Math 221 - Discrete Structures - Fall 2006  
Instructor: Alex Wilce  
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Office Hours: TTh 9:00-11:00; MF 4:10-5:00,  
(or by appointment, or serendipitously).

Description and Objectives: This course provides an introduction to the logical, set-theoretic and combinatorial ideas that form the common background for most areas of advanced mathematics and many areas of computer science. Material covered includes propositional and first-order predicate logic, basic set theory (including relations, mappings, cardinality, etc.), induction and recursion, and various counting principles. Additional topics will be discussed as time and interest permit.

An important collateral goal of the course is to help students develop fluency in reading and writing idiomatic modern mathematics. Students will be expected to write (and re-write!) proofs throughout the semester, with the goal of leaving the course able to produce a well-organized, well-presented, and mathematically correct argument.

Texts: The course will be strongly lecture-based, meaning that the primary source of information will be the lectures themselves. These will be supplemented by
- A detailed set of Lecture Notes, which will be distributed via Blackboard as we go.

I'll assign reading, and recommend routine exercises, at the start of each class: be sure to do this reading and try these exercises before the next class meeting!

Grades will be based on several short quizzes (15%), homework and problem sets (45%), a midterm exam (20%) and a comprehensive final exam or a final project (20%). Problem sets will be assigned weekly, and will consist of two parts: a selection of routine problems taken from my Notes and/or the Gerstein text, and a smaller number of more challenging exercises. Solutions to latter are to be written up carefully and in some detail, and will be graded for clarity and economy, as well as for correctness. There will be opportunities to re-write certain assignments. You may discuss the material with one another, solutions are to be written up individually.
LaTeX: We will be using the mathematical type-setting program LaTeX – a tool in universal use by professionals in the mathematical sciences. LaTeX is installed on the computers in Seibert 017. Various LaTeX systems, both freeware and commercial, can be found by going to www.tug.org or www.ctan.org. Beginning with the second problem set, all work must be submitted in LaTeX.

Approximate Schedule (subject to radical change at a moment’s notice):

Weeks 1-2: Propositional logic and (very) basic set theory
Weeks 3-4: Predicates and quantifiers
Week 5: Induction and recursion
Weeks 6-8: Sets and relations
   Mid-Term Exam on or about Friday, October 20th.
Week 9: Mappings; injections, surjections and bijections.
Week 10: Comparing finite sets
Week 11: Comparing infinite sets
Week 12: Models of Computation
Weeks 13-14: Further topics and/or final projects
   Final Exam: Thursday, December 11 (8:00-10:00).

Attendance and Academic Honesty: I will follow the policies set forth in the student handbook. (Frequent absences will be noted, and may result in a lowered or, in egregious cases, a failing grade.)

Some Advice: You will be learning a new language, adapted to express unfamiliar, and very abstract, ideas. This makes for a rather challenging course! I recommend that you devote a non-trivial amount of time (on the order of 6-8 hours per week) outside of class to reading the text and the notes, working through examples and exercises, and discussing the material with me and with your classmates. Make every effort to attend each lecture and to complete all of the assignments in a timely manner: if you fall behind, it will be very difficult to catch up. Finally, please make use of my office hours!