Topology Seminar at Texas State

**When:** Friday, Sep. 09, 2022, 12:00 noon–1:20 p.m.
**Where:** DERR 333, (Zoom info at bottom of page)
**Speaker:** David F. Snyder
**Title/Topic:** Manifolds and Triangulability.

**Abstract:** Let $n$ be a whole number. In this talk, the term $n$-manifold refers to a subset of a Euclidean space that has local coordinate charts, each consisting of $n$ coordinates so that the charts overlap “nicely”. For example, knots and links are 1-manifolds and surfaces are 2-manifolds.

In applications, manifolds arise as solution spaces to equations or as invariant sets for dynamical systems, or, in data analysis, as a structure underlying data clusters. Identifying manifolds via algebraic-topological invariants such as homology and cohomology continues to be of great interest in applications. A triangulation of a manifold (that is, finding a simplicial complex “nicely” homeomorphic to the manifold) can greatly simplify the computation of such invariants and, thus, identifying the manifold presented before us as data.

But can every $n$-manifold be triangulated? In dimensions $n \geq 5$, alas, the answer is ‘no’; moreover, even those that can be triangulated may not admit a combinatorial triangulation (one in which the link of every vertex is homeomorphic to an $(n - 1)$-sphere.

This presentation sketches the current state of affairs regarding triangulations of manifolds. We will outline the proof(s) that any smooth $n$-manifold can be triangulated. We show one way to construct examples of manifolds that have triangulations that are not combinatorial. Finally, we discuss the fact that, for $n \geq 5$, there are topological manifolds that admit no triangulation whatsoever.

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**Zoom Information**

Meeting URL (clickable):
https://txstate.zoom.us/j/97703903382?pwd=S2JwanRRbjZIUo1UW9JcTJyNjA5QT09
**Meeting ID:** 997 0390 3382
**Password:** manifolds