

BOROUGH OF MANHATTAN COMMUNITY COLLEGE

City University of New York

Department of Computer Information Systems

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Discrete Structures

CSC 230

Spring 2008

Credits: 3

Class hours: 3

Lab hours: 0

Course Description:

This course covers foundational materials for computer science. Topics include algorithm analysis, recursion, recurrence, advanced graph theory, trees, Boolean algebra, and modeling computation. Students will be expected to complete projects for each topic involving formal proof techniques, mathematical reasoning and/or programming.

Prerequisites: MAT 200 Intro Discrete Mathematics and CSC110 Computer Programming I

Student Learning Outcomes:

After completing this course, students will be able to:

- to describe basic properties of each discrete structure
- to apply formal proof techniques
- to solve problems in computer science using graphs and trees
- to analyze algorithm complexity
- to prepare for the mathematical aspects of other computer science courses

Required Text & Readings:

Title: Discrete Mathematics and Its Applications, 6th Edition

Author: Kenneth H. Rosen

Pub: McGraw-Hill

ISBN: 13 9780073229720

Other Resources: Floppy diskettes and CDs are needed for use during Lab. Flash drives are recommended.

Use of Technology (if applicable):

Evaluation & Requirements of Students:

Mid-Term Exam	40%	
Final Exam	40%	
Projects		<u>20%</u>
Total	100%	

Outline of Topics:

2 The Fundamentals: Algorithms, the Integers, and Matrices 119

- 2.1 Algorithms 120
- 2.2 The Growth of Functions 131
- 2.3 Complexity of Algorithms 144
- 2.4 The Integers and Division 153
- 2.5 Integers and Algorithms 169
- 2.6 Applications of Number Theory 181
- 2.7 Matrices 196

3 Mathematical Reasoning, Induction, and Recursion 213

- 3.5 Recursive Algorithms 274
- 3.6 Program Correctness 284

6 Advanced Counting Techniques 401

- 6.1 Recurrence Relations 401
- 6.2 Solving Recurrence Relations 413
- 6.3 Divide-and-Conquer Relations 425
- 6.4 Generating Functions 435
- 6.5 Inclusion-Exclusion 451
- 6.6 Applications of Inclusion-Exclusion 457

8.5 Euler and Hamilton Paths 577

- 8.6 Shortest Path Problems 593
- 8.7 Planar Graphs 603
- 8.8 Graph Coloring 613
- End of Chapter Material 622

9 Trees 631

- 9.1 Introduction to Trees 631
- 9.2 Applications of Trees 644
- 9.3 Tree Traversal 660
- 9.4 Spanning Trees 674
- 9.5 Minimum Spanning Trees 688

10 Boolean Algebra 701

- 10.1 Boolean Functions
- 10.2 Representing Boolean Functions
- 10.3 Logic Gates
- 10.4 Minimization of Circuits

11 Modeling Computation 739

- 11.1 Languages and Grammars 739
- 11.2 Finite-State Machines with Output 751
- 11.3 Finite-State Machines with No Output 758
- 11.4 Language Recognition 765
- 11.5 Turing Machines 775

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 three-hour class. In that class, you would be allowed 4 hours of absence (not 4 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.

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