

MATHEMATICS 564 A1: Introduction to Topology
Spring Semester 2001

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Lectures: MWF 11-12 in MCS 148

Text: *Basic Topology*, by M. A. Armstrong (Springer).

My Office Hours: To be announced.

Content: Topology is a different way of thinking about geometric objects. Roughly speaking, if one geometric object can be continuously deformed into another then these two objects are topologically the same. This notion should be familiar from knots – two knots are the same if one can move the strings from one configuration to the other without cutting (or untying) the string. Tools from topology turn out to be quite useful, for example, in analyzing the qualitative behavior of solutions to equations which cannot be solved explicitly. Many problems of this kind arise in mathematics and the sciences and are active areas of current research.

In this course, we will begin by defining the notion of a topological space, many examples of which you are already familiar such as $\mathbf{R}^n$. We will explain how to generalize notions such as continuity, compactness, and connectedness from $\mathbf{R}^n$ to topological spaces. We will also give methods which can be used to construct topological spaces through identifying (or gluing) pieces together.

The remainder of the course is devoting to developing tools to study topological spaces such as the fundamental group and covering spaces, triangulations, surfaces and Euler characteristics, homology, and Lefschetz number. We will also consider invariants of knots such as the Alexander polynomial.

The material in the course is nontrivial but all that is required is some basic mathematical literacy. We will introduce all other notions as necessary. The best way to see if you have mastered the material is to do the homework problems. I urge you to ask questions either during class or during my office hours.

Web Page: This class Web page is located at the URL:

<http://math.bu.edu/people/kimura/Spring01/564/>

Documents distributed in class, homework assignments, and related information will be posted there.

Homework: Generally, homework will be assigned on Wednesday during class and will be due the following Wednesday at the beginning of class. Late homework will not be accepted. Students may discuss homework with each other (and are encouraged to do so) but all written work must be prepared independently.

Exams: There will be a midterm and a final exam.

Grades: Your final grade is determined by three categories – the exams, the homework, and the final. Grades are based upon the formula:

$$\text{Final Grade} = \frac{1}{4}(\text{Midterm Exam}) + \frac{1}{2}(\text{Homework Average}) + \frac{1}{4}(\text{Final Exam})$$

The final grade is curved.