# Math 107–03
# Linear Methods
# MWF 11:00am to 11:50am
# Frazier Jelke Hall FJC

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| Instructor: | Dr. Christopher Seaton |
| Office: | 318 Ohlendorf Hall |
| Office Hours: | MWF 1:00pm to 2:30pm, T 12:15pm to 1:15pm or by appointment |
| Phone: | x3721 |
| E-mail: | seatonc@rhodes.edu |
| Text: | Waner and Costenoble, **Finite Mathematics** (3rd edition) |
| Text Website: | www.FiniteMath.com |

## Course Description:

Linear algebra is a powerful subject with applications to many problems that arise in human endeavors. We will study some methods that have been developed to address these problems and examine some of their theoretical foundations. The problems and examples we will consider come from subjects such as business, economics, and politics. We will use Excel throughout the course.

We will begin with a brief review of (systems of) linear equations. Then, we will learn how to solve linear systems using Gauss-Jordan elimination. We sill discuss matrix algebra with applications to input-output analysis and Markov processes Input-output analysis is used to determine how interdependent producers should behave. Markov processes are used to predict long term values of interdependent quantities that vary probabilistically.

Next, we will talk about linear programming (LP) problems. An LP problem is on in which you seek to maximize a linear function—profit, for example—subject to certain linear constraints, such as budgetary or workforce limitations. You will learn to solve LP problems geometrically, using the simplex method, and by computer.

Integer and 0-1 programming problems, which are closely related to LP problems, are too labor-intensive to solve by hand. We will learn how to solve them using Excel. We will touch briefly on the subject of computational complexity.

We will take a look at game theory, the study of strategic interactions between competing interests. We will explore the connection between game theory and LP problems.

Finally, we will look at the mathematics of finance. Here we study how different forms of interest can affect loans and investments.

## Content:

We will briefly review the material in sections 1.1 through 1.4 of the text, although I will assume that you are familiar with this material. Then, we will cover Chapters 2: Systems of Linear Equations and Matrices, Chapter 3: Matrix Algebra and Applications, Chapter 9: Markov Systems, and Chapter 4: Linear Programming, in that order. Time permitting, we will cover Chapter 5: The Mathematics of Finance.

## Course Prerequisites:
Algebra I, Algebra II, and Geometry.

## Attendance Policy:
I will take attendance.  You are permitted **two** unexcused absences throughout the semester; if you are absent two or fewer times, you will be allowed to skip one problem on the final for which you will receive full credit (one tenth of the test).  An excused absence must be discussed with me **in advance**, and the proper documentation must be made available where appropriate.  If I decide that excessive absences are jeopardizing your ability to pass the course, I will take action as outlined on page 70 of the catalogue.  It is your responsibility to obtain notes and assignments when you are absent.

If you are to be absent for an exam, you must make arrangements with me as early as possible **before** the day of the exam, and you will be expected to document your absence.  Otherwise, you will not be allowed to make up the test.  **In most circumstances, I will not make arrangements for you to make up an exam unless I have been notified one week before the day of the exam.**

## Grading:
Your letter grade for the course will be based on the following scale:

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| A | [93, 100] | B- | [80, 83) | D+ | [67, 70) |
| A- | [90, 93) | C+ | [77, 80) | D | [63, 67) |
| B+ | [87, 90) | C | [73, 77) | D- | [60, 63) |
| B | [83, 87) | C- | [70, 73) | F | [0, 60) |

The total percentage will be computed as follows:

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|---|---|
| Homework: | 15% |
| Written Group Projects: | 15% |
| Exams: | $3 \times 15\%$ |
| Final Exam: | 25% |

## Homework:
At the end of each lecture, I will assign both practice problems for you to test your comprehension and homework problems to be handed in.  The homework from one week is due the following Wednesday.  The homework you hand in must be your own work; you may work on the problems with other students, but they may not aide in the write-up.  I will also occasionally give in-class quizzes or group assignments that will count as homework assignments.

## Written Group Projects:
There will be two projects that consist of longer, more involved applications of the material for groups of 1, 2, or 3 students.  These projects must be typed and will be graded both on content and exposition.

**LATE HOMEWORK WILL NOT BE ACCEPTED.**

**Exams:**

There will be three exams tentatively scheduled for Wed. Sept. 29th, Wed. Nov. 3rd, and Wed., Dec. 1st.

**Final Exam:**

The final exam is scheduled for Saturday, Dec. 11th at 8:30am. It will be a closed-book, closed-notes, cumulative exam.

**Calculators:**

I will allow the use of calculators on the exams, including the final. However, you may not use your calculator to store any formulas or notes. I will require you to show your work on homework amd exams for full credit.

**MatHelp:**

MatHelp is a free problem session run by students in the evenings (Sun. through Thurs. in OH 225; exact times to be determined). It is a place to enhance your understandings of the concepts of the course; however, it is not a place to get answers to your homework.

**Honor Code:**

All students are expected to conduct themselves within the guidelines of the College's Honor Code. Please ask me if you have any questions about what is allowed.

**Students With Disabilities:**

If you have or think you may have a documented disability, please contact me and the Office of Student Disability Services as early in the semester as possible.