MATH 524
ORDINARY DIFFERENTIAL EQUATIONS A
Fall Semester, 2002

Time and Place:	TH, 11:00 AM, CAB 659
Instructor:	Mark A. Lewis
Offices:	545B CAB
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Office Hours:	By arrangement
Text:	L. Perko *Differential Equations and Dynamical Systems, Springer, 3rd edition.*

The Course. Math 524 is a core course and is the first semester of a two semester graduate ordinary differential equations sequence. The contents are as follows:

1. Linear Systems: solution space, fundamental matrix, variation of parameters, Abel-Liouville-Jacobi formula, autonomous systems, phase plane analysis, periodic systems, Floquet theory.
2. Existence, uniqueness and continuous dependence upon parameters.
3. Nonlinear systems, local theory: flows and linearization, hyperbolic critical points, saddles, nodes, foci and centres, stable and unstable manifolds, Stable Manifold Theorem, Hartman Grobman Theorem.
4. Stability: basic theorems on linear and nonlinear stability, Lyapunov, and asymptotic stability.
5. Nonlinear Systems, global theory: limit sets, attractors, periodic orbits, limit cycles, orbital stability, Poincare map, Poincare-Bendixson theorem.
6. Bifurcations: structural stability, classification, Hopf bifurcation.

Prerequisite. Math 334 or equivalent.

Homework. Homework assignments will be given every 2 weeks. The homework should be your own work. Copying is not permitted. Homework is due at the beginning of the class at which they are due. Each homework assignment will carry equal weight.

Grading. There will be a midterm and a final exam. The breakdown of the grades is as follows: midterm 15%, final 35%, homework assignments 50%.

A percentage will be calculated based on these homework assignments. The percentage will be translated into a grade according to a preassigned scale: 9: 87+, 8: 77–87, 7: 67–77, 6: 57–67, 5: 47–57 and so on. If necessary, I reserve the right to adjust the grading scale downwards uniformly (so as to give *higher* grades).

Supplemental Texts

1. E. Coddington and N. Levison *Theory of Ordinary Differential Equations*
2. P. Hartman *Ordinary Differential Equations*
3. J.K. Hale *Ordinary Differential Equations*
4. J. Hale and H. Kocak, *Dynamics and Bifurcations*
5. M.W. Hirsch and S. Smale, *Differential Equations, Dynamical Systems*
6. M.H. Protter, C.B. Morrey *A First Course in Real Analysis*
7. W. Rudin, *Principles of Mathematical Analysis*
8. S. Strogatz, *Nonlinear Dynamics and Chaos*