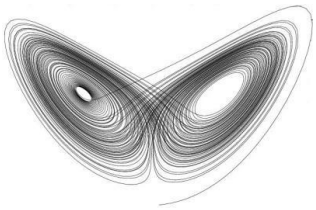
# First Course Handout



# PHY306A: ORDER AND CHAOS

*Academic Year: 2022-2023; Semester II*

**I/C: Sagar Chakraborty**

**Course Content (from OARS Course Master Database):**

Dynamical systems, importance of nonlinearity, nonlinear dynamics of flows (in 1, 2, and 3 dimensions) and maps (in 1 and 2 dimensions) in phase space (equilibrium, periodicity, bifurcation, catastrophe, deterministic chaos, strange attractor), routes to chaos (period doubling, quasiperiodicity, intermittency, universality, renormalization), measurement of chaos (Poincaré section, Lyapunov exponent, entropy), fractal geometry and fractal dimension, examples from physical sciences, engineering and biology.

**Remarks:**

1) This course has no specific prerequisite but it will be taken for granted that the students know how to find eigenvectors of matrices and how to solve simple ordinary differential equations.
2) We shall cover topics from different sources but if one follows the book—"Nonlinear Dynamics and Chaos"—by S. H. Strogatz, almost 70% of the course material can be found there.
3) Total marks (and corresponding grades) at the end of the course will be given out of 100 marks.
4) The mid-semester exam will carry a total of 40 marks.
5) The end-semester exam will carry a total of 60 marks.
6) 100% attendance is expected. If a student is absent too often, then the student will be deregistered from the course.
7) Absence in the end-semester exam will fetch the absentee F grade (vide point no. 8 below).
8) Only and only institute sanctioned leaves (medical or otherwise) will be considered as the excuses for absences during the lectures and the exams. Any request for make-up exams must come through SUGC/DOAA.