

Math 149 - Applied Algebraic Topology - Winter 2014

Course Schedule

1. Week of 1/5: Introductory lecture, homotopy, fundamental group, equivalence relations.
2. Week of 1/12: Groups, rings, modules vector spaces, isomorphisms, homomorphisms, classification by normal forms of matrices.
3. Week of 1/19: Simplicial complexes, homology, functoriality. Problem set 1 due 1/23.
4. Week of 1/26: Metric spaces, persistent homology, Vietoris-Rips, Čech, witness, and α -complexes. Final projects to be decided by 1/30.
5. Week of 2/2: Persistence vector spaces, their classification, algorithms, barcodes and persistence diagrams. Problem set 2 due 2/6.
6. Week of 2/9: Examples: Image processing, neuroscience, viral evolution.
7. Week of 2/16: Stability theorems, metrics on barcode spaces, coordinates on barcode spaces. Problem set 3 due 2/20.
8. Week of 2/23: Zig-zag and multidimensional persistence.
9. Week of 3/2: Mapping methods, connection with machine learning.
10. Week of 3/9: Examples of Mapping, working on final project. Final project due 3/17.