

**Discrete Mathematics (Course Number: MTH-129-51)**  
**Fall Semester, 2004**  
**Camden County College (Blackwood Campus)**  
**Adams, Room 004**  
**Meeting Times: Monday & Wednesday, 5:30PM – 7:10PM**

Instructor: Professor Gregory Safko  
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Phone Numbers:  
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Prerequisites:  
College Algebra and Trig (MTH-125) -or- Pre-Calculus I (MTH-120) -or- proper Placement Exam score

Text: Discrete Mathematics with Applications – Third Edition (required)  
Author: Epps  
Publisher: Thompson Publishing  
ISBN 0-534-35945-0

Grading: Homework and Class Participation: 20%  
2 Exams: 25% each = 50%  
Final Exam: 30%

Letter Grade: A: 90 to 100  
B: 80 to < 90  
C: 70 to < 80  
D: 60 to < 70  
F: Below 60

Homework and exam policy:

You are responsible for everything covered in class and for all assigned readings and problems. You may get help from classmates on the problems or on understanding the concepts of the course but the solutions should be your own.

Exams will focus on the concepts covered in Epps and the lectures. The final exam will be cumulative.

On the exams I will provide any “cheat sheets” that I feel are necessary in helping you be successful on the exams. The exams will be closed book otherwise.

Grade points will be deducted for late homework at the rate of 25 points per day (this is much better than a policy where no late work will be accepted). Homework that runs more than a page must be stapled together, with your name on each page. Six points (out of 100) will be deducted for homework that has ragged edges (i.e., it was just ripped out of a notebook). Five points (out of 100) will be deducted for homework that runs more than one page and does not have a staple holding the pages together

(paperclips don't count). If there are compelling reasons that force you to submit late work, please discuss them with me beforehand. Exceptions may be granted on a case-by-case issue.

I do not accept extra credit work to improve grades.

Life happens, and you may have to miss a class when I am administering an exam. If you miss an exam, the burden is on you to schedule a mutually convenient make-up time. In fairness to others, however, the make-up exams are more challenging.

#### Classroom policy:

With the exception of “baby beepers” or EMT beepers, the use of cell phone, pagers, and beepers are not permitted in the classroom. This also includes alarm watches.

The classroom is an area of learning. It is not an area where your friends or children hang out while you attend class. If you are bringing friends or children along because of circumstances beyond your control (carpooling, etc.) please have them wait for you in the lobby areas while you attend class.

No food or drink of any type is permitted in the classroom.

#### Course Description:

This is an introductory course to the principles, concepts, and applications of discrete mathematics intended for mathematics and computer science students. Topics such as logic and proof, sets, functions and relations, graphs and trees, and combinatorials will be presented. The study and use of algorithms will be emphasized.

#### Course Topics:

Discrete Mathematics will cover the following five topics:

1. Logic and Logic Circuits (Statements, propositions, connectives, notations, equivalence, logic gates, and methods of proof and mathematical induction)
2. Sets, Relations, and Functions (Set notation and operations, relations, matrices)
3. Graphs (Paths and connectedness, isomorphisms, coloring, directed graphs, shortest paths, Prim's Algorithm, Kruskal's Algorithm, and [time permitting] Dijkstra's Algorithm)
4. Trees (Properties, spanning trees, depth-first and breadth-first searches, rooted trees, binary search trees and traversals)
5. Combinatorials (Pigeonhole principles, permutations, probability, the principle of inclusion-exclusion, recurrence relations)

If time permits, the concepts of algorithm design and analysis, and automata may be discussed.

#### Important Dates:

Check out the academic calendar at [www.camdencc.edu/programs\\_courses/academic\\_calendar.htm](http://www.camdencc.edu/programs_courses/academic_calendar.htm)

### Attendance Policy:

All students are expected to attend all classes. This includes arriving late and leaving early. Due to the accelerated nature of this course, it is extremely difficult to catch up on missed material. Excessive absences or lateness will affect your grade. In any case, please extend the courtesy to me and let me know if you will be absent or late.

### Other important information:

Camden County College's Emergency Closing Number is 559 for the daytime, 2559 for the nighttime.

### Approximate Schedule (As of August 29, 2004):

Please complete each reading assignment before that evening's class.

- Week 1      Introduction & Syllabus  
                 Logical Form and Equivalence (1.1)  
                 Conditional Statements (1.2)  
                 Valid and Invalid Arguments (1.3)  
                 Digital Logic Circuits (1.4)  
                 Readings: Chapter 1 & 2 (pages 1 – 57 and 75 – 124)
- Week 2:      Predicates and Quantified Statements I (2.1)  
                 Predicates and Quantified Statements II (2.2)  
                 Arguments with Quantified Statements I (2.3)  
                 Direct Proof and Counterexample I: Introduction (3.1)  
                 Readings: Chapter 3 (pages 125 – 198)
- Week 3      Direct Proof and Counterexample II: Rational Numbers (3.2)  
                 Direct Proof and Counterexample III: Divisibility (3.3)  
                 Direct Proof and Counterexample IV: Division Into Cases (3.4)  
                 Indirect Argument: Contradiction and Contraposition (3.6)  
                 Readings: Chapter 4 (pages 199 – 254)
- Week 4:      Two Classical Theorems (3.7)  
                 Application: Algorithms (3.8)  
                 Sequences (4.1)  
                 Mathematical Induction I (4.2)  
                 Readings: Review for Exam 1
- Week 5      Exam (on material from Week 1 – Week 4)
- Week 6:      Mathematical Induction II (4.3)  
                 Strong Math Induction and the Well-Ordering Principle (4.4)  
                 Basic Definitions of Set Theory (5.1)  
                 Properties of Sets (5.2)  
                 Readings: Chapter 5 (pages 255 – 296)

- Week 7: The Empty Set, Partitions, Power Sets (5.3)  
 Russell's Paradox and the Halting Problem (5.4)  
 Counting and Probability (6.1)  
 Possibility Trees and Multiplication Rule (6.2)  
 Readings: Chapter 6 (pages 297 – 388)
- Week 8: Counting Elements of Disjoint Sets: The Addition Rule (6.3)  
 Counting Subsets of a Set: Combinations (6.4)  
 The Algebra of Combinations (6.6)  
 The Binomial Theorem (6.7)  
 Readings: Chapter 7 (pages 389 – 456)
- Week 9: Functions Defined on General Sets (7.1)  
 One-to-One and onto, Inverse Functions (7.3)  
 Application: The Pigeonhole Principle (7.4)  
 Composition of Functions (7.5)  
 Readings: Review for Exam 2
- Week 10: Exam (on material from Week 5 – Week 9)
- Week 11: Cardinality with Applications to Computability (7.6)  
 Recursively Defined Sequences (8.1)  
 Solving Recurrence Relations by Iteration (8.2)  
 Second – Order Linear Homogeneous Recurrence Relations with  
 Constant Coefficients (8.3)  
 Readings: Chapter 8 (pages 457 – 509)
- Week 12: General Recursive Definitions (8.4)  
 Relations on Sets (10.1)  
 Reflexivity, Symmetry, and Transitivity (10.2)  
 Equivalence Relations (10.3)  
 Readings: Chapter 10 (pages 571 – 648)
- Week 13: Partial Order Relations (10.5)  
 Graphs: an Introduction (11.1)  
 Paths and Circuits (11.2)  
 Matrix Representations of graphs (11.3)  
 Isomorphism of Graphs (11.4)  
 Readings: Chapter 11 (pages 602 – 692)
- Week 14: Isomorphism of Graphs (11.4)  
 Trees (11.5)  
 Spanning Trees (11.6)  
 Special Topics and Problems  
 Readings: Review all previous readings for the Final Exam  
 Final Exam Review  
 Interested Computer Science Majors should read Chapter 9 (pages 510 – 570 ) and  
 Chapter 12 (pages 734 – 775)
- Week 15: Final Exam (Cumulative)