MATH 147. Topology. Harvey Mudd College Spring 2005

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Office hours to be arranged.

See the course page: http://www.math.hmc.edu/~su/math147.

PREREQUISITES: Math 131 (analysis). Math 171 (abstract algebra) is recommended.

COURSE FORMAT: This course will be taught using the (modified) Moore method. You will receive handouts containing theorems, definitions, examples. Your goal is to prove all the theorems by yourselves in a guided discovery process: with the collaboration of classmates and guidance from me.

Students will take turns presenting proofs of theorems in class, while the other students determine if it is correct. I will provide perspective on the material, and motivating examples if you get stuck.

TEXT: There is NO textbook for the course. In fact, as is customary in the Moore method, you are forbidden to consult any topology textbooks this semester. You may collaboratively consult other people in the course, however. As you prove the theorems in this course (or see them proved in class), you will develop your own notebook on topology, something you can be proud of.

REQUIRED MATERIALS: You should acquire a **loose-leaf binder**, in which you will save all theorems that you write up. You will also need a pack of **white index cards**, which you should bring to class every day. These will be used to provide feedback to others on their presentations.

HOMEWORK AND THEOREM BINDER: Between classes, you are expected to write up any theorems that you prove. These should be placed in your binder. I will inspect these notebooks from time to time, and they will be used in evaluating your grades. Most importantly, if you do a nice job with them, your notebook will be something you will be very proud of.

Also, you will be asked to write up selected theorems and hand them in weekly. Thus, it is important to pay attention to proofs of theorems presented in class, since you may write these up for credit.

EXAMS: There will be no midterm, but there will be a final examination. Four components will determine your grade, each worth 25%: (1) class presentations and participation, (2) homeworks, (3) your notebook and the theorems you proved in it (4) a final examination.

HONOR CODE: Cooperation in this class is ENCOURAGED, but solutions should be written up INDIVIDUALLY. You are on your honor not to consult any topology textbooks unless you have my permission.

Expect this course to be very challenging, but also very rewarding. The value of the Moore method is that if you prove all the theorems yourself, you will never forget the proofs you came up with, and you will gain confidence in your abilities as mathematicians!

Suggestions for Proofs:

There will be many times when you are stuck on a problem. This is where the real learning occurs. Here are several ideas:

1. Draw pictures. For instance, unions, intersections, complements, etc. are often effectively represented by circles.

2. Make certain you thoroughly understand the definitions involved and any relevant examples you can think of.

3. Work a special case if you cannot solve the whole problem.

4. Ask yourself whether every hypothesis is necessary, and construct examples to show why the theorem fails if a hypothesis is missing. This will often show you what is needed for the proof.

5. Ask yourself if you can modify the statement to obtain a new, related theorem. When you have a proof, ask what other statements can be proved with the same proof?

One of the goals of the course is to help you see mathematics more as a collection of techniques, examples, and proofs than as a collection of theorem statements.

Suggestions for Presentations:

Begin by giving a brief outline of the argument, before giving details. The outline should consist of a sequence of complete, true statements, whose proofs can be explained when you give the details. Be prepared to justify the details if asked. You may put your outline on a transparency, if you wish. Give details on the blackboard.

Speak loudly.

Most importantly, form a study group, and practice presenting your proofs to each other! Knowing a proof and presenting it are two very different things!