

Topics for the Graduate Exam in ODE

Existence, uniqueness and dependence of initial data. Continuation of solutions. Linear systems, periodic linear systems, Floquet's Theorem, stability of critical points, and periodic orbits. Grobman-Hartman theorem. Lyapunov functions. Two dimensional systems, classification of elementary critical points, Poincaré-Bendixson Theorem. Invariant sets and manifolds. Stable Manifold Theorem.

References:

- L. Barreira and C. Valls: Ordinary Differential Equations: Qualitative Theory (main reference)
- E.A. Coddington and N. Levinson: Theory of Ordinary Differential Equations
- J. Hale: Ordinary Differential Equations
- C. Chicone: Ordinary Differential Equations with Applications
- P. Hartman: Ordinary Differential Equations