

Syllabus for Math 47a, Fall 2008

The idea of this course is to show you how research in pure mathematics is conducted. I will use one of the areas of my current research: *Cluster categories*. This is a recent (2004) invention which I will try to explain. Since this is an undergraduate course, I will concentrate on the numerical and graphic aspects of this theory.

During the first month (September) we will quickly develop the basic background language: permutations, braids, partially ordered sets, graphs and trees, Catalan numbers (algebra, topology, combinatorics). We won't have time to do a comprehensive study of each topic. We need to focus on special aspects relevant to the particular theory I want to study. I will try to keep lecturing to a minimum. Class discussion and joint development of ideas will be the goal.

Later (October, November), we will move more slowly. We will spend hours talking about one or two questions, throwing around ideas most of which will not answer the question but which will help us to progress. Students will need to learn to speak their ideas. Also, I will explain how to ask the right questions.

This is a writing intensive course. That means you have to write 2 papers. One final paper and one midterm paper. (Could be on the same topic.) *wi* means you need to write these papers several times.

The final paper should be a report on your research project. Each student will get/choose a separate project to work on. I envision that these projects could be pieces of one grand project. Each student needs to talk to the instructor (me) outside of class to talk about his/her final project.

One of the things you will learn is *TeX*. The final paper is required to be written in *TeX* or *LaTeX*. I would also be happy if the midterm paper were also written in *TeX*. Look at the *LaTeX* source file for this syllabus. It is very simple since there are no formulas.

Problem sets: 3. About once a week during the first month (September). Problem set #1 will be due Sept 17.

Oral presentations: Each student will give an oral presentation of his/her final paper.

The other activities that I am planning are:

- a trip to the library (in October)
- searching for reference (on the internet)
- expert consultation (we ask an "expert" to come to our class to answer questions)
- study the organization of published papers (so you can imitate them).

Grades:

- 20% first paper
- 30% final paper
- 20% class discussions/participation
- 20% problem sets
- 10% oral presentation