
CHAPTER 1: INTRODUCTION. Sections 1.1 to 1.3. Some examples. Phase lines and direction fields. Classification of differential equations. (1 lecture).


CHAPTER 3: SYSTEMS OF TWO FIRST ORDER EQUATIONS. Sections 3.1 to 3.6. $2 \times 2$ systems of linear equations, eigenvalues and eigenvectors. Existence and uniqueness of solutions for linear and nonlinear systems. Homogeneous linear systems with constant coefficients: distinct real eigenvalues, complex eigenvalues, repeated eigenvalues. (6 lectures)


CHAPTER 5: THE LAPLACE TRANSFORM. Sections 5.1 to 5.8. Definition and basic properties. Solution of initial value problem for constant coefficient linear differential equation using the Laplace transform. Discontinuous and impulse forcing (Dirac delta function). Convolution and the transfer function. (7 lectures)

CHAPTER 7: NONLINEAR DIFFERENTIAL EQUATIONS AND STABILITY. Sections 7.1 to 7.4. Phase portraits. Autonomous 2-dim systems and stability. Linear and almost linear systems. Competing species and predator-prey models. (4 lectures)

Additionally, there may be some discussion of numerical methods for the solution of ordinary differential equations, and some homework assignments requiring the use of the computer package MATLAB.

The number of lectures on each chapter is a suggestion. Some professors may spend more time on some topics and less on others. The suggested total of 40 lectures leaves some time available for midterm tests and review.