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| **Contra Costa College** |

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| **Course Outline** |

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| **Department & Number** | MATH-185 | **Number of Weeks** | 18 |
| **Course Title** | Discrete Mathematics  | **Lecture Hours By Term** | 54 |
| **Prerequisite** | MATH-171 *or both* MATH-121 and MATH-135 | **Lab Hours By Term** |  0 |
| **Challenge Policy**  | Satisfactory completion of equivalent course our courses at another institution | **\*Hours By Arrangement** |  0 |
| **Co-requisite** |  | **Units**  |  3 |
| **Challenge Policy**  |   |  |  |
| **Advisory** |  |

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| **\*HOURS BY ARRANGEMENT:** | 0 | Hours per term.  |
|  **ACTIVITIES:** (Please provide a list of the activities students will perform in order to satisfy the HBA requirement): |
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| **COURSE/CATALOG DESCRIPTION** |

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| This course covers fundamental topics for Computer Science, such as logic, proof techniques, sets, introduction to computer programming, basic counting rules, relations, functions and recursion, graphs and probability trees. This course meets the CSU General Education requirement for Area B4-Mathematics/Quantitative Reasoning, and the IGETC for Area 2: Mathematical Concepts and Quantitative Reasoning. Emphasis will be on topics of interest to students of computer science and mathematics. Not repeatable. |

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| **COURSE OBJECTIVES:** |
| At the completion of the course the student will be able to: |

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| 1. Use recursion to analyze algorithms and programs;
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| 1. Write proofs using symbolic logic and Boolean Algebra;
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| 1. Use sets to solve problems in combinatorics and probability theory;
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| 1. Apply matrices to analyze graphs and trees; and
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| 1. Use finite state machines to model computer operations.
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**INTENDED STUDENT LEARNING OUTCOMES:**

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| 1. Students will be able to use the laws of formal logic and the rules of logical inference to analyze the validity of a formal argument.
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| 1. Students will be able to apply proof techniques, including mathematical induction, to prove results from elementary number theory.
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| 1. Students will be able to construct and carry out traversal algorithms on graphs, including binary trees.
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| 1. Students will be able to construct and determine the output of computational structures including logic circuits and deterministic finite automata.
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| 1. Students will be able to carry out recursive algorithms, including the Euclidean Algorithm.
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 **COURSE CONTENT (Lecture):**

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| 1. Formal logic including statements, symbolic representation, tautologies, propositional logic, quantifiers, predicates, and validity, predicate logic, and logic programming;
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| 1. Proofs, recursion, and analysis of algorithms including proof techniques, proof by induction, proof of correctness programming, recursive definitions, recurrence relations, and analysis of algorithms;
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| 1. Sets, combinatorics, probability, and number theory including counting, principle of inclusion and exclusion; Pigeonhole Principle, permutations and combinations, and Binomial Theorem;
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| 1. Relations, functions, and matrices including relations and databases, modular arithmetic;
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| 1. Graphs and trees including graphs and their representations, trees and their representations, decision trees, and Huffman Codes;
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| 1. Graph algorithms including directed graphs and binary relations; Warshall’s algorithm, Euler Path and Hamiltonian Circuit, shortest path and minimal spanning tree, traversal algorithms, and articulation points and computer networks;
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| 1. Boolean Algebra and computer logic including Boolean algebra structure, logic networks, and minimization; and
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| 1. Modeling arithmetic, computation, and languages including algebraic structures, finite-state machines, and formal languages.
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 **COURSE CONTENT (Lab):**

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| **METHODS OF INSTRUCTION:** |
| Lecture and discussion |
| Demonstration and collaboration |
| Daily reading assignments |
| Homework exercises |

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| **INSTRUCTIONAL MATERIALS:** |

**NOTE:** To be UC/CSU transferable, the text must be dated within the last 7 years OR a statement of justification for a text beyond the last 7 years must be included.

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| Textbook Title: | Discrete Mathematics and Its Applications |
| Author: | Kenneth H. Rosen |
| Publisher: | McGraw-Hill |
| Edition/Date: | Seventh Edition / 2012 |
| Textbook Reading Level: |  |
| Justification Statement: | *(For textbook beyond 7 years)* |
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| Lab Manual Title  | (*if applicable*): |
| Author: |  |
| Publisher: |  |
| Edition/Date: |  |

**OUTSIDE OF CLASS WEEKLY ASSIGNMENTS:**

Title 5, section 55002.5 establishes that a range of 48 -54hours of lecture, study, or lab work is required for one unit of credit. For each hour of lecture, students should be required to spend an additional two hours of study outside of class to earn one unit of credit.

* State mandates that sample assignments must be included on the Course Outline of Record.

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|  **Outside of Class Weekly Assignments** | **Hours per week** |

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| Weekly Reading Assignments *(Include detailed assignment below, if applicable)* | 3 |

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| Students are responsible for reading the sections of the textbook corresponding to the week’s lectures. The number of sections covered per week may vary between 2 and 5. For the adopted text listed above, this translates to approximately 20 – 30 pages of reading per week. |

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| Weekly Writing Assignments *(Include detailed assignment below, if applicable)* |  |

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| Weekly Math Problems *(Include detailed assignment below, if applicable)* | 3 - 6 |

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| Students are assigned homework exercises by chapter, and are expected to complete the exercises as the material is covered in lecture. A typical assignment includes approximately 8 problems per section of the text; this translates to a minimum of between 20 – 40 homework exercises per week. Note: 3 – 6 hours per week represents the minimum amount of time a student will spend on homework exercises. |

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| Lab or Software Application Assignments *(Include detailed assignment below, if applicable)* |  |

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| Other Performance Assignments *(Include detailed assignment below, if applicable)* |  |

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**STUDENT EVALUATION**: **(Show percentage breakdown for evaluation instruments)**

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| * Course must require use of critical thinking, college-level concepts & college-level learning skills.
* For degree credit, course requires essay writing unless that requirement would be inappropriate to the course objectives. If writing is inappropriate, there must be a requirement of problem-solving or skills demonstration.
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|  | **%** | Essay (If essay is not included in assessment, explain below.) |
| N/A |
| 25 | **%** | Computation or Non-computational Problem Solving Skills |
|  | **%** | Skills Demonstration |
| 75 | **%** | Objective Examinations |
|  |  | Other (describe) |
|  | **%** |  |

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|  **GRADING POLICY: (Choose LG, P/NP, or SC)** |
|  **X** | **Letter Grade** |  | **Pass / No Pass** |  | **Student Choice** |
| 90% - 100% = A  | 70% and above = Pass | 90% - 100% = A |
| 80% - 89% = B  | Below 70% = No Pass  | 80% - 89% = B |
| 70% - 79% = C  |  | 70% - 79% = C |
| 60% - 69% = D  |  | 60% - 69% = D |
| Below 60% = F  |  | Below 60% = F |
| *or* |
| 70% and above = Pass |
| Below 70% = No Pass |
| **Prepared by:** | Carol Stanton, Mathematics |

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| **Date:**  | Spring 2014 |

*Revised form 01/14*