

Department: MATHEMATICAL SCIENCES

Semester Hours: 3

Course Title and Number: MATH 450 - INTRODUCTION TO TOPOLOGY

Course Description: Basic notions of metric and topological spaces; additional topics from combinatorial and algebraic topology may be included.

PRQ: MATH 430.

Course Objectives.

- To reason rigorously in mathematical arguments.
- To communicate mathematics clearly and efficiently.
- To think creatively in abstract situations.
- To understand the unifying nature of abstract mathematical treatments.
- To more fully understand the basic underlying principles of mathematics.

Content:

- Sets: distributive laws, DeMorgan laws.
- Functions, equivalence relations, infinite sets.
- Metric spaces: Open and closed sets; accumulation points; interior; closure; boundary; continuity; isometries; homeomorphisms; subspaces; products; Cauchy sequences; completeness; contraction mapping principle.
- Topological spaces: Open; closed; accumulation points; interior; closure; boundary; bases; local bases; sub-bases; continuity; subspaces; first countability; separability; Hausdorff; connectness; compactness; compact metric spaces.
- Product spaces: Tychonoff Theorem; quotient spaces; separation axioms; normal spaces; Urysohn's Lemma.

Course requirements: Discussion of new viewpoints of geometric concepts, and comparison with concepts in the plane and line. Discussion of new tools and strategies in problem solving. Solution of more advanced problems and proofs and discussion of depth in mathematics. Read and write about concepts and connections within mathematics. Homework graded regularly. Midterm exam. Final exam.

Assessment instruments: Judgment on student involvement and depth of contributions in class discussions. Homework problem solutions. Midterm exam. Final examination.

References:

Mendelson, **Introduction to Topology**, Third Edition, Dover (1990)
Gemignani, **Elementary Topology**, Second Edition, Dover (1990)