Course Description
Matrices, systems of linear equations and inequalities, linear programming using geometric and algebraic methods, set theory, probability, data analysis, and game theory. Prerequisite: two years of high school algebra or Mathematics 105 or 107.

Text
No book required.

Much of the work will be done via handouts worked on in class. However, each member of the class should have a calculator available for work in the classroom. A basic calculator would be sufficient; however, it would be advantageous if it is capable of calculating factorials, permutations, combinations, etc.

Objectives
Upon the completion of this course students will:
• Understand that in “real world” situations there may be many acceptable approaches to solving a specific problem. Likewise, they will learn that there are often multiple acceptable solutions and sometimes no acceptable solution.
• Be able to solve systems of linear equations and inequalities using paper and pencil methods and/or function plotting software and interpret the results.
• Be able to set up spreadsheets and demonstrate their “if..., then...” capabilities.
• Demonstrate the application of matrices to “real world” situations.
• Be able to apply applicable empirical probability processes and compare the results to results obtained by using mathematical probability.

Course Overview and Objectives
The overall scope of the course will of necessity be dependent on the present abilities and previous experience of the participants. The basic goal is to enable participants to use mathematics, when applicable, as a tool for problem solving and decision making and to help them recognize possible methods of solution. The emphasis will be on understanding basic mathematical concepts and applications rather than on mathematical structure. The Curriculum and Evaluation Standards from the National Council of Teachers of Mathematics will serve as a guide for many of the topics and methods addressed in this course. Emphasis will be placed on modeling “real-world” situations using systems of equations and inequalities, data analysis, mathematical and empirical probability, and matrices to describe relationships and the use a variety of methods to solve problems, reach conclusions and interpret results. Students will demonstrate an ability to use paper and pencil methods of solutions for basic work; as topics get more
advanced they will use function plotting software, data analysis software, spreadsheets, etc.
Participant’s progress and understanding will be assessed through the use of quizzes, worksheets, group projects, demonstration of knowledge and/or skills and class discussion.

**Grading**
The final grade for the course will be based for the most part on in-class worksheets or group projects. There may be occasional quizzes to access individual understanding. The instructor will monitor participation in class discussion and group projects as part of the assessment process.

Exercises related to material covered in the session may be presented as take-home worksheets. The purpose of homework is not for a grade, it is to help the student realize what he/she can do and what he/she might need help with. Questions related to the homework will be discussed before the quiz in each session.

Worksheets that are not completed by the end of a session may be taken home. The completed worksheets will be due at the beginning of the next session.

Letter grades will be assigned based mainly on active participation in group work and class discussion.

**Attendance**
Each participant is expected to attend every session. Missing one session is approximately equivalent to missing two consecutive weeks in a traditional 3-hour course. Because of the nature of some of the group projects it is not possible to make up projects missed. In-class worksheets missed due to absence may be made up outside of class time. Quizzes and exams missed due to absence may be made up only if prior arrangements have been made with the instructor or extraordinary circumstances forced missing of the quiz or exam. The final grade for a student who misses two sessions will be lowered one letter grade. If a student misses three or more sessions it is unlikely that he/she will pass the course.

**OVERVIEW OF SESSIONS**
Following is the proposed schedule for each session. It may be necessary to deviate from the schedule based on the needs of the participants and/or time available. Student understanding of material and development of necessary skills is more important than the amount of material covered. For each session after the first there is a possibility of a quiz over material from the previous session.

**Session 1:**
Overview of course and discussion “real world” problems as opposed to contrived problems
Review of basics related to Cartesian coordinate system and linear relations
Introduce concept of functions and related notation and terminology
Session 2:
Review topics from Session 1 and discuss any questions on homework
Review systems of equations on the coordinate system
Discuss various paper-pencil methods to solve systems of linear equations
In-class worksheet or group project

Session 3:
Review topics from Session 2 and discuss any questions on homework.
Introduce concepts of linear programming
Discuss graphs of linear inequalities and systems of linear inequalities as they relate to linear programming solutions
In-class worksheet or group project

Session 4:
Discuss questions over material from first three sessions
Mid-term exam or project
Introduce concept of matrices to represent data and discuss the algebra of matrices

Session 5:
Review topics from Session 4 and discuss any questions on homework
Demo use of spreadsheets or other software with matrices
Discuss real-world applications of matrices
In-class group project

Session 6:
Review topics from Session 5 and discuss any questions on homework
Introduce basics of Set Theory, terminology, notation, Venn diagrams, etc.
Discuss counting principles and use of permutations and combinations

Session 7:
Review topics from Session 6 and discuss any questions on homework
Discuss basics of both mathematical and empirical probability
In-class project using data collection and modeling using empirical probability

Session 8:
Probability Project
Review material from first 7 sessions
Final exam or project