

Math 565a, Ordinary Differential Equations

- **Text:** Ordinary Differential Equations with Applications, 2nd ed., by Carmen Chicone
- **Course Outline:** On following page
- **Professor:** Robert J. Sacker
- **Office and Phone:** KAP 438a, (213)740-3793
- **Office Hours:** To be announced
- **Course Credit:** 3 unit
- **Grade Distribution**
 - Midterms 20% each
 - Problems 40 %
 - Final 20 %

Course Description

Math 565a

Ordinary Differential Equations

First order system with a parameter,
Uniform contraction principle,
 C^k Implicit Function Theorem,
Existence, Uniqueness, C^k Dependence,
Continuation of solutions,
Autonomous versus non-autonomous,
Linearizations, Stability,
Real Jordan decomposition,
Abel-Liouville's Theorem,
Periodic systems, Floquet's Theorem,
Stability of Nonlinear Systems
Lyapunov-Perron Formula,
Stable Manifold Theorem, Center Manifold Theorem
Hartman-Grobman Theorem

Flows

Continuous and Discrete Flow,
Positive and Negative orbits, Omega-limit sets,
Invariant Sets, Positively compact orbits,
Poincare-Bendixson Theorem, Limit Cycles,
Index of a Vector Field,

Bifurcations

Examples: Fold or Cusp Bifurcation, Discontinuous or Hysteresis-like
Bifurcation, Pitchfork Bifurcation, Subcritical and Supercritical cases,
Hopf Bifurcation, Poincare Map,
Bifurcation in Discrete Case—Maps, Neimark-Sacker Bifurcation.

Skew Product Dynamical Systems

Examples: Retarded Functional Differential Equations, Evolution Equations.
Shift flow, Skew Product Dynamical System, Sacker-Sell Spectral Theorem,
the Splitting Index, Morse-like decomposition of an Invariant Set

Miscellaneous Topics

Stability by Lyapunov Functions, Invariance Principle of LaSalle,
Nearly Linear Systems, Regular Perturbations,
KAM Theory