# Course Objectives

## Introduction to Point-Set Topology

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## Fall 2012

**Length of Course:** One semester

**Prerequisite:** Calculus sequence and Foundations of Mathematics (Math 224 or 512) with grades of 'C' or better or permission of instructor. This course is best taken in the Senior year (undergraduate) or during graduate school.

**Text (required):**

None

**Handouts, Worksheets, Open Questions, etc. (required to be downloaded each class):**

http://faculty.kutztown.edu/mcloughl/Math431.asp

**Texts (optional & supplemental)**:

You are not allowed to read any text, go to any web-site, discuss with any other person anything about the material of this course until **after** a claim, lemma, exercise, corollary, theorem, example, problem, or exposition has been completed and the class has agreed the question has been answered.

**Course Objective:**

This course is designed to provide the student with an intense foundation in fundamental concepts of point-set topology. After completing the course the student should be able to work basic problems (proofs, construction of examples, counter-examples, or argue that a claim is false) in the Topology of $\mathbb{R}$, Topology of Metric Spaces, Moore Spaces, Tychonoff spaces, and Hausdorff spaces. Further we shall become familiar with separability, completeness, connectedness, compactness, density, and basis.

**Course Objective:**

It is important to note that a mathematics student needs to learn to conjecture and prove or disprove said conjecture. Ergo, learning requires doing; only through inquiry is learning achieved; and this course is meant to teach you how to do, critique, or analyse proofs, counterexamples, examples, or counter-arguments. For you to learn, you must be *active* in learning. Thus, the student must learn to understand a problem and solve it precisely, accurately, and correctly (not just 'get' an answer by 'any means'). You must learn and constantly be encouraged to conjecture and prove or disprove said conjecture. One cannot learn to conjecture from a book, we learn to conjecture by conjecturing![1] One does not learn to prove claims by reading other people's proofs in a book or on the board or disprove claims by reading someone else's counterexample, we learn to prove or disprove claims by hard work, trying again and again until we succeed![2] There is no 'shortcut' to learning mathematics that is not inherently flawed or carries with it the potential for non-authentic learning (sophism). This class is a Socratic not Sophistic class.

A particular point must be made that in this course not all questions posed are answered. Many of the questions posed in the courses are left for the student to ponder during the student's matriculation and are answered (hopefully by you, the student) at a later date. Examples of proofs, counterexamples, etc. are given but *most of the actual work is done by the students.*

So, this course is designed to get you, the student, to opine, to do, and to think. You will be required to do more work than in any other course and much of it at home and by yourself with the three most important mathematical tools anyone can have: your brain, a pencil, and paper.

[1] This statement is not meant to be sarcastic but to demonstrate that there is idempotency within the meaning of the words.

[2] Ibid.

**Outline of the Course (with suggested pace):**
We will go as 'far' as we can without sacrificing depth. We shall start at a beginning and (hopefully) reach a place to say is a fine place with which to stop discussing as a group (but there is never an ending) around or about December of this year. Warning$_1$: The pace is swift and one needs to keep up with the homework and material. Do not fall behind and use every available, ethical, and practical method you have toward learning the material.

Warning: It needs to be said that you can read all the books till you are blue in the face, watch all the mathematicians you know do proofs for you, and you will still not have learnt the material in a course. The *only way to learn is by doing.*