

SYLLABUS FOR MATH 281
INTRODUCTION TO MATHEMATICAL REASONING
Fall 2008

INSTRUCTOR: Renzo Cavalieri.

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Office hours: official office hours are typically right after class. I am happy to accomodate extra/alternative times by appointment.

TEXTBOOK: *A concise introduction to pure mathematics*, M. Liebeck

LOGISTICS: The class will meet MWF 11:00 - 11:50am in ENGRG E 202.

INITIAL DISCLAIMER: This syllabus is not necessarily what exactly is going to happen in this class. I feel that in this case the journey is equally (if not more!) important than the destination itself, and so some flexibility should be essential in targeting the material to YOUR taste, pace, and interests. I strongly (STRONGLY!) encourage continuous feedback and input on the course (in any form...I have also set-up an anonymous electronic comment form that you can use if you are shy or need to insult me really bad - there is a link from the course webpage); I promise to always listen carefully and ponder any feedback, even though I reserve the right of making the final decisions.

As far as class and grading policies go, for the sake of simplicity, fairness, and intellectual honesty, they are decided once and for all, and will be followed exactly as stated here.

COURSE OUTLINE: this course has many many goals. First and foremost, it should give you a flavor of what “pure mathematics is, and what it entails. In order to do so, many “characters will be introduced (sets, numbers, number systems, algebraic structures). Then of course we will see how these characters play together (relations, functions, operations, morphisms). In our study we will be trying to develop and identify the core ideas, concepts and strategies that lead a mathematician in his/her work, which is to PROVE interesting properties, results and statements about the characters above. Another obvious goal is to learn how to prove things, and how to communicate your ideas. In my opinion, this cannot really be attained by just talking about how to prove things, in fact (hopefully) we will do very little talking and a lot of concrete examples and playing.

If there is time and interest, towards the end of the semester we might choose

to make a quick incursion into some more sophisticated area of mathematics.

PRE-REQUISITES: I can't really think of any formal prerequisite to this course, besides an open mind to learning to think about mathematics in maybe a slightly different way.

OFFICE HOURS: Office hours are right after class, or by appointment. I strongly encourage you to come to my office with problems, questions, things you are confused about, or just for a cup of tea.

HOMEWORK: It is a fact that doing problems is THE way to learn math. It's only when you get our hands dirty that you really end up grasping the concepts. So, in an ideal world, I should not be assigning homework, but only recommending exercises, and you guys should be responsible enough to work through them and come talk about any sort of problems you have with your problems. Alas, the daily news remind us constantly that we live in a world that in many ways is far from ideal, so we will be having weekly graded homework deadlines, on fridays.

You are encouraged to work on the homeworks together, but I do insist that everybody writes up their own solutions in their own words and demonstrate understanding of what they have done. Write effectively, with due attention to organization and logical progression of the ideas. Each solution should be complete and appropriately supported - by relevant observations, argumentation, drawings (I like drawings - a picture often time can represent an excellent explanation in topology), etc.

PROJECTS: over the course of the semester we will be working on several projects. This will consist of in class group-work, followed by presentations. The idea is to both get your hands "dirty with doing some math, and getting used to exposing your ideas in a clear way. It's kind of hard at first, but it is a worthwhile exercise.

EXAMS: We'll have two intermediate exams, that at this point are tentatively scheduled for the following dates:

- Oct 3rd;
- Nov 21st.

FINAL EXAM: the final exam may be a regular exam, a take home, or a project...I don't know yet. I'll let you know details plenty in advance.

COURSE GRADES. Here is the chart of how grades will be decided:

- 30% $-\varepsilon$ for the final exam.
- 25% $-\varepsilon$ for each of the two intermediate exams.

- 15% $-\epsilon$ for homework.
- 5% $-\epsilon$ for class attendance and participation.
- 4ϵ for micro-quizzes.

MISCELLANEOUS: Make up quizzes and exams can be arranged, but please, please, please do notify me beforehand. I reserve the right to refuse to offer a makeup if I am asked after the event itself.

In case of special needs I am willing to make special arrangements about homework, attendance policy etc etc but again I require that you discuss such arrangements “before the fact”.

I consider class participation extremely important. I encourage you to make questions, remarks, comments. I will often ask you guys to come up to the blackboard to solve exercises. And yes, questions. Ask lots of questions, don't be afraid...as usual, if you are confused, most likely other people are, and everybody is just being shy. Worse case scenario, if I feel I can't afford the time to answer your question during class time, we will discuss it after class.

Remember: NO QUESTION WILL EVER BE HELD AGAINST YOU!

ADA STATEMENT: the American with Disabilities Act requires that reasonable accommodations be provided for students with physical, cognitive, systemic, learning and psychiatric disabilities. Please contact me at the beginning of the course to discuss any such accommodations you may require for the course.