

MAT 660: Discrete Structures for Mathematics Teachers
Preview Syllabus: Autumn 2009
(Subject to change and update in the online format)

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SAC 520
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(I have been inundated with junk mail, which I often delete after only a cursory glance. **To ensure that your message is not overlooked, please put [MAT660] at the start of the subject heading** for all e-mail messages to me about the course.)
Mailing Address: Department of Mathematical Sciences, DePaul University
2320 N. Kenmore, Chicago, IL 60614
- Meeting Times and Locations:** September 19 (9:00-5:00), September 20 (10:00-4:30)
October 17 (9:00-5:00), October 18 (10:00-4:30)
November 15 (9:00-4:00)
All classes will be held in a room TBA (probably Levan 301), except, possibly, for the midterm and final exams which will be held in a room TBA.
- Review Sessions:** Informal evening &/or weekend review sessions have become an important part of the program. I anticipate two review sessions before each exam.
- Textbook and other materials:** *Discrete Mathematics with Applications*, 3rd Edition, by Susanna S. Epp, Brooks/Cole Publishing, 2004
A scientific calculator
Additional materials will be provided in class and through Blackboard (<https://oll.depaul.edu/>).
See the website <http://condor.depaul.edu/~sepp/DMwA3e.htm> for further resources linked to the text, including errata information.

RATIONALE: This course is intended to clarify the logical basis for much of high school mathematics and to provide a solid foundation for the study of abstract mathematics and theoretical computer science. The first part of this course focuses on the basic principles of logical reasoning and how to apply these principles to formulate and explore the truth and falsity of mathematical statements. Proof, disproof, and conjecture all figure prominently. The main vehicle for exploration is number theory, including the representation of real numbers on a number line, divisibility properties of integers, properties of rational numbers, the irrationality of the square root of 2, the infinitude of the prime numbers, the logic of solving equations and inequalities, and the binomial theorem. The second part of the course focuses on sets, functions, cardinality, and recursion, and the third part deals with combinatorial reasoning and its applications in a variety of different areas.

This course will probably place greater emphasis on communication, both written and oral, than other mathematics courses you may have taken previously. Justifying a belief in the truth or falsity of a mathematical assertion requires a rational argument. A main theme of the course is learning to express such arguments with clarity and precision. This theme supports the NCTM *Principles and Standards for School Mathematics*, which urges all K-12 teachers to place greater emphasis on reasoning and communication.

COVERAGE

SECTIONS

CONTENT

1.1 - 1.3	Logic of Compound Statements (including extra applications to the high school curriculum)
2.1 - 2.4	Logic of Quantified Statements
3.1 - 3.4, 3.6, 3.7 (+ a bit of 11.2 & 11.5)	Elementary Number Theory and Methods of Proof
4.1 - 4.4	Sequences and Mathematical Induction
6.6 - 6.7	Pascal's Triangle and the Binomial Theorem
8.1 - 8.2, 8.4	Recursion
5.1 - 5.3	Set Theory
7.1, 7.3, 7.5, 7.6	Functions and Cardinality
10.1 - 10.3	Binary Relations
6.1 - 6.4, 11.1, 11.2	Combinatorial Reasoning

EVALUATION:

1. Exams will test knowledge of definitions and basic facts and techniques, primarily through problems similar to those discussed in class and assigned as homework. There will be a midterm exam on October 17 at 9:00 AM, a final exam on November 15 at 9:00 AM, and a short quiz on November 15 at approximately 3:30 PM.
2. The bulk of the assigned exercises from the textbook will not be collected because there are complete solutions for them in the back of the book, but **you will be responsible for being able to do these exercises**. Many of them, however, allow for a variety of correct answers, and so you may occasionally have doubts about whether yours are correct. **Please do not hesitate to ask me to look over your solutions if you have questions about them**. You may bring them to the review sessions or e-mail or fax them to me, or discuss them with me over the telephone.
3. Each weekend, selected problems will be assigned. Details of when and how to hand these in will be given in the assignments. To access the assignments, click on "Assignments" on the left-hand menu bar of the Blackboard website.
4. During the second part of the quarter you will work with 1-3 other MAT 660 students to develop a lesson to use in a high school class. Specific instructions will be provided. You may hand in your lesson at any time before the official end of the DePaul quarter, which is November 24.
5. The midterm exam will count 40%, the final exam 40%, the first homework assignment 10%, the lesson segment 5%, and the quiz 5% of your grade. The midterm exam will cover the material discussed in class on the first weekend and the exercises in the first assignment. The final exam will cover the entire course.

6. Extra credit of up to 5 additional points on the final exam may be earned if the second homework assignment is submitted by the due date. Extra credit on homework and on exams may also be given for solutions that are exceptionally well expressed. Multiple-choice, online worksheets may be offered for self-evaluation during the quarter.

DePaul University's Academic Integrity Policy: Students must abstain from any violations of academic integrity and set examples for each other by assuming full responsibility for their academic and personal development, including informing themselves about and following the university's academic policy. Violations of academic integrity include but are not limited to the following categories: cheating; plagiarism; fabrication; falsification or sabotage of research data; destruction or misuse of the university's academic resources; alteration or falsification of academic records; and academic misconduct. Conduct that is punishable under the Academic Integrity Policy could result in additional disciplinary actions by other university officials and possible civil or criminal prosecution. To review the complete Academic Integrity Policy of the University, please go to <http://studentaffairs.depaul.edu/handbook/code16.html>.

Information for Students with Disabilities: Students who feel they may need an accommodation based on the impact of a disability should contact me privately to discuss their specific needs. All discussions will remain confidential. To ensure that you receive the most appropriate accommodation based on your needs, contact me as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the PLS Program (for LD, AD/HD) at 773-325-8656 in SAC 220, or The Office for Students with Disabilities (for all other disabilities) at 773-325-7290 Student Center 307.