

Fundamental Concepts for Advanced Math Spring 2004

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Meeting Times MATH 233 Section 02 meets T-Th 4:00 - 5:15 in LA5-243.

Office hours (held in my office: FO3-218):

Tuesdays and Thursdays 3:00 - 4:00.

Feel free to stop by, email or call to schedule an appointment or ask a question!

Description:

Topics: Fundamentals of logic and set theory, functions and relations, induction and recursion, elementary number theory, congruences, counting principles, introduction to probability. Students will be asked to write valid mathematical proofs.

Prerequisites: A grade of "C" or better in MATH 123.

Goals:

In addition to gaining mastery of the topics, the students should be able to

- **reason deductively** from explicit assumptions and definitions
- correctly **use the language** of mathematics both verbally and in well written sentences.
- determine **how to begin** thinking about mathematical questions in such a way to efficiently approach a solution.
- determine whether or not a mathematical argument is complete, and **assess the validity** of mathematical assertions.

Assignments:

Homework. **Expect daily homework assignments, due the following class period.**

The assignments will be graded subject to the following rules:

- A problem completed correctly and on time will receive 10 points.
- A problem completed correctly and *up to one week* late will receive 8 points. *(I really want you to do the homework!!)*
- An incorrect problem (one which is either mathematically wrong or written poorly) will receive partial credit and may be corrected and resubmitted *within a week* from when it is returned for up to 8 points. *(In fact, I really want you to do the homework correctly!! Even if you need help or more time.)*

Quizzes. Once in a blue moon, I may want to give you a quiz. If I do, you will be warned in advance. The scores from any quizzes will be added into the homework scores for grading purposes.

Text:

Introduction to Mathematical Structures and Proofs, by Larry J. Gerstein. Third edition, Springer-Verlag, 1996.

Tentative Schedule: I will modify this plan as we go!

Week	Sections
1	Introductions Section 1.1 Statements, Propositions and Theorems Section 1.2 Logical Connectives and Truth Tables Section 1.3 Conditional Statements
2	Section 1.4 Proofs: Structures and Strategies Section 1.5 Logical Equivalence
3	Most of Section 2.10 Mathematical Induction Part of Section 6.3 Divisibility
4	Section 2.1 Fundamentals (Sets) Section 2.2 Russell's Paradox
5	Section 2.4 Set inclusions a bit more from Section 2.10 Mathematical Induction
6	Exam 1
7	Part of Section 6.3 Divisibility (Fundamental Theorem of Arithmetic) and Section 2.5 Union, Intersection and Complement
8	Section 2.8 Ordered Pairs and Cartesian Products Section 2.9 Set Decomposition: Partitions and Relations
9	Section 6.4 Congruence Section 3.1 Functions: Definitions and Examples
10	Section 2.3 Quantifiers and some calculus (definition of a limit)
	Spring Break
11	Part of Section 3.2 Surjections, Injections, Bijections
12	Exam 2
13	Part of Section 3.2 Sequences
14	Section 3.3 Composition of Functions Part of Section 5.3 Introduction to Permutations
15	Tie up loose ends

Grade Distributions	
Homework and Quizzes	40%
Midterm 1	15%
Midterm 2	15%
Final Exam	30%

Exams: <i>All exams are closed book and closed note. Students will not be permitted to use notes or calculators.</i>	
Thursday, March 4	Midterm 1
Thursday, April 22	Midterm 2
TBA	Final Exam (Cumulative)