

Fractals are sets which typically have fine detail, are self-similar in some sense and have a fractal dimension. Fractals are known to abound in both nature and mathematics.

The mathematics used to study fractal sets has grown tremendously in recent years. This course will introduce students to some of these mathematical ideas and consider applications to areas such as harmonic analysis, probability theory and differential equations.

Topics may include: Construction of Hausdorff measure, Hausdorff, box and Assouad dimensions, Iterated function systems, self-similar sets and measures, Local dimensions and multi-fractal analysis, Bernoulli convolutions, Laplacians on fractals, Besicovitch and Kakeya sets

Background: Students should have taken or be currently taking a course in general Measure theory.

Recommended Text: Fractal Geometry: Mathematical Foundations by K. Falconer (or any of his other books would serve, as well.) Some material may be taken from recent research papers.