**Course Outline**
**Differential Equations with Linear Algebra - Fall 2002**
**Math 341**
**Prof. John A. Pelesko**

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Office Hours: Monday 1-2, Wednesday 9-10, Friday 9:30-10:30

Texts:

> **Elementary Differential Equations and Boundary Value Problems**, by W.E. Boyce and R.C. DiPrima
>
> **Linear Algebra with Applications**, by S.J. Leon

Optional supplements:

> **Students Solution Manual for Elementary Differential Equations and Boundary Value Problems**, by C.W. Haines

Following is our course outline for the first semester of our two semester course in ordinary differential equations with linear algebra. The prerequisite for this course is Math 242, Analytic Geometry and Calculus B. Students are expected to posses a firm grasp of calculus; techniques of integration and differentiation should be second nature. During the semester there will be three hourly examinations, each of which is worth 100 points. The final exam will be worth 220 points. In addition I will grade selected homework assignments for a total of 80 more points. The homework assignments to be graded will be announced in advance. This semester, you have the option of being involved in a project. If you chose to participate your project grade will replace your lowest hourly exam grade. Information about the projects and about the course is available on my web site: www.math.udel.edu/∼pelesko

**Week One - Introduction** *Overview of the course. What is a differential equation? Where do they come from? What do we mean by a solution? Discussion of group projects.*

**Week Two - First Order ODE's** *Linear variable coefficient equations, integrating factors, separable equations, models using first order ode?s.*

**Week Three - First Order ODE's II** *Linear and nonlinear equations, first order autonomous equations, Euler's method and numerical approximations.*

**Week Four - First and Second Order ODE's** *The fundamental existence and uniqueness theorem for first order ode's. Linear constant coefficient second order ODE's, superposition, fundamental solutions.*

**Week Five - Second Order ODE's II** *Linear independence, the Wronskian. Brief review. First exam scheduled for October 4th!*

**Week Six - More Second Order ODE's** *The characteristic equation and the complex exponential, reduction of order and method of undetermined coefficients.*

**Week Seven - Even More Second Order ODE's** *The method of variation of parameters. The harmonic oscillator.*

**Week Eight - Interlude** *More on modeling. A brief introduction to the calculus of variations. Project update.*

**Week Nine - Linear Algebra I** *Systems of linear equations, matrices, elementary applications of matrices.*

**Week Ten - Linear Algebra II** *Matrix algebra, review. Second exam scheduled for November 6th!*

**Week Eleven - Linear Algebra III** *More matrix algebra, elementary matrices, partitioned matrices.*

**Week Twelve - Determinants** *The determinant of a matrix, properties of determinants, Cramer's rule.*

**Week Thirteen - Vector Spaces I** *The definition of a vector space, examples, subspaces. No class of Friday of this week.*

**Week Fourteen - Vector Spaces II** *Linear independence and dependence, basis and dimension. Third exam scheduled for December 6th!*

**Week Fifteen - Review** *Review of the semester, tidy up loose ends, prepare for final. Last class is Wednesday of this week.*

*I really didn't have much to teach. I didn't even believe in it. I felt so strongly that everybody has to find their own way. And nobody can teach you your own way... In terms of art, the only real answer that I know of is to do it. If you don't do it, you don't know what might happen.*

- Harry Callahan, 1991