

MATHEMATICS 564 A1

Introduction to Topology

Spring Semester 2004

Instructor: Takashi Kimura

e-mail: kimura@math.bu.edu

Phone: (617)353-1486 Office: MCS 234

Lectures: MWF 10-11 in PSY B47

Text: *Basic Topology*, by M. A. Armstrong, Springer-Verlag, 1983; ISBN 0-387-90839-0.

My Office Hours: MW 11-12, F 12-1

Class Web Page: <http://math.bu.edu/people/kimura/Spring04/564/>

Content: Topology is a different but fundamental way of thinking about geometric objects. Topology is the study of topological spaces. Familiar examples of topological spaces include $\mathbf{R}^n$ and its subsets. Much of this course will be devoted to the study of when two topological spaces are the “same”. For example, two surfaces in $\mathbf{R}^3$ can be regarded as topologically the “same,” intuitively speaking, if one can be stretched into the other without tearing.

We will study continuity, compactness, and connectedness on topological spaces generalizing the familiar notions from $\mathbf{R}^n$. We will also describe constructions of topological spaces by gluing. We will develop tools to study topological spaces such as the fundamental group and covering spaces, triangulations, surfaces and Euler characteristics, homology, and Lefschetz number. Finally, we will construct invariants of knots.

Topology turns out to be useful 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.

Prerequisites: The material in the course is nontrivial but all that is required is some basic mathematical literacy including the ability to write and understand proofs. A course in analysis is somewhat helpful but is not necessary. 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.

Homework: Generally, homework will be assigned on a periodic basis and will be due the following week. 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 exam and a final exam.

Academic Dishonesty: Plagiarism and cheating will not be tolerated and anyone suspected of such academic misconduct will be referred to the Dean’s Office as per the provisions of the CAS Academic Conduct Code.