

CATALOG INFORMATION

Dept and Nbr: MATH 4

Title: DISCRETE MATH

Full Title: Discrete Mathematics

Last Reviewed: 9/14/2020

| Units   |      | Course Hours per Week |      | Nbr of Weeks | Course Hours Total |       |
|---------|------|-----------------------|------|--------------|--------------------|-------|
| Maximum | 4.00 | Lecture Scheduled     | 4.00 | 17.5         | Lecture Scheduled  | 70.00 |
| Minimum | 4.00 | Lab Scheduled         | 0    | 17.5         | Lab Scheduled      | 0     |
|         |      | Contact DHR           | 0    |              | Contact DHR        | 0     |
|         |      | Contact Total         | 4.00 |              | Contact Total      | 70.00 |
|         |      | Non-contact DHR       | 0    |              | Non-contact DHR    | 0     |

Total Out of Class Hours: 140.00

Total Student Learning Hours: 210.00

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**  
A lower division Discrete Mathematics course including formal logic, Boolean logic, and logic circuits, mathematical induction, introduction to number theory, set theory, principles of combinatorics, functions, relations, recursion, algorithm efficiency, and graph theory.

**Prerequisites/Corequisites:**  
Completion of Math 27 (formerly MATH 57).

**Recommended Preparation:**  
Math 1A.

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: A lower division Discrete Mathematics course including formal logic, Boolean logic, and logic circuits, mathematical induction, introduction to number theory, set theory, principles of combinatorics, functions, relations, recursion, algorithm efficiency, and graph theory. (Grade Only)  
Prerequisites/Corequisites: Completion of Math 27 (formerly MATH 57).  
Recommended: Math 1A.

Limits on Enrollment:

Transfer Credit: CSU;UC. (CAN CSCI26)

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                      |                      |  |            |           |
|----------------------|----------------------|--|------------|-----------|
| <b>AS Degree:</b>    | <b>Area</b>          |  | Effective: | Inactive: |
|                      | B                    | Communication and Analytical Thinking          | Fall 2001  |           |
| <b>CSU GE:</b>       | <b>MC</b>            | Math Competency                                | Fall 1981  |           |
|                      | <b>Transfer Area</b> |  | Effective: | Inactive: |
|                      | B4                   | Math/Quantitative Reasoning                    | Fall 2001  |           |
| <b>IGETC:</b>        | <b>Transfer Area</b> |  | Effective: | Inactive: |
|                      | 2A                   | Mathematical Concepts & Quantitative Reasoning | Fall 2001  |           |
| <b>CSU Transfer:</b> | Transferable         | Effective:                                     | Fall 2001  | Inactive: |
| <b>UC Transfer:</b>  | Transferable         | Effective:                                     | Fall 2001  | Inactive: |

### **CID:**

#### **Certificate/Major Applicable:**

Not Certificate/Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

tudents will be able to :

1. Properly structure mathematical algorithms and proofs.
2. Do proofs by induction.
3. Apply elementary number theory.
4. Be able to apply set theory.
5. Apply combinatorics including use of pigeonhole principle, permutations, combinations, and probability.
6. Apply functions, inverse functions, and finite state automata.
7. Solve recurrence relations.
8. Analyze the efficiency of algorithms.

### **Topics and Scope:**

1. Logic  
Logical form and equivalence, conditional statements, valid and invalid arguments, predicates, quantified statements, and arguments with quantified statements.
2. Elementary number theory.  
Direct proofs, counterexamples, rational numbers, divisibility, floor and ceiling functions, proofs by contradiction, proofs by contraposition, and algorithms.
3. Mathematical Induction  
Sequences, weak and strong induction, well ordering principle,

correctness of algorithms.

algorithms.

correctness of algorithms.

n

rule, inclusion/exclusion, permutations, combinations, and counting of multisets.

## 5. Set Theory

Definitions, binary operations, properties, partitions, power sets, and Boolean algebras.

## 6. Functions

Definition, one-to-one, onto, inverse functions, finite state automata, and composition of functions.

## 7. Recursion

Sequences defined recursively, solving recurrence relations by iteration, and solutions of second-order linear homogeneous recurrence relations with constant coefficients.

## 8. Algorithm Efficiency

Comparison of real valued functions and their graphs, O-notation, and calculations of efficiency.

## 9. Relations

Relations on sets, reflexivity, symmetry, transitivity, and equivalence relations.

## 10. Graph Theory

Definitions, paths and circuits, matrix representations, and trees.

### Assignment:

1. Students will have daily outside readings, problem set assignments from required text(s), or instructor chosen supplementary materials.
2. Instructional methodology may include, but not be limited to, lecture, demonstrations, oral recitation, discussion, supervised practice, independent study, outside project(s), or other assignments.

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems, Quizzes, Exams

Problem solving  
30 - 90%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Skill Demonstrations  
0 - 0%

**Exams:** All forms of formal testing, other than skill performance exams.

Multiple choice, True/false, Matching items, Completion

Exams  
10 - 70%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None

Other Category  
0 - 0%

**Representative Textbooks and Materials:**

- 1. Discrete Mathematics, Second Edition by Susanna S. Epp  
PWS Publishing Company  
ITP, An International Thompson Publishing Company, 1995.
- 2. Discrete Mathematics, Fifth Edition by Richard Johnsonbaugh  
Prentice Hall, 2000.