Topology

Instructor: Billy Cember

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Meeting Place: Jefferson 256 (Jefferson is located behind the science center)

Meeting Time: Saturday 3-5, February 6 - April 3

Introduction: The course will cover the basics of topology. In the process we will study topological spaces, continuous functions, and homeomorphisms on such spaces, as well as properties of topological spaces such as compactness and connectedness. The course will be proof based, and at the beginning of the course we will review how mathematical proofs work.

Goals: The most obvious goal is to understand topological spaces and the mathematical tools they involve. However, a more important goal is to learn the language of mathematics, and specifically how to write proofs. Proofs are the essence of mathematics and understanding and being able to write proofs is a required skill for mathematicians.

Lectures and Homework: The course will be taught in lecture format. Nonetheless, questions and other forms of participation are welcome and encouraged. After each lecture there will be an optional (but highly encouraged) problem set where you will prove mathematical results using the tools you learned in lecture.

For most people (myself included) the core of mathematical learning consists of completing proofs on one's own. Therefore, *the bulk of the learning from this class should come from completing problem sets*. I do understand that you all are leading very busy lives (well, maybe not second-semester seniors...) so I will keep problem sets at under two hours per week. If people are interested in more or less work, I can write the problem sets to suit these needs. Additionally, if anyone individually is looking for extra material, I am more than willing to provide supplemental problems and reading.

Additionally, instead of (or in addition to) problem sets, I may assign reading from some of the textbooks listed below. For such reading I will provide photocopies. During the course I will discuss how to read mathematics.

Textbooks: The following textbooks are optional reference materials. They are not required. If any specific passages are needed or if there is any "required" reading, I will provide photocopies. However, the course progression will mirror the presentation in the following textbooks, so if one is interested in reviewing material before class, the following textbooks, especially the first one, are recommended.

Topology: *Topology* by James Munkres.

Set Theory: N*aive Set Theory* by Paul Halmos, *Set Theory* by Thomas Jech, *Set Theory: An Introduction To Independence Proofs* by Kenneth Kunen. (Warning: the last two books—Jech and Kunen—are very advanced, so they are probably not appropriate at this point in your mathematical career. Depending on the mathematical abilities and interests of students, I may, however, use material from them.)