Syllabus

General Info

Course MAT220 Logic, Sets and Relations
Instructor Charilaos Skiadas (skiadas at hanover dot edu)
Term Spring 2015-2016
Office SCH 121C
Office Hours MWR 1pm-2pm, and by appointment.
Book *Mathematical Proofs: A Transition to Advanced Mathematics*, 3rd ed, by G. Chartrand, A. D. Polimeni, P. Zhang
Websites for notes[1], for quizzes[2].
Class times MTWRF 10am-12pm in SCH102.

Course Description and Goals

This course is a study of formal mathematical proofs. More than any other discipline, mathematics relies on a very precise method for ascertaining what is a true statement and what is not. There can be no doubt whatsoever about the veracity of any claim. Everything is built step by step from a set of assumptions and following formal logic laws. In this course we will learn to work with this system of reasoning. In other words, you will learn to think, write and talk like a mathematician. In particular, you will learn what mathematicians mean when they use certain words and phrases; these meanings often differ from the colloquial usage of the very same words and phrases.

Along the way we will also learn key facts about sets, relations and functions, all fundamental concepts upon which most of further mathematical study is based. We will learn the basic definitions and properties of these constructs, and we will get a glimpse of how we can build more elaborate structures on top of this foundation; you will get the opportunity to explore this topic further as you continue your mathematical studies.

By the end of this course:

- You will be comfortable with the essential formal logic concepts required for all mathematical reasoning.
- You will have become familiar with the fundamental proof techniques employed by mathematicians.
- You will be able to critically examine a mathematical proof for errors.
- You will be able to systematically construct proofs or counterexamples for mathematical statements.
- You will have learned to write and talk like a mathematician, and will have had ample opportunity to practice these skills.

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[1]skiadas.github.io/LogicSetsCourse/site/
[2]https://moodle.hanover.edu/course/view.php?id=1619

- You will be comfortable with the principle of mathematical induction, its various forms and its usage in proving statements.
- You will have developed a solid understanding of the concepts of sets and relations, which form the foundation for higher mathematics.

Course Components

Reading Notes and Practice Quizzes

On the website you will find a schedule[3] with links to documents for each class day. In those documents you will find notes for the day's lesson, a reading assignment, and a list of practice problems. You should work on those practice problems, and ask any questions you have about them. You do not have to turn the problems in.

There will be daily quizzes based on the reading assignments. These will be due the night before. For example on Monday you will find posted reading assignments for Tuesday. The quiz corresponding to these assignments is due Monday night. You will have exactly two attempts on each quiz, and your scores in the two attempts will be averaged.

Class Attendance

You are expected to attend every class meeting. Given the accelerated nature of Spring term, even a single missed day will set you back considerably. Each hour of absence will result in a reduction of your final score by one percentage point, up to a total of 5 points.

Homework Assignments

There will be daily homework assignments. They will usually be divided between a few problems that you have to write down and submit, and some more problems that you are expected to work on for practice. As a part of this course is devoted to teaching you how to write and talk about mathematics, a part of your homework grade will be based on an evaluation of the style of your submission.

Class Participation

A significant goal for the course is for the students to develop their ability to discuss mathematical statements and proofs. Therefore a part of the course grade represents the level to which students achieve this. There are a number of ways in which you can accumulate "participation points":

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[3]http://skiadas.github.io/LogicSetsCourse/site/schedule.html

- You can present a proof on the board. This counts for 4 points (2 points if you present a proof that is missing too many pieces).
- You can offer feedback that would improve a presentation. This counts for up to 2 points.
- You can ask or answer a question relevant to the subject matter. This counts for 1 point.

On a given day you can receive no more than 4 points. The maximum for class participation is 30 points.

Exams

There will be four exams, one on each Friday. In terms of your final grade, the exams you did better on will weigh more.

Getting Help

- You should never hesitate to ask me questions. I will never think any less of anyone for asking a question. Stop by my office hours or just email me your question, which has the great benefit of forcing you to write it down in clear terms, which often helps you understand it better.
- You are allowed, and in fact encouraged, to work together and help each other regarding the notes and the practice problems. However, I strongly encourage you to try the problems out on your own first before talking to someone about them.
- You may discuss homework problems with others, but only after you have spent some time trying them on your own. And in any event the submitted work must be your own! So even though you may talk to others about the problem, when you sit down to write the answers you should be on your own.

Grading

Your final grade depends on class attendance and participation, homework and quizzes, midterms and the final, as follows:

Component	Percent
Attendance	5%
Participation	15%
Homework	15%
Quizzes	5%
Worst Exam	10%
3rd Best Exam	15%
2nd Best Exam	15%
Best Exam	20%

This gives a number up to 100, which is then converted to a letter grade based roughly on the following correspondence:

Letter grade	Percentage Range
A, A-	90%-100%
B+, B, B-	80%-90%
C+, C, C-	70%-80%
D+, D, D-	60%-70%
F	0%-60%