INTRODUCTION TO ABSTRACT MATHEMATICS

1. **Course:** Math 13, Fall 2007

   Lecture (Zeman): M-W-F 9:00 – 9:50 in MSTB 122
   Discussion (Andrew-David Bjork): Tue – Thr 9:00 – 9:50 in MSTB 122

2. **Instructor:** Martin Zeman

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   Office Hours: M-W 12:00 – 1:30 in MSTB 261

3. **Teaching Assistant: Andrew-David Bjork**

   Office hours: M and Tue 10:00 - 12:00 in RH 402B

4. **Textbook:** *Foundations of Higher Mathematics* by Peter Fletcher and C. Wayne Patty

5. **Goals and the Material Covered.** This is a course that is designed as a "bridge" between lower division and upper division classes. In practical terms, it should guide the students from "computational" way of thinking, that prevails in lower division classes, to "mathematical" way of thinking based on abstract notions and logical arguments. It should also help students to understand the language of mathematics; this includes making sense of formal expressions and formulas, and also converting the intuitive ideas into rigorous mathematical text. Therefore, this course does not have any firm topic that one will learn, since the goal is to focus on learning the **method**. Of course, no method can be learnt without actually going into concrete topics, and so the course will cover basics of logic, set theory, algebra and number theory, on which the method will be demonstrated.

   Here is a brief summary of the course objectives:

   - Gain understanding of basic notions and methods of mathematics.
   - Improve the understanding of rigorous mathematical proofs.
   - Practice working with rigorous mathamatical language and proving mathematical theorems.

   The course starts from very elementary and even trivial facts, so it will seem to be trivial at first glance. However, this is deceptive. The abstract notions we will discuss in the course will accummulate, and the first contact with them will naturally be more difficult than expected. **Therefore it is important to keep up with the flow of the course.**

6. **Lecture and Discussions.** The class will meet five times in a week; M-W-F is reserved for the lecture and Tue-Th for discussions. **Attendance on all days is expected.** In the event you must miss a lecture, you will be responsible for all class work that was missed. Discussions will be devoted to homework and quizzes.

7. **Discussion Problems.** There will be regular exercise assignments. It is **very important** to work through the assigned problems. **As it was stressed above, one of the goals is to begin developing the ability of proving theorems. This is impossible without doing the problems.** After each lecture I will post **discussion problems** on **my web page**. These will contain material illustrating and extending the material from the lecture. You will be supposed to go over these exercises and discuss them in the discussions. **There will be no credit for solving these problems, but some of these problems will be used in quizzes resp. will be needed as background material for problems assigned in graded homeworks (see below).**

8. **Graded Homework.** Around Wednesday each week I will assign **graded homework**. You will have one week to work on it. If you prefer to work on the homework in groups, this is fine. However, crude copying homeworks from other students without actual working on them is considered cheating. **No graded homework will be assigned on Wednesday preceding the midterm or final exam.** The graded homework is supposed to be **turned in on the the due day**, which will usually be Thursday the week later. The due day will be specified on the webpage. **Graded homework will significantly count towards the final grade.**

9. **Quizzes.** The problems/questions given on quizzes will be of two kinds:

   - **Either a problem chosen from discussion problems**
   - **or else a simple and straightforward question thesting your understanding of definitions; usually some kind of verification of a definition.**

   Thus, working carefully through the discussion problems **will help you to do well on quizzes.** The point of quizzes is to check whether you understand the basic notions, resp. simple mathematical arguments, and give you the feedback. Quizzes will be given usually on Thursdays; the dates will be specified on the webpage. **There will be no quiz on Week 6 (the midterm exam week) and Week 10 (the last week).**

10. **Examinations.** The following will count towards the final grade. One midterm exam, quizzes (around 6), graded homeworks (around 8) and the final exam. **No extra credit will be given.**

    - **Quizzes:** Will be held usually on Thursdays and each will take about 15 minutes.
    - **Midterm:** Monday, Novembar 5
    - **Final:** Wednesday, December 12, 8:00 a.m. – 10:00 a.m. (Scheduke of Classes)

11. **Grading.** Grading will be based on the **relative score**, which is the ratio

    the number of obtained points/maximal number of points

    The score S for determining the final grade is given by the formula:

    $$S = 0.35F + 0.25M + 0.2Q + 0.2H$$

    where F, M, Q and H is the score of the final exam, the score of the midterm exam, the mean value of the quizzes scores and the mean value of the homeworks score, respectively. (That is, the final exam will count by 35%, midterm exam by 25%, quizzes by 20% and homeworks by 20%.) **Both the lowest quizz and the lowest homework will be dropped.**

Final Grade. The final grade will be calculated as follows:

- A: more than the mean plus standard deviation
- D: less than the mean minus standard deviation
- The interval between A and D will be divided into equally large parts to provide the remaining grades.

12. **Rules for the exams.**

    - **You should arrange your schedule now to take the exams at the assigned times. A make-up exam will be given only in the case of a fully documented serious illness or personal emergecy and generally, by its very nature, will be more difficult than the regular exam.**
    - **Cheating during exams will not be tolerated whatsoever and the guilty party will receive an F in the class and a letter put in his/her personal file.**
    - **Calculators will not be allowed at the exams and quizzes.**
    - **Cellular phones will be supposed to be turned off and kept out of reach during the exams and quizzes.**

13. **Incompletes.** The grade of Incomplete is given only when "the student's work is of passing quality, but is incomplete because of circumstances beyond the student's control" (quote from Academic Regulations.) Therefore **it is essential to keep up with the course work**. Any problems that develop should be discussed **immediately** with the instructor.

14. **Feedback.** Questions and comments are strongly encouraged during lectures as well as at other times. You are encouraged to make use of e-mail as well as office hours. A student who interacts more during lecture is likely to have a more fulfilling experience in the class.

15. **Good study habits.**

    A. Work on exercises as they are assigned after the lecture (do not delay).

    B. Read the previous lecture notes before attending the next class.

    C. Keep a list of all definitions, and a list of relevant theorems.