Marshall University

College of Science

MTH 431: Topology II

Course catalog description

First course in algebraic topology. Homotopy, fundamental group, simplicial homology.

Credit hours

3 hours

Prerequisites

A grade of C or higher in MTH 430 and MTH 450

List of topics

- Introduction to homology theory
    - Topology around us
    - Introduction to homology
    - Topology of graphs
    - The Euler characteristic of graphs
    - Homology groups of graphs
    - Maps of graphs
- Point-set topology (review)
    - Introduction to point-set topology
    - Neighborhoods and topologies
    - Topological spaces
    - Continuous functions
    - Topological equivalence: homeomorphisms
    - Relative topology
- Complexes and their homology
    - Euclidean space made discrete
    - Cubical chains
    - The chain complex
    - Cubical complexes

- Oriented chains
- Data made Euclidean
- Simplicial complexes
- Simplicial maps and chain maps
- Topological spaces (review)
  - Compact spaces
  - Quotients
  - Cell complexes
  - Triangulations
  - Manifolds
  - Products
- Maps and homology
  - Cell maps and Chain operators
  - Homotopy and homotopy equivalence
  - Simply connected spaces
  - Homology of maps

Suggested textbooks

- *Topology of Surfaces*, Kinsey
- *Basic Topology*, Armstrong
- *A Combinatorial Introduction to Topology*, Henle
- *Introduction to Topology* Gamelin and Green.

Last updated
    March 2014