MATH 254
Introduction to Differential Equations

Text: "Elementary differential equations and boundary value problems" Boyce, W.E. and Di Prima,R.C.

June 29 - July 8

I. Introduction
1.2 Solutions of some differential equations
2.8 The existence and uniqueness theorem.

II. First Order Equations
1.1 Direction fields
2.2 Separable equations
2.5 Population dynamics
2.2 Homogenous equations.
2.6 Exact equations and integrating factors
2.1 Linear equations
2.4 Differences between linear and nonlinear equations

III. Second Order Linear Equations
3.1 Homogeneous equations with constant coefficients
3.2 Fundamental solutions of linear homogeneous equations
3.3 Linear independence and the Wronskian
3.4 Complex roots and the characteristic equation
3.5 Repeated roots; reduction of order
3.6 Nonhomogeneous equations
3.6 The method of undetermined coefficients
3.7 Variation of parameters
3.8 Mechanical and electrical vibrations
3.9 Forced vibrations

July 9, 18.00: I. Midterm

July 13 - 22

V. Series Solutions of Differential Equations
5.2 Series Solution near an ordinary point
5.3 Series Solution near an ordinary point

VI. The Laplace Transform
6.1 Definition of the Laplace transform
6.2 Solution of initial value problems
6.3 Step functions
6.4 Discontinuous forcing functions
6.5 Impulse functions
6.6 The convolution integral

July 23, 18.00: II. Midterm

July 27 - August 5

VII. Systems of Linear Equations
7.4 Basic theory of systems of first order linear equations
7.5 Homogeneous linear systems with constant coefficients
7.6 Complex eigenvalues
7.7 Repeated eigenvalues
7.8 Fundamental matrices
7.9 Nonhomogeneous linear systems

X. Partial Differential Equations and Fourier Series
10.1 Two-point boundary value problems
10.2 Fourier series
10.3 The Fourier convergence theorem
10.4 Even and odd functions
10.5 Separation of variables and heat conduction

August 13, 12.00: Final exam

Grading:
I. Midterm: % 35
II. Midterm: % 35
Final exam: % 35
% 70 Attendance is required