Lecturer: Dan Thompson

Title: Ergodic Geometry

Abstract:

This course is about ergodic geometry, which is the ergodic theory of geodesic flows. Geometry studies the properties of space, particularly shape and size. Ergodic theory studies the expected long-term behavior of systems which are changing with time. The most natural dynamical system in geometry is the geodesic flow: given an initial position and direction, we flow at unit speed along the path that locally minimize distance. This flow has special importance because of its relationship with the geometry and topology of the underlying space. If the space has non-trivial geometry the flow will often exhibit ergodic behavior. Consider a torus with more than one hole, which can be visualized as a pretzel. Paths that start close together will usually separate and take different and unpredictable journeys around these holes, and typically these journeys will eventually look independent of where they started. This is a model situation where the dynamics and geometry can be understood using the tools of ergodic theory. The aim of this course is to give an accessible introduction to this interesting and active area of research, with a view to describing the interesting dynamical phenomena which are typical in negative curvature spaces.