

Discrete Mathematics

Credit - $\frac{1}{2}$

Term(s) - 1 Semester

Instructor: Mr. L. Allen

Text: Applied Finite Mathematics – Tomastik, © 1994
Discrete Mathematics – Dossey, Otto, Spence, and Vanden Eynden, © 1987

Prerequisites: Passed Algebra II/Trig-H, A or B in Algebra II-S

Course Description:

Today an increasing proportion of the applications of mathematics involves discrete rather than continuous models. The main reason for this trend is the integration of the computer into more and more of modern society. This course is intended as a one-semester introductory course. It has a strong algorithmic emphasis that serves to unify the material. Algorithms will be presented in English so that knowledge of a particular programming language is not required. Although this course requires few formal mathematical prerequisites, students are assumed to have the math maturity ordinarily obtained by taking at least 3 years of high school mathematics, including problem-solving and algorithmic skills, and the ability to think abstractly. Topics will vary but will be chosen from the following list:

1. Cartesian coordinates and lines	6. Sets, relations, and functions
2. Systems of linear equations and matrices	7. Graphs
3. Sets and counting	8. Trees
4. Probability	9. Matching
5. Introduction to combinatorial problems and techniques	10. Counting techniques

◆ Technology will be used as needed

Course Content:

Chapter 1 – Sets and Linear Modeling
 Chapter 2 – Matrices
 Chapter 6 – Counting Techniques
 Chapter 7 – Probability
 Chapter 3 – Graphs
 Chapter 4 - Trees

Course Format:

The format for Discrete Mathematics will be mainly teacher led lectures with daily homework assignments.

There will be a few hands-on lessons in which students will work on graphing calculators or conduct probability experiments/simulations.

Course Expectations:

- Knowledge of Content
- Comprehension of Content
- Application of Content
- Some Analysis Activities

Grades:

Grades will be determined by points received on quizzes, projects and tests.

Quizzes and projects make up between 30 and 40 percent of the overall grade while tests make up the remaining 60 to 70 percent.

Course Objectives:**STATE GOAL FOR LEARNING SIX****INTRODUCE/DEVELOP/MASTER**

6A.901 Compute possible outcomes using the multiplication principle, permutations, or combinations

6B.902 Evaluate a polynomial function using synthetic substitution and find its zeroes

6B.903 Use synthetic division and apply the remainder and factor theorems

6B.904 Define and apply integral and rational exponents

6B.905 Define and use exponential and natural exponential functions

6B.906 Define and apply logarithms and their laws

6B.907 Define and evaluate determinants

6B.908 Use determinants to solve algebraic problems

STATE GOAL FOR LEARNING EIGHT**INTRODUCE/DEVELOP/MASTER**

8A.903 Determine connectedness, Euler circuits, Euler paths, Hamiltonian cycles of a graph and be able to color a graph

8A.904 Determine if a graph is a tree, and find a spanning tree using various algorithms

8A.909 Solve inequalities in two variables and graph the solution set of a system of inequalities

8A.910 Identify a function and determine the domain, range, and zeroes of a function

8A.911 Perform operations on functions and determine the domains of the resulting functions

8A.912 Find the inverse of a function, if the inverse exists

8A.913 Identify an arithmetic or geometric sequence and find a formula for its nth term

8A.914 Use sequences defined recursively to solve problems

8A.915 Find the sum of the first n terms of arithmetic or geometric series

8A.917 Find or estimate the limit of an infinite sequence

8A.918 Find the sum of an infinite geometric series

8A.919 Represent series using sigma notation

8B.905 Represent graphs, directed graphs, and multi-graphs by using the sets of vertices and edges, adjacency matrix, or adjacency list

8B.920 Find the slope of line equations of parallel and perpendicular lines

8B.921 Find the equation of a linear function

8B.922 Graph a polynomial function and determine an equation for a polynomial graph
8B.923 Write a polynomial function for a given situation and find the max or min value
8C.906 Perform operations on matrices and find the inverse of a matrix
8C.924 Find the sum, difference, or scalar multiples of matrices
8C.925 Find the product of 2 matrices
8C.926 Find the inverse of a 2×2 matrix and solve linear systems using matrices
8C.927 Solve communication network problems using matrices
8D.907 Use linear models to solve problems
8D.908 Solve systems of equations using augmented matrices
8D.928 Solve quadratic equations using different methods
8D.929 Solve polynomial equations by various methods of factoring
8D.930 Solve and graph linear and polynomial inequalities in one variable
8D.931 Solve systems of second-degree equations

STATE GOAL FOR LEARNING NINE

INTRODUCE/DEVELOP/MASTER

9B.932 Find the equations of circles, ellipses, hyperbolas, and parabolas
9D.919 Define trigonometric functions of angles and find values of trig functions
9D.923 Simplify trigonometric expressions and prove identities and identify graphs of a trig function
9D.924 Use trigonometric identities and formulas to solve equations, to find values of functions, and to prove identities
9D.925 Find coterminal angles and reference angles, and determine in which quadrant an angle lies
9D.926 Convert between degrees and radians, and find the number of degrees or radians in a given rotation
9D.933 Translate graphs and determine periodicity and amplitude
9D.934 Find the measure of an angle in either degrees or radians
9D.935 Find the arc length and area of a section of a circle
9D.936 Use the definitions of sine and cosine to find values of these functions and solve trig equations
9D.937 Use reference angles, calculators, and special angles to find values of the sine, cosine, tangent, cotangent, secant, and cosecant functions
9D.938 Find values of inverse trig functions
9D.939 Solve simple trig equations
9D.940 Find equations of different sine and cosine curves and apply these equations
9D.941 Simplify trig expressions and prove identities
9D.942 Use trig to find unknown sides or angles of a right triangle
9D.943 Find the area of a triangle, given the length of two sides and the included angle
9D.944 Use the law of sines to find unknown parts of a triangle
9D.945 Use the law of cosines to find unknown parts of a triangle
9D.946 Use trig to solve navigation and surveying problems
9D.947 Derive and apply addition and subtraction formulas for sine, cosine, and tangent
9D.948 Derive and apply double-angle and half-angle formulas
9D.949 Use identities to solve trig equations

DEVELOP/MASTER

9A.916 Find the distance between any two points and the midpoint of the segment joining them

9D.904 Solve any given triangle using trig laws, including real-world applications of triangles

STATE GOAL FOR LEARNING TEN**DEVELOP/MASTER**

10A.950 Use Venn diagrams to illustrate intersections and unions of sets and use the inclusion-exclusion principle to solve counting problems involving intersections and unions

10B.951 Use the multiplication, addition, and complement principles to solve problems

10B.952 Solve problems involving permutations and combinations

10B.953 Use the binomial theorem and Pascal's triangle

10C.924 Compute probabilities using various counting methods

10C.954 Compute simple probabilities and probabilities involving various counting methods