Department of Mathematics & Statistics, KFUPM

Math 465 Syllabus (152, 2015-2016)

Dr. K. M. Furati

Course Title: Ordinary Differential Equations

Textbook: F. Brauer and J. A. Nohel, The Qualitative Theory of Ordinary Differential Equations, An Introduction. Dover, 1989

Course Description: Existence, uniqueness and continuation of solutions to initial value problems: scalar, 1st order systems and linear systems. Linear systems: solution matrix, fundamental solution matrix. Variation of constants method. Phase space analysis. Autonomous systems. Definitions of Stability. Stability for linear and almost linear systems. Basic concepts of Liapunov's method.

Prerequisite Math 202, Math 280

Learning Outcomes

By the end of the course, the student is expected to

1. comprehend the Existence and Uniqueness Theorem for systems of 1st-rder equations
2. be familiar with the phase space analysis and apply it to simple systems
3. understand the stability theory and apply it to linear and almost linear systems construct Lyapunov functionals and establish stability for simple certain systems

Grading Policy

HW	25%	
Midterm	30%	Week 8.
Project	15%	
Final	30%	

Wk	Date	Ch.	Topic	HW
1-3	Jan 17 - Feb 4, 2016	1	Systems of Differential Equations	
4-7	Feb 7 - Mar 3, 2016	2	Linear Systems with an Introduction to Phase Space Analysis	
8 Break 9-10	Mar 6 - Mar 31, 2016	3	Existence Theory	
11-13	Apr 3 - Apr 21, 2016	4	Stability of Linear and Almost Linear Systems	
14-15	Apr 24 - May 5, 2016	5	Lyapunov's Second Method	