MATH 235, SPRING 2000

DYNAMICAL SYSTEMS THEORY

Course Outline

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Meetings: MW 10:00–11:45am, AS358

Office hours: T 2:00–3:30pm, W 2:00am–3:00pm,
or by appointment

Text: *Geometrical Methods in the Theory of Ordinary Differential Equations*
by V.I. Arnold; Second Edition, Springer, 1988

Syllabus. In this course, I will focus on main concepts and notions used in the analysis of dynamical systems rather than on technical proofs of general theorems. Topics to be covered:

- Local analysis of dynamical systems: the linearization problem and local normal forms; asymptotic behavior of solutions, stability and Liapunov functions, invariant manifolds.
- Introduction to the local bifurcation theory: Sard's lemma and transversality, generic families, examples of local bifurcations.
- Global theory in dimension two: index and the Poincaré–Bendixson theorem.
- Periodic orbits, Poincaré maps and cross–sections, a survey of results for systems with discrete time.
- Structural stability, Denjoy's theorem and differential equations on the torus, hyperbolic diffeomorphisms and flows: geodesic flows on manifolds of negative curvature and Smale's horseshoe.