WINONA STATE UNIVERSITY

COLLEGE OF SCIENCE AND ENGINEERING

DEPARTMENT OF MATHEMATICS AND STATISTICS

**Course Outline - Mathematics 110**

**Title:** Finite Mathematics

**Number of Credits:** 3

**Catalog Description:** Applications of matrices, linear programming, probability, and the mathematics of finance to real-life problems. This course provides the non-calculus mathematics background necessary for students in business, management, and social sciences.  Meets GOAL 4. Prerequisite: Qualifying score on the mathematics placement exam or MATH 050 - Intermediate Algebra.

**Note:** *Effective Spring 2013* - Applications of matrices, linear programming, probability, the mathematics of finance, and other non-calculus mathematics to real-life problems.  Prerequisite: Qualifying score on the mathematics placement exam or MATH 050 - Intermediate Algebra.

**Possible Textbooks:**

* Finite Mathematics by Abe Miizrahi and Michael Sullivan
* Finite Mathematics by Karl J. Smith

**Topics Covered:** Specific topics will be selected by the instructor. A typical selection might be:

1. Linear equations
   1. Rectangular coordinates and lines
   2. Parallel and intersecting lines
   3. Applications
2. Systems of Linear Equations
   1. Substitution and elimination
   2. Matrix reduction
   3. Matrix algebra, matrix multiplication, inverse of a matrix
   4. Using technology to solve large systems
   5. Applications
3. Linear Programming - a geometric approach
   1. Linear inequalities
   2. Linear Programming problems
4. Finance
   1. Interest
   2. Compound interest
   3. Annuities
   4. Amortization
   5. Applications
5. Counting techniques
   1. Sets
   2. Multiplication principle
   3. Permutations
   4. Combinations
   5. Applications
6. Probability
   1. Sample spaces and probability models
   2. Properties of the probability of an event
   3. Probability based on counting techniques
   4. Conditional probability
   5. Independent events

**Listing of Sections in Departmental Text to be Covered (Name and Author of Text Here):**

**Remarks:**

**Approximate pace of coverage:**

**Method of Instruction:** Determined by the instructor. Typically lecture with class

discussion.

**Evaluation Process:** Determined by the instructor. Typically a combination of during

semester exams and quizzes, homework, group projects, journals, and a final exam.

**Course Requirements:**

* Access to a graphing calculator
* Access to Microsoft EXCEL

**Minnesota Transfer Curriculum:** *The following language should appear on each**instructor’s syllabus for the course:*

**Goal 4 under GEP:** ***Mathematics/Logical Reasoning*** – This is a General Education Program course that satisfies the Mathematics/Logical Reasoning requirement of the Minnesota Transfer Curriculum. The goal of this requirement is to increase students' knowledge about mathematical and logical modes of thinking. This will enable students to appreciate the breadth of applications of mathematics, evaluate arguments, and detect fallacious reasoning. Students will learn to apply mathematics, logic, and/or statistics to help them make decisions in their lives and careers. Minnesota's public higher education systems have agreed that developmental mathematics includes the first three years of a high school mathematics sequence through intermediate algebra.

Students will be able to:

1. Illustrate historical and contemporary applications of mathematics/logical systems.

Students learn to write and solve an appropriate linear system in order to solve specific applied problems. Examples may include economic systems. Students learn to solve systems of linear equations by methods of substitution, elimination, and matrix reduction. Finance is covered including interest, compound interest, annuities, amortization, and their applications.

1. Clearly express mathematical/logical ideas in writing.

Students learn to express mathematical relationships using linear equations, matrices, and equations of mathematical finance. Matrix algebra, matrix multiplication, and the inverse of a matrix are employed to solve these problems, and students are required to explain and intepret their solution and explain why their solution is appropriate.

1. Explain what constitutes a valid mathematical/logical argument (proof).

Students will use mathematical logic to substantiate their conclusions and articulate the process by which they arrived at those conclusions. Aruments will be particular to linear programming (examined by using a geometric approach) and probability (utilized through sample spaces and probability models, properties of the probability of an event, probability based on counting techniques, conditional probability and independent events).

1. Apply higher-order problem-solving and/or modeling strategies.

Math 110 solves linear equations. This includes rectangular coordinates and lines, parallel and intersecting lines, and their applications. Counting techniques are also used such as sets, the multiplication principle, permutations, combinations, and applications.

**MnSCU Learning Outcomes:**

**Last Revised:** Spring 2013 by the Mathematics Subgroup (Double-checked Spring 2016)