

**DEPARTMENT OF MATHEMATICS
SYLLABUS**

Course # & Name: 119A: Ordinary Differential Equations

Recommended Text(s) & Price: S. H. Strogatz, "Nonlinear Dynamics and Chaos, 1st Edition" (\$49.00)

Prepared by: A. Schwarz UPC Approval Date: Jan. 2003

Lecture(s)	Sections	Comments/Topics
1-3	1-d systems	Phase space analysis, fixed points & stability, existence & uniqueness flow on the circle
4-6	1-d bifurcation theory	Saddle-node bifurcation, transcritical bifurcation, pitchfork bifurcation, catastrophes
7-9	Linear systems with constant coefficients	Canonical form & classification, stability
10-17	2-d systems	Phase place analysis: fixed points, nullclines & limit set; existence & uniqueness; stability: linearization & Lyapunov function; special systems: conservative, gradient & reversible systems; index theory; coupled oscillators & quasiperiodic orbits; poincare map: stability of periodic orbit; iterative methods for solving equations
18-25	Limit cycles	Poincare-Bendixson theorem, lienard systems, weakly nonlinear oscillators, relaxation oscillators
26-29	2-d Bifurcation Theory	Saddle-node, transcritical and pitchfork bifurcations; hopf bifurcation; homoclinic bifurcation