Introduction to Discrete Mathematics MAT 200

Semester: Spring 2013  
Instructor: Xin, Ke

Class hours: 4  
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Credits: 4  
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Course Description
This course is designed to show the relevance and practicality of discrete mathematics and to give students the mathematical foundations they need in their future studies of computer information systems. This course covers foundations of logic and proofs, sets and functions, mathematical induction, the basics of counting and discrete probability, relations, orderings and graphs.

Prerequisites/Co-requisites
The student must have passed or been exempt from MAT 056 (Intermediate Algebra and Trigonometry).
Note: MAT 206 (Precalculus) is not a prerequisite but is strongly recommended as additional preparation.

Student Learning Outcomes
Upon successful completion of this course, students will be able to:
- formalize and verify logical arguments with and without quantifiers;
- apply various techniques of proof;
- perform basic operations of sets and functions;
- identify various types of integer sequences, find their general terms and sums;
- use mathematical induction and structural induction;
- solve problems using methods of counting and discrete probability theory;
- identify reflexive, symmetric, transitive relations and partial orderings;
- identify special types of graphs and their basic properties, determine whether given graphs are isomorphic.

Required Text & Readings
Evaluation & Requirements of Students
The instructor will advise the student of the determination of the final grade. Students are required to attend all scheduled classes.

Outline of Topics
1. The Foundations: Logic and Proofs
   1.1 Propositional Logic
   1.2 Propositional Equivalences
   1.3 Predicates and Quantifiers
   1.4 Nested Quantifiers

2. Basic Structures: Sets, Functions, Sequences and Sums
   2.1 Sets
   2.2 Set Operations
   2.3 Functions
   2.4 Sequences and Summations

4. Number Theory and Cryptography
   4.1 Divisibility and Modular Arithmetic
   4.2 Integer Representations and Algorithms
   4.3 Primes

5. Induction and Recursion
   5.1 Mathematical Induction
   5.2 Strong Induction and Well-Ordering
   5.3 Recursive Definitions and Structural Definition

6. Counting
   6.1 The Basics of Counting
   6.2 The Pigeonhole Principle
   6.3 Permutations and Combinations
   6.4 Binomial Coefficients

7. Discrete Probability
   7.1 An Introduction to Discrete Probability
   7.2 Probability Theory
   7.3 Bayes' Theorem
   7.4 Expected Value and Variance

9. Relations
   9.1 Relations and Their Properties
   9.2 n-ary Relations and Their Applications
   9.3 Representing Relations
   9.4 Closures of Relations
   9.5 Equivalence Relations
   9.6 Partial Orderings
College Attendance Policy
At BMCC, the maximum number of absences is limited to one more hour than the number of hours a class meets in one week. For example, you may be enrolled in a four-hour class. In that class, you would be allowed 5 hours of absence (not 5 days). In the case of excessive absences, the instructor has the option to lower the grade or assign an F or WU grade.

Academic Adjustments for Students with Disabilities
Students with disabilities who require reasonable accommodations or academic adjustments for this course must contact the Office of Services for Students with Disabilities. BMCC is committed to providing equal access to all programs and curricula to all students.

BMCC Policy on Plagiarism and Academic Integrity Statement
Plagiarism is the presentation of someone else’s ideas, words or artistic, scientific, or technical work as one’s own creation. Using the idea or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism.

Students who are unsure how and when to provide documentation are advised to consult with their instructors. The library has guides designed to help students to appropriately identify a cited work. The full policy can be found on BMCC’s web site, www.bmpcc.cuny.edu. For further information on integrity and behavior, please consult the college bulletin (also available online).