Course Syllabus

MAT 501E Differential Equations I

2019-2020 Fall

Instructor: Saadet S. ÖZER
Office: Faculty of Science and Letters, B412
Classroom: FEB B428
email: saadet.ozer@itu.edu.tr
www.web.itu.edu.tr/ozersaa
Office hours: W 11.30-12.30; F 11.30-12.30 or by appointment

Please contact me if you need any academic customization.

Description:

In this first semester of a yearlong graduate course in differential equations, we shall focus on the system of ordinary differential equations by following basically the first two chapters of the text book. By the end of the course students will be able to

- determine the solutions of the linear systems of diffential equations
- understand the stability of the systems
- know the main existence and uniqueness theorems
- understand the local theory of the dynamical systems

Text book:

Perko,L.(2001). Differential Equations and Dynamical Systems, Springer.

Recommended texts:

Strogatz, S.H. (2000). Nonlinear Dynamics And Chaos: With Applications To Physics, Biology, Chemistry, And Engineering, CRC Press,.
Lynch, S.(2010). Dynamical Systems with Applications Using MAPLE, Second Edition,
Miller, R. K. ve Michel, A. N.(1982). Ordinary Differential Equations, Academic Press.
Cronin, J. (2008). Ordinary Differential Equations - Introduction and Qualitative Theory

Weekly Program

week	subject	book
1	Linear Systems	1.1, 1.2
2	Exponential Operators and Linear systems in R^2	1.3, 1.4, 1.5
3	Complex Eigenvalues – Multiple Eigenvalues	1.6-1.7
4	Stability Theory and Nonhomogenous Systems	1.9,1.10
5	Some Preliminary Concepts and Definitions, The Fundamental Existence-Uniqueness Theorem	2.1, 2.2

week	subject	book
6	Dependence on Initial Conditions and Parameter	2.3
7	The Maximal Interval of Existence, Local Theory of Dynamical Systems	2.4, 2.5
8	Midterm	
9	Linearization	2.6
10	The Stable Manifold Theorem	2.7
11	The Hartman-Grobman Theorem	2.7, 2.8
12	Stability and Liapunov Functions	2.9
13	Center Manifold Theory	2.12
14	Center Manifold Theory, Gradient and Hamiltonian Systems	2.14

Grading Policy:

There will be 1 midterm (40%) and a final exam (%60). App. 10 homework and at least 8 is compulsory.