Math 110 Finite Mathematics
Course Objectives & Description

Department of Mathematics
Morehouse College
Fall 2003

Length of Course:

One semester

Prerequisite:

MAT 100 with a "**C**" or better **(*a "C -" in Math 100 requires repeating Math 100***) or placement by the Mathematics Department.

Text (required):

Finite Mathematics & its Applications, 6th Edition, Goldstein, Schnieder, & Siegel

Course Objective:

This course is designed to provide the non- science/ mathematics/ engineering/ business student a intense foundational introduction to the fundamental concepts in Mathematics. The course continues the introduction the student started in Math 110 to many branches of Mathematics and concentrates on pertinent and concrete examples and applications. After completing the course the student should be able to work basic problem and word problems in logic, set theory, counting methods, probability, and statistics.
The non- science/ mathematics/ engineering/ business student should have mastered and demonstrated the following quantitative skills after completing Math 110:

- the student is able to think logically
- the student is able to reason and recognise patterns and be able to make conjectures
- the student is able to create, read, and interpret graphs, charts, histograms, and diagrams
- the student is able to perform operations on matrices and apply them
- the student is able to perform set - theoretic operations and understand their applicability to surveys
- the student is able to collect, organise, and represent data, and be able to recognise and describe relationships
- the student is able to understand and use the basic measure of central tendency
- the student is able to understand and use the language of probability
- the student is able to compute the probabilities of composite events using the basic rules of probability
- the student is able to understand the significance of statistics and probability in the real world
- the student is able to understand the significance of the connection between logic and sets and their applicability to the real world
- the student is able to understand the significance of the connection between linear algebra and probability and their applicability to the real world
- the student is able to understand the significance of the connection between statistics and probability and their applicability to the real world
- the student is able to understand the concept of approximation, quantities, estimation, error, precision, and accuracy in interpreting the results of such measurements
- the student is able to understand the role of numbers as a logical, predictable system for expressing and relating quantities in analyzing and solving problems in the real world
- the student is able to demonstrate several approaches to basic problem solving and implement those strategies
- the student is able to acquire, organise, and synthesize information and creatively use that information
- the student is able to understand and appreciate the significance of the interconnection between areas of mathematics (especially applied finite mathematics) and their applicability to the real world

Outline of the Course:

I Preliminaries

On the first day of the course, the student will be familiarised with definition of finite mathematics, the basic mathematical symbols, subscripts, superscripts, absolute value notation, and proof notation.

II Applications of Matrices Chapter II, Sections 3 through 6

After completing this section of the course, the student should be familiar with the concepts operations on matrices: addition, subtraction, multiplication, the inverse of a matrix and using matrices to solve input-output problems.

III Set Theory Chapter V, Sections 1 through 3

An introduction to basic set theory. After completing this section of the course, the student should be familiar with the concepts of sets, subsets, set operations, the fundamental principle of counting, Venn Diagrams, cardinality, and the use of such in solving set-theoretic problems. Further, the student will have mastered the use of the previously mentioned material to apply it to the real-world problem of surveying.

IV Logic Chapter XII, Sections 1 through 6

An introduction to basic logic. After completing this section of the course, the student should be familiar with the concepts of logic: conjunction, disjunction conditional, negation, biconditional, syllogisms, and fallacies. He will be able to understand and explain the relation between set theory and logic. Further, the student will have mastered the use of syllogistic arguments, truth tables, and the predicate calculus.

V Elementary Combinatorial Analysis Chapter V, Sections 4 through 8

An introduction to basic counting methodologies. After completing this section of the course, the student should be familiar with permutations, combinations, indirect counting, the Binomial Theorem, multinomial coefficients and partitions, and the fundamental counting principle. Further, the student will have mastered the use of counting methods to solve problems.

VI Probability Chapter VI, Sections 1 through 7

An introduction to basic probability. After completing this section of the course, the student should be familiar with sample spaces, experiments, events, the rules of probability, probability functions, conditional probability, independence or dependence, Tree Diagrams, Bayes' Theorem, odds and the fundamental probability principles. Further, the student will have mastered the use of Pascal's Triangle, as well as the material from this section, to solve problems.

VII Probability & Statistics Chapter VII, Sections 1 through 6

An introduction to basic statistics. After completing this section of the course, the student should be familiar with graphs, histograms, frequency distributions, measures of central tendencies and their uses, measures of dispersion and their uses, the normal and other distributions, expected value, variance, standard deviation, Chebychev inequality, percentiles, and other selected topics in statistics.

VIII Markov Processes Chapter VIII, Sections 1 through 3.

An introduction to elementary applications of sequences of experiments which are Markov processes. After completing this section of the course, the student should be familiar with Markov processes, transition matrices, stochastic matrices, distribution matrices, stability of matrices, and absorbing matrices and states. Further, the student will be able to apply the material from this section to real-world problems.

IX Game Theory Chapter IX, Sections 1 through 3.

An introduction to elementary applications of strategies which in Math is called game theory and in other areas decision science. It is an application of linear algebra, stats, and probability theory and is very interesting. After completing this section of the course, the student should be familiar with games, strategies, mixed games, and optimisation.

X In Depth Application The book & handouts.

An in depth analysis of application using the subjects studied in the previous part of the course. This section changes from semester to semester and is based on a survey of the interests and needs of the students taking the course. It can be, but is not limited to, applications of logic, set theory, counting, probability, linear algebra, statistics, Markov processes, Game Theory, etc. It is a part of the course students from previous semesters report is extremely interesting and useful. After completing this section of the course, the student should be familiar with that which was studied.