Doane College at Grand Island
MTH 115-7 Finite Mathematics

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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. Please do not purchase a “special” calculator for this course.

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. 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 may 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 on in-class quizzes, group projects, mid-term exam, and final exam. The final examination is meant to access the level of individual understanding. The instructor will reward participation in class discussion and group project work as part of the assessment process.

Exercises related to material covered in the session may occasionally 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**

The 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 (strong) 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 Problem Solving and the use of Sets; introducing the concept of set-building and related notation and terminology.

**Session 2:**
Review topics from Session 1 and discuss any questions. Review systems of logical decision making. In-class quiz or group project.
Session 3:
Review topics from Session 2 and discuss any questions. Introduce concepts of Numeration Systems and Number Theory. In-class quiz or group project.

Session 4:
Discuss questions over material from first three sessions. Mid-term exam or project. Introduce concept of Equations and Inequalities, along with Functions and Graphs.

Session 5:
Review topics from Session 4 and discuss any questions. Introduce concepts of practical Geometry. In-class quiz or group project.

Session 6:
Review topics from Session 5 and discuss any questions. Introduce basics of Mathematical Systems and Matrices, along with Counting Techniques. In-class quiz or group project.

Session 7:
Review topics from Session 6 and discuss any questions. Discuss basics of Probability and Statistics. In-class quiz or project.

Session 8:
Review material from first 7 sessions. Final exam or project. Put Your Money Where Your Math Is. Practical applications of Finite Math in business and finance.