**OE0704 Nonlinear Dynamical Systems**

Picard's theorem, Boundedness of solutions, Omega limit points of bounded trajectories. LaSalle's invariance principle; Stability via Lyapanov's indirect method, Converse Lyapanov functions, Sublevel sets of Lyapanov functions, Stability via Lyapanov's direct method, Converse Lyapanov's theorems, Brokett's theorem, Applications to control system; Stable and unstable manifolds of equilibria, Stable manifold theorem, Hartman-Grobman theorem, Examples and applications, Center

manifold theorem, Center manifold theorem, Normal form theory, Examples and applications to nonlinear systems and control; Poincare map, and stability theorems for periodic orbits; Elementary Bifurcation theory.

**References:**

1. Jordan, D. W., and P. Smith. Nonlinear Ordinary Differential Equations. New York, NY: Oxford University Press, 1999.
2. Guckenheimer, J., and P. Holmes. Nonlinear Oscillations, Dynamical Systems and Bifurcations of Vector Fields. New York, NY: Springer-Verlag, 2002.
3. Perko, L. Differential Equations and Dynamical systems, Springer, 2000