This course is a continuation of Math 623: Ordinary Differential Equations I. This term we will mostly study techniques for analyzing systems of nonlinear differential equations. Topics to be covered include linearization, stability of equilibria and periodic orbits, invariant manifolds, center-manifold reduction, normal forms, local bifurcation theory, asymptotic methods (method of averaging, regular and singular perturbations).

Text: I will draw material from multiple sources. For each lecture, the references will be clearly indicated. The recommended text for this term is Nonlinear Oscillations, Dynamical Systems and Bifurcations of Vector Fields, by J.P. Guckenheimer and P.J. Holmes. Another recommended text is lecture notes by G. Teschl available at http://radon.mat.univie.ac.at/~gerald/ftp/book-ode/index.html. These and several other texts are placed on 2 hour reserve at the W.W. Hagerty Library:


[P] L. Perko, Differential equations and dynamical systems


[A] V.I. Arnold, Ordinary differential equations

[H] J.K. Hale, Ordinary differential equations

Assessment: Grades in this course will be based on the homework assignments and a final project. The latter will be either in the form of a take-home exam or presentation of a research paper.