam: only once in semester (end of November or first week of December). Students altogether write 120 minutes long test. This test is evaluated by max 50 points. The minimal score of the test is 25 points.

Final exam: Students who do not reach the midterm exam minimal score must take the entire course in the final exam. In this case, the final exam is evaluated by max 100 points. The final exam's minimal score is 55 points. Students who reach the midterm exam minimal score take only the part of the final exam that is not covered by the midterm test. In this case, the final exam

			is evaluated by max 50 points. The minimal score is 30 points.