

Montgomery County Community College  
 MAT 125  
 Discrete Mathematics  
 3-3-0

**COURSE DESCRIPTION:**

A course in discrete mathematics with special emphasis on computer science applications. Topics include sets, number systems, the nature of proof, formal logic, functions and relations, combinatorics, recurrence relations, trees and Boolean algebra.

**REQUISITE(S):***Previous Course Requirements*

- \* CIS 111 Computer Science I: Programming and Concepts with a minimum grade of "C"
- \* MAT 100 Intermediate Algebra with a minimum grade of "C"

*Concurrent Course Requirements*

None

**COURSE COMMENTS**

- \* Quantitative Reasoning, Algebra, and Statistics Accuplacer Test Score of 251 or higher or an Advanced Algebra and Functions Accuplacer Test Score of 237-275.

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Form truth tables to determine if two statements are logically equivalent.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
2. Determine if an argument is valid or invalid.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
3. Build a logic circuit given a desired output table.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
4. Negate sentences in simplified English form.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
5. Convert base 10 numbers to base 2 and base 16.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
6. Add in base 2 or base 16.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
7. Write a given sequence both recursively and explicitly where possible.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
8. Solve a recursive definition by iteration.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
9. Prove appropriate theorems using Mathematical Induction.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
10. Use symbols connected with set notation appropriately.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
11. Prove theorems involving sets with both an element proof and an algebraic proof.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
12. Use the addition and multiplication rules in counting problems.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
13. Distinguish between a permutation and a combination problem.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
14. Expand a binomial using the Binomial Theorem.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
15. Define a function and determine its domain and range.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
16. Determine the language accepted by a finite state automaton.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
17. Find both an Euler and a Hamiltonian circuit in a graph where possible.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
18. Write a graph in matrix form.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
19. Redraw a graph to demonstrate its planarity.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
20. Form binary search trees to store information.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects
21. Find minimum spanning trees.	Lectures Small Group Discussions and/or Projects The Use of TI 84 Graphics Calculator Homework Quizzes Projects	Exams Quizzes Homework Projects

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria.*

#### SEQUENCE OF TOPICS:

1. Logic
2. Logic Circuits; Binary Notation; Predicates and Quantifiers
3. Negation; Quantified Statements
4. Sequences; Mathematical Induction
5. Mathematical Induction; Set Theory
6. Proofs

7. Counting; Probability; Multiplication Rule
8. Addition Rule; Combinations; Binomial Theorem
9. Functions; Recursion
10. Iteration
11. Graphs; Paths and Circuits; Matrices
12. Matrices; Planarity; Trees
13. Huffman Code; Finite-State Automata

#### LEARNING MATERIALS:

Epps, Brooks, Cole. (2011). *Discrete Mathematics with Applications*. Cengage.

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

#### COURSE APPROVAL:

Prepared by: Walter R. Hunter	Date: 5/1998
Revised by: Edwina K. Smith, Professor of Mathematics	Date: 8/2000
Revised by: Edwina K. Smith, Professor of Mathematics	Date: 8/2003
Revised by: Edwina K. Smith, Professor of Mathematics	Date: 1/2004
Revised by: Edwina K. Smith, Professor of Mathematics	Date: 8/2004
VPAA/Provost Compliance Verification: Dr. John C. Flynn, Jr.	Date: 9/11/2009
Revised by: Mark McFadden	Date: 2/1/2013
VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D.	Date: 2/15/2013
Revised by: Marion Graziano/Debbie Dalrymple	Date: 8/2/2017
VPAA/Provost or designee Compliance Verification:	Date: 8/24/2017



*This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.*