Dynamical Systems and Chaos (0540-6308-01)

Fall Semester 2013/2014

Lecturer: Dr. Yair Shokef , shokef@tau.ac.il , 03-640-8393
Wolfson Mechanical Engineering Building – Room 231

Lectures: Thursday 16:00-19:00, Engineering Studies Classrooms Building – Room 102

Office Hour: Thursday 15:00-16:00

Final Grade: 50% final exam + 50% home assignments (5 assignments, 10% each)

Course Website: http://www.eng.tau.ac.il/~shokef/chaos/

Topics Covered:

introduction to chaos, dynamical systems, mappings, phase space, Poincare sections, delay coordinates, fixed points, limit cycles, the logistic map, period-doubling bifurcations, linearization, stability, Frobenius-Perron equation, probability measure, Lesbegue measure, Lyapunov exponents, strange attractors, fractal dimensions, box counting-dimension, linear stability of high-dimensional flows, pointwise dimension, Lyapunov dimension, phase space contraction, classification of fixed points, correlation dimension, universality, quasiperiodicity, transition to chaos, controlling chaos, stabilizing unstable periodic orbits, targeting, synchronizing.

Recommended Books:

Edward Ott - Chaos in dynamical systems (1993, 2002) - 530.151 OTT

Steven Strogatz - Nonlinear dynamics and Chaos (1994) - 530.151 STR

K.T. Alligood, T.D. Sauer, J.A. Yorke - Chaos: an introduction to dynamical systems (1996) - 517.15 ALL

Gregory L. Baker and Jerry P. Gollub - Chaotic dynamics: an introduction (1990, 1996) - 530.151 BAK

Robert C. Hilborn - Chaos and nonlinear dynamics (1994, 2000) - 530.151 HIL