MATH 0015 - DISCRETE MATHEMATICS

SECTION A

1. Division: Sciences & Mathematics
2. Subject Code: MATH
3. Course Number: 0015
4. Course Title: DISCRETE MATHEMATICS
5. Semester of First Offering: SPRING 2007

SECTION B General Course Information

1.Units: 4.0 **Variable Units:** N/A
2.This Course is: Degree-Applicable Credit - Transferable
3A. Cross-List: **3B. Formerly:**

Course Format and Duration

4. Standard Term Hours per Week		**5. Standard Term Total Semester Hours**	
Lecture/Discussion:	4	Lecture/Discussion:	72
Lab:		Lab:	
Activity:		Activity:	
By Arrangement:		By Arrangement:	
Total Hours per Week:	4	**Total Hours :**	72

6. Minimum hours per week of independent work done outside the class: 8

Course Preparation - (Supplemental form B required)

7a. Prerequisite(s): (Course and/or other preparation/experience that is REQUIRED to be completed previous to enrollment in this course.)

Completion of Math. 30 with a grade of "C" or better

7b. Co-requisite(s): (Courses and/or other preparation that is REQUIRED to be taken concurrently with this course.)

7c. Advisory: (MINIMUM preparation RECOMMENDED in order to be succesful in this course. Also known as "Course Advisory".)

Catalog Description And Other Catalog Information:

8. Repeatability: **Not Repeatable**

Please note: Repeatability does not refer to repeating courses because of substandard grades or a lapse of time since the student took the course. A course may be repeated only if the course content differs each time it is offered and the student who repeats it is gaining an expanded educational experience as stipulated in Title V.

- ☐ Skills or proficiencies are enhanced by supervised repetition and practice within class periods.
- ☐ Active participatory experience in individual study or group assignments is the basic means by which learning objectives are attained.
- ☐ Course content differs each time it is offered.

Explanation for above repeatability selection:

9a. Grading Option: Standard Grade

9b. Catalog Description:

Study of set theory, relations and functions, logic, combinatorics and probability, algorithms, computability, matrix algebra, graph theory, recurrence relations, number theory including modular arithmetic. Various forms of mathematical proof are developed: proof by induction, proof by contradiction.

Course Outline Information

10. Student Performance Objectives: (Performance objectives for all credit courses must indicate that students will learn critical thinking and will be able to apply concepts at college level.Performance objectives must be related to items listed in Section 11.)

1. create mathematical proofs directly, indirectly, and by contradiction;
2. use mathematical induction to create a mathematical proof;
3. create a mathematical proof with truth tables and logical equivalences;
4. translate mathematical statements using universal and existential quantifiers;
5. use sets to organize and quantify data;
6. create an algorithm using pseudocode;
7. evaluate a series;
8. model using permutations and combinations and numerically evaluate appropriate applied problems;
9. model using probabilities, including conditional probabilities;
10. solve counting problems using a generating function;
11. assess that a relation is an equivalence relation;
12. create a graph and a tree to describe the structure of a system;
13. use Boolean algebra to mathematically model electronic circuits;
14. verify functions are one-to-one and onto;
15. use matrices to solve applied problems.

11. Course Content Outline: (Provides a comprehensive, sequential outline of the course content, including all major subject matter and the specific body of knowledge covered.)

I. Predicate Calculus
A. Propositional Equivalences
B. Universal and Existential Quantifiers
II. Proofs
A. Counterexample
B. Direct
C. Indirect
D. Contradiction
E. Mathematical Induction
F. Truth Tables
G. Logical Equivalences
III. Algorithms
A. Complexity
B. Growth
C. The Division Algorithm
D. The Euclidean Algorithm
E. Number Bases
IV. Counting Principles
A. Combinatorics
B. Generating Functions
C. Difference Equations
V. Probability
A. Conditional Probability
B. Independence
C. Expected Value
VI. Relations
A. Equivalence Relation
VII. Graphs and Trees
A. Euler and Hamiltonian Paths
B. Shortest Distance Applications
VIII. Boolean Algebra
A. Logic Gates and Switching Circuits
IX. Matrices
A. Operations
B. Applications
C. Systems of Equations

12. Typical Out-of-Class Assignments: (Credit courses **require** two hours of independent work outside of class for each lecture hour, less lab/activity classes. List type of assignments including library assignments.)

a. Reading Assignments: (Submit at least 2 examples.)
Throughout the course, read assigned topics from text. For example, how to verify a formula by mathematical induction.

Search the library or the internet for applications of the golden ratio and the fibonacci sequence.

b. Writing, Problem Solving or Performance: (Submit at least 2 examples)

Throughout the course, write mathematical proofs. For example, given a function f, prove that the image of the intersection of two sets is a subset of the intersection of the images of those two sets.

Complete homework assignments including exercise sets from the text.

c. Other (Term projects, research papers, porfolios, etc.)

13. Required Materials:

a. All textbooks, resources and other materials used in this course are college level?

- ☑ Yes
- ☐ No

b. Representative college-level textbooks (for degree applicable courses) or other print materials:

Book 1:

Author:	Kenneth Rosen
Title:	Discrete Mathematics and Its Applications
Publisher:	McGraw Hill
Date of Publication:	2003
Edition:	fifth

c. Other materials and/or supplies required of students:

14.Check all Instructional methods used to present course content:

- ☑ Lecture
- ☑ Discussion Semminar
- ☐ Lab
- ☑ Directed Study
- ☐ Activity
- ☐ Distance Education (requires supplemental form)
- ☐ Work Experience
- ☐ Tutoring

Other:

Give detailed examples of teaching methodology that relate to the course performance objectives:
Critical Thinking: The Instructor will use an interactive teaching style to engage the student in developing the techniques of creating a mathematical proof.

Reading: The student will read in the text examples of mathematical proofs in order to be prepared to engage in classroom debate on the validity of the argument posed.

Writing: The student will write mathematical proofs outside of class, then return to class for peer evaluation. These evaluations will then be used to engage the class in debate on the validity of the argument originally written.

15. Methods of Assessing Student Learning
15a. Methods of Evaluation:

☐ Essay Exam	☐ Reports
☑ Objective Exam	☑ Problem Solving Exam
☑ Projects	☐ Skill Demonstration
☑ Class Discussion	☐ Other

15b. (All courses must provide for measurement of student performance in terms of stated student performance objectives, Area 10, and culminate in a formal recorded grade based on uniform standards. Submit at least 2 examples.)

1. Prove that sqr(2) is irrational.

2. In how many ways can 5 computer monitors be chosen so that no more than 2 are defective from a collection of 8 monitors, 3 of which are known to be defective?

SECTION C

1. Program Information:

- ☑ In an approved program
- ☐ Part of a new program
- ☐ Not part of an approved program

2. TOP Code Information

Program Title: Mathematics, General 170100

3. Course SAM Code:

- ☐ A - Apprenticeship Course
- ☐ B - Advanced Occupational
- ☐ C - Clearly Occupational
- ☐ D - Possibly Occupational
- ☑ E - Non-Occupational

4. Faculty Minimum Qualifications/Degrees:

Mathematics

Comments:

SECTION D

General Education Information:

1. College Associate Degree GE Applicability:

Communication & Analytic Thinking

Math Competency

2. CSU GE Applicability:

B-4 Mathematics/Quantitative Reasoning

3. IGETC Applicability:

2: Mathematical Concepts & Quantitative Reasoning

4. CAN :

5. LDTP:

SECTION E

1. Articulation Information: (Required for Transferable Courses Only)

- ☑ CSU Transferable
- ☑ UC Transferable
- ☐ CSU/UC Major Requirement.

If CSU/UC major requirement, list campus and major. (Note: Must be lower division)

2. List at least one community college and its comparable course. If requesting CSU and/or UC transferability also list a CSU/UC campus and comparable lower division course

Laney College, Math 11, Discrete Mathematics
Humboldt State University, Math 253, Discrete Mathematics
San Diego State University, Math 245 Discrete Mathematics
University of California, Riverside, Math 11, Introduction to Discrete Structures

SECTION F

Planning and Resources: Please address the areas below:

1. Evidence of Need or Potential: recommendations of advisory committee, connection to existing or planned degrees/certificates, or regional/national developments, transfer university requirements.

We are changing the prerequisite from Intermediate Algebra to a first semester calculus course. This will better prepare our students for the rigor inherent in the course content.

There is a need to increase the units from 3 to 4 to correspond to the change in the prerequisite. The amount of rigor attributed to the change in prerequisite requires more time.

2. Appropriateness to Mission: connection to basic skills, transfer, career technical education, or lifelong learning; relationship

This course will also well prepare a student who will continue taking courses that rely heavily on proof writing.

3. Place in Program/Department: relationship to student learning outcomes identified by program, connection to general education, or articulation with other institutions.

4. Availability of Faculty and Facilities: minimum qualifications to teach course, special training for instructors, or long-term physical impact of course.

5. Potential Impact on Resources: impact on library, computer support, transportation, equipment, or other needs

SECTION G

1. Maximum Class Size (recommended): 40

2. If recommended class size is not standard, then provide rationale: