Ordinary Differential Equations

MATH 565a **Spring 2015**

Text: Ordinary Differential Equations with Applications (2nd ed.) by Carmen Chicone

Course outline on following page.
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Course credit: 3 units

See course web page for more detailed information.

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,
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