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

COURSE

Course title	**Qualitative Theory of Differential Equations**			
Course code	Semester	Course status	ECTS	Contact hours (L+AE+LE)
AMAT 470	II	Mandatory course	8	3+2+0
Lecturer				
Course Goals	Differential equations are used to model processes in nature, physics, economy, and other sciences. However, solving the appropriate models, described by differential equations, is usually very tough. Therefore, the main goal of this course is to explain ways to analyze solutions to differential equations without solving them.			
Learning Outcomes	After completion of this course the student will be able to: - understand the concept of continuous dynamical system and basic properties associated. - separate and classify different local behaviour at zero of solutions of a linear differential system - understand the different types of stability of a singular point and identify them in concrete equations. - analyze different models from applications.			

COURSE CONTENT

Autonomous equations. Critical points. Periodic solutions. Introduction to the theory of stability. Stability by linearisation. Stability analysis by the direct method. Bifurcation theory. Applications.

LITERATURE

[1] Morris W. Hirsch, Stephen Smale, Robert L. Devaney: Differential Equations, Dynamical Systems & An Introduction to Chaos, Elsevier Academic Press 2003.
[2] Ferdinand Verhulst: Nonlinear Differential Equations and Dynamical Systems, Springer, 2nd ed., 1996.
[3] Wolfang Walter: Ordinary Differential Equations, Graduate Text in Mathematics, Readings in Mathematics, Springer, 2nd ed., 1998.

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.