

Math 422 - ELEMENTARY GEOMETRIC TOPOLOGY

Course Catalog Description

Topology of subsets of Euclidean space. Topological surfaces. Surfaces in \mathbb{R}^n . Surfaces via gluing, connected sum and the classification of compact connected surfaces. Simplicial complexes and simplicial surfaces (simplicial complexes with underlying spaces that are topological surfaces). Euler characteristic.

Prerequisite

2360252

Schedule

Monday, 13:40-15:30

Wednesday, 15:40 - 16:30

Instructor Information

Name/Title

Prof.Dr. M. Turgut Önder

Office Address

Department of Mathematics, Room 140, METU, 06800 Ankara

Email

onder@metu.edu.tr

Office Hours

To be fixed in the first week.

Course Objectives

At the end of the course the student will have

- gotten some opinion of basic ideas of geometric topology
- learned basic notions about topological surfaces
- learned basic techniques to construct new surfaces
- learned some basic invariants of topological surfaces
- learned classification of compact connected surfaces

Instructional Methods

- Online lectures using zoom
- PDF files of lecture notes in ODTUCLASS
- Exercise sets assigned regularly
- Online office hours and discussions

Tentative Weekly Outline

Week Topic

- 1 An overview of point-set topology of Euclidean space; open, closed subsets, relative neighborhoods, continuity, compact sets, connected sets and applications.
- 2 Overview of point-set topology of Euclidean space (continuation).
- 3 Homeomorphisms and quotient maps
- 4 Arcs, disks and 1-spheres
- 5 Surfaces in n-dimensional Euclidean space; surfaces via gluing.
- 6 Surfaces via gluing (cont.); properties of surfaces
- 7 Connected sum and the classification of compact connected surfaces
- 8 Simplices
- 9 Simplices (cont.); simplicial complexes
- 10 Simplicial complexes (cont.)
- 11 Simplicial surfaces
- 12 Euler characteristic; proof of the classification of compact connected surfaces
- 13 Proof of the classification of compact connected surfaces (cont.); simplicial curvature and Simplicial Gauss-Bonnet Theorem.
- 14 Simplicial disks and Browder Fixed Point Theorem.

Course Textbook

"A first course in Geometric Topology and Differential Geometry" by Ethan D. Bloch, Birkhauser Boston Inc., 1997.

Course Material(s) and Reading(s)

Material

PDF files of lecture notes will be available in ODTUCLASS.

Resources

"Topology of Surfaces" by L. Christine Kinsey.

Assessment of Student Learning

The assesment will be based upon two online (open-camera) midterm exams (30 % each) and a final exam (40 %). The letter grade will be assigned by the instructor according to the distribution of weighed total grades.