MATH 210 Section 1

Mathematical Structures and Proof

Spring 2012

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* While these are the official office hours, I am available at other times as well. If you want to meet at a time outside of office hours, the safest option is to set up an appointment with me. You can also just come by any time, but you might want to call or email first to see if I'm there.

Course materials. 1) Textbook: H. Joseph Straight and Julia M. Wilson. *Mathematical Structures and Proof*. The text is available on the ANGEL page for our course. 2) Sources posted under *Reed Library E-Reserves* on the ANGEL page for our course. 3) Additional course material will be provided by the instructor. Much of this will also be posted on ANGEL. 4) You will need *at least one* three-ring binder. Two are recommended.

Prerequisite. A grade of C- or better in either MATH 121 (Survey of Calculus II) **or** MATH 123 (University Calculus II)

Catalog Description. Careful study of the concepts and techniques often used in mathematics courses at the advanced undergraduate level. Topics include logic, set theory, proof techniques, elementary number theory, mathematical induction, functions, and relations. Additional topics from abstract algebra, combinatorics, or countable vs. uncountable sets as time permits.

Course objectives. The purposes of this course for the student include (1) Developing a deeper and more rigorous understanding of the fundamental definitions and concepts of mathematics, (2) Developing an ability to identify mathematical truth and write mathematical proofs, (3) Improving reasoning, critical thinking, and problem-solving skills (particularly those used in discrete mathematics), (4) Gaining experience in reading mathematics effectively, (5) Becoming acquainted with the culture within and conventions under which mathematics is usually done today, and (6) Becoming familiar with the basic concepts and computations of number theory and combinatorics. *The primary overall aim of the course is to prepare students for success in upper level mathematics courses.*

Expected results. Our course web page includes a link to the departmental master syllabus for MATH 210. See the "Objectives" section of this master syllabus for a list of abilities you should expect to develop and concepts you should expect to learn by the end of this course. This is more specific and extensive than the list of course objectives given above.

Content and Methodology. The course will cover proof, logic, sets, number theory, and functions, roughly in that order. (There is a fair amount of overlap among these topics.) This includes most of the material in Chapters 1–3 of the text. However, we will not use the text consistently throughout the semester. Material from sources outside the text will often be presented. In the event of differences in definitions, notation, format, etc., what is presented in class or on handouts will be the "official" version for which students will be responsible on graded work. Equivalence relations and combinatorics are two other core topics that we might or might not have time to explore. An *approximate* daily schedule is available on our Course Web Page.

The beginning of most class periods will be made available for discussion of the homework and related questions. Up to the first 15 minutes of the period may be used for this purpose. Any questions remaining after this time can be (a) discussed outside of class, (b) answered via email, or (c) postponed until the following class. Students are welcome to write questions on the board prior to the start of class to expedite the discussion. Most of the remaining time will be used for presentation of new material via lecture and discussion. Students are encouraged to ask questions and make relevant comments about this material at any time during such presentation. There might also be some group work during class, and students will sometimes be asked to demonstrate work on the board.

Readings. You will have a reading assignment to complete prior to most class meetings. One goal of the readings is to familiarize yourself with the terminology and definitions of each topic and get a rough idea of its basic concepts before we discuss the topic in class. The reading assignments will be posted on our course web page. Some readings will be taken from sources other than the text, and the relevant material for these will typically be found on the ANGEL page for our course. Most reading assignments will include a few questions that you should be able to answer after completing the reading. **See our course web page for guidelines for submitting answers to the reading questions**. The reading assignments will be graded in part on completion, and will not be "returned" in the usual sense. However, I might occasionally respond to your submission with some comments, and at times I will compile select student responses for display and discussion in class.

Problem Assignments and Homework. Two types of homework will be assigned regularly. *Problem assignments* (PA's) will be collected and graded. Feedback will be provided on all PA problems, but some problems might be graded on completion rather than in detail for correctness. On PA's, *clarity of exposition is important*, and one should strive for **well-written, polished solutions**. **All PA's must be typed.** More specific guidelines will be given, and every PA will include *style points* that will be awarded based on how well you follow these guidelines. All of your work for a given assignment must be handed in at the same time and be stapled together. **See the Academic Integrity Policy section below for important information about completing the PA's.**

Homework assignments (HW's) will not be collected, but will often be discussed in class. It is vital that you complete these assignments. The HW problems provide an opportunity to deepen your understanding of concepts as well as valuable practice for PA's and quests. At least one problem on each exam will be taken directly from the HW. **In order to be successful, ask questions about problems from either type of assignment that give you difficulty.**

In addition, each student will also complete a *polished proof portfolio* by the end of the semester. Details will be given in class.

Due dates for the PA's and any other collected work will be specified, and no late work will receive full credit, except in the case of an excused absence on the due date. (See the **Attendance Policy** section below.) I define work to be *late* if it is handed in, without an excused absence, after 8:30am the day following the due date. Late work can still be handed in and graded, but will receive credit for only 50% of the points earned. However, except in truly exceptional circumstances and with prior permission of the instructor, no late work may be handed in after the last day of class or more than two weeks after the original due date.

I recognize the importance of timely feedback on your work, and will endeavor to return all graded material to you within one week.

Quests and Exam. You will take six quests during the semester—essentially one every two weeks. A quest is somewhere between a quiz and a test in length and material covered. The time allowed to complete each quest will vary, but it will be about 30 minutes on average. The purpose of the quests is to allow you to demonstrate your level of mastery of the *concepts* of the course. They will test not only your ability to memorize and compute, but especially your ability to think. Some problems on each quest will involve writing proofs. There will also be a 120 minute comprehensive final examination. Expected dates for the quests are listed on the daily schedule; exact dates will be announced at least two class periods in advance. The final exam will be given on Thursday, May 10, at 8:30am.

Make-up quests will be given only in *serious* and *unavoidable* circumstances, or in the event of an excused absence, and only if your request to make up a quest is approved by the instructor *in advance or as soon as reasonably possible*. Make-up quests must be taken within two class periods following the day of the exam. If these conditions are not satisfied, it is understood that the opportunity to make up the quest is voided.

Grading and Evaluation. Performance in this course will be evaluated on a percentage system. Your average on the quests will constitute 36% of the final grade. Reading assignments will comprise 10% of your grade. There will be a 5% component to the grade based on class participation, and your polished proof portfolio will account for another 5%. The problem assignments will be combined in a category with any other graded items to make up another 25% of the grade. The remaining 19% of the grade will be determined by the final exam. At the end of the course, your cumulative average (AVE) will be computed as follows.

Q	=	Quest average
R	=	Reading assignment average
C	=	Class participation score
P	=	Polished proof portfolio score
A	=	Problem assignment (etc.) average
F	=	Final exam percentage
AVE	=	.36Q + .10R + .05C + .05P + .25A +.19F

During the semester, averages will be posted and (somewhat) regularly updated on ANGEL.

Letter grades will be assigned as follows based on a student's final percentage:

93 and above=A; 90-92=A–; 87-89=B+; 83-86=B; 80-82=B–;
77-79=C+; 73-76=C; 70-72=C–; 67-69=D+; 63-66=D; 60-62=D–; below 60=F.

The instructor reserves the right to lower the grade ranges. The grade ranges will not be raised.

Attendance Policy. Since this course is so critical to success in upper-level mathematics courses, you cannot afford to miss any classes. Attendance is required. An attendance sheet will be passed around each time the class meets. **It is your responsibility to sign this sheet** each period in order for your attendance to be official. Attendance is a direct factor in grade determination in the sense that, if you don't attend, you can't participate, and your class participation score will decrease. More significantly, it is an indirect factor, since you probably won't be able to understand the concepts well enough to pass the course if you do not attend regularly.

We will follow the SUNY Fredonia attendance policy. (See http://www.fredonia.edu/catalog/3833.htm in the 2011–2012 University Catalog.) Work missed during an absence can be made up if the absence is determined by the instructor to be an *excused absence*. Your absence will be excused if you are participating in a university-sponsored program, exercising religious beliefs, hospitalized, or attending the funeral of a relative. *Other absences due to unavoidable circumstances may also be excused at the discretion of the instructor.* Appropriate documentation related to an absence, provided to the instructor in a timely manner, will greatly aid your case for getting that absence excused. If you must be absent and know it, please notify the instructor in advance.

Special Accommodations. Reasonable accommodations are available to students with documented disabilities at SUNY Fredonia. Students who might require instructional and/or examination accommodations should contact the office of Disability Support Services for Students (DSS), located on the Fourth Floor of Reed Library (716-673-3270 or disability.services@fredonia.edu). The DSS coordinator will review documentation and determine accommodations on a case-by-case basis. DSS will notify the instructor with an accommodation letter which verifies that you have registered with the DSS office and which describes any accommodations approved for you. After you have met with the DSS coordinator, please contact the instructor to discuss any needed accommodations. See also www.fredonia.edu/tlc/DSS/dss.htm .

Withdrawal Policy. The student schedule changes policy for this course will be that of the University. (See http://www.fredonia.edu/catalog/3826.htm and http://www.fredonia.edu/catalog/3849.htm in the 2011–2012 University Catalog.) IT IS YOUR RESPONSIBILITY TO KNOW AND COMPLY WITH ALL DEADLINES. The last day to DROP this course is **Friday, January 27**. The last day to WITHDRAW from this course is **Friday, March 30**. The last day to completely withdraw from the university is **Tuesday, April 24**.

Academic Integrity. Each student is expected to "support and abide by all provisions of the ... Academic Integrity Policy" (http://www.fredonia.edu/catalog/4442.htm, 2011–2012 University Catalog). While we will follow this policy, more details are given below regarding the conduct that is expected in this class. Please ask if it is ever unclear to you whether a given action is or is not allowed.

The purposes of this course include changing the way that you think about mathematics, cultivating the abilities to reason logically and analyze critically, and preparing for success in higher level mathematics courses. *In order to be successful in attaining these goals, you need to do a significant amount of independent work.* Hence, while you *are* encouraged to discuss and study the course material with each other and work together on assignments, I urge you to try to work out problems yourself as much as possible before working with others in order to obtain the maximum learning benefit. Furthermore, **all final work submitted for individual assignments must be your own**. The principle here is simple: *Under no circumstances and in no way should you ever copy any part of anyone else's work and present it as your own.* Whether discussing a problem assignment with a group, comparing solutions with a friend, or getting help from a tutor, do not take any notes from the discussion away with you—in other words, you can share your thoughts (including, for instance, on paper or a board), but you must walk away with only your understanding. In particular, write solutions up on your own. By the way, no collaboration is allowed on quests.

In cases where work appears to be copied, I will invite the students involved to my office to explain the relevant material to me. A student who cannot explain his or her work adequately or who fails to present an explanation will lose points or receive a grade of zero on the assignment in question. Furthermore, a required report of the violation will be sent to the Dean of the College of Arts and Sciences. Once again, *in order to be successful in learning the material and preparing for the quests and future courses, you need to try to work out assigned problems yourself as much as possible.*

SUNY Fredonia Counseling Center. LoGrasso Hall; Phone: 673-3424; www.fredonia.edu/counseling Services are free and confidential.

Daily schedule. An *approximate* daily schedule for this course is is available online at http://www.fredonia.edu/faculty/math/JonathanCox/210/sch210s12.pdf .

Any changes to this syllabus will be communicated in class by the instructor.