(—–; 3-0-0) **Introduction to Deterministic Dynamical Systems** MATH-427*

This course is given jointly with MATH-827*. Topics include: global properties of flows and diffeomorphisms, Invariant sets and dynamics, Bifurcations of fixed and periodic points; stability and chaos. Examples will be selected by the instructor.

Textbook: *Ordinary Differential Equations with Applications* by C. Chicone (Springer-Verlag, Texts in Applied Math #34)

Prerequisite: MATH 328*; 110 *or* 111; 231* *or* permission of the instructor.

Instructor: D. Offin

Evaluation:

Final Examination	40%
Assignments	60%

Outline:

Linear Systems

Exponential of Operators

Fundamental Theorem for Linear Systems

Complex Eigenvalues

Jordan Forms

Nonlinear Systems: Local Theory

Existence - Uniqueness Theorem

Dependence on Initial Conditions and Parameters

Flow Defined by Differential Equation

Dynamical Systems on Smooth Manifolds

Hamiltonian Systems

Stability and Liapunov Functions

Applications to Predator Prey Models

Gradient Systems

Nonlinear Systems: Global Theory

Limit Sets and Attractors

Periodic Attractors

Poincaré Map

Lorentz Attractor

Chaos. Feigenbaum Universality