



M W F Period 7 (1:55-2:45pm), Little Hall room 235

Topology is geometry without lengths and angles. Topology is good for combining local quantitative information to obtain global qualitative descriptions that are coordinate-free and not sensitive to small errors.

Across academia and industry there is a huge appetite for new tools to make sense of the vast quantities of data being produced and recorded. We will see how topology can be used to represent and learn from the shape of data.

This course will introduce topology and see how it can be used in applications. Our main mathematical object will be the simplicial complex, a generalization of a graph. Instead of just having vertices and edges, we are allowed to add triangles, tetrahedra etc. From a simplicial complex we will use matrices to calculate something called simplicial homology and its modern variant, persistent homology.

In addition to learning some interesting mathematics, we will also introduce some of the most important tools in modern data science. Finally we will see how topology can be used in applications. For example, the following two figures are in fact simplicial complexes. We will use topological data analysis to distinguish such figures.



MAS 4105 Linear Algebra 1, or permission from the instructor.

Please contact me if you have any questions and/or requests!

A Short Course in Computational Geometry and Topology, by Herbert Edelsbrunner. Available from the UF library as an eBook download.