

C A M O S U N C O L L E G E
M A T H E M A T I C S D E P A R T M E N T
C O U R S E O U T L I N E

CALENDAR DESCRIPTION

MATH 109 - FINITE MATHEMATICS

This course accompanies Mathematics 108 to provide a sound mathematical background for Business, Biology, and Social Science Students. Topics: Linear Equations, Matrices, Linear Programming, Probability, Markov Chains, Elementary Statistics, and Annuities.

OFFERED:	Winter
CREDIT	4
IN-CLASS WORKLOAD:	5 lecture
OUT-OF-CLASS WORKLOAD:	3 - 6
PREREQUISITES:	Math 115 or assessment

OBJECTIVES:

To provide students with a background in finite mathematics sufficient to meet the mathematical challenges of Business, Biology, and Social Science at the College.

OUTLINE

Howard L. Rolf, *Finite Mathematics*, 4th edition, Saunders, 1999

	<u>Topic</u>	<u>Sections</u>	<u>Suggested Hours</u>
UNIT 1:	Functions and Lines	1.1 - 1.3	3
UNIT 2:	Linear Systems	2.1 - 2.7	13
UNIT3:	Linear Programming	3.1 - 4.6	12
UNIT 4:	Sets and Counting	5.1 - 5.6	7
UNIT 5:	Probability	6.1 - 6.8	12
UNIT 6:	Statistics	7.1 - 7.8	10
UNIT 7:	Mathematics of Finance	8.1 - 8.4	3
	TOTAL HOURS		<u>60</u>

Whenever possible the student's attention should be directed to the applications of each mathematical idea to problems from other fields.

OUTLINE OF OBJECTIVES

UNIT 1 - Functions and Lines. (Review)

Main objective: The student will become reacquainted with functions, and the xy coordinate system, and lines.

Enabling Objectives: The student should be able to : Text References

1. Construct and evaluate simple functions Sec. 1.1
2. Graph lines, find slopes, intercepts, equations of lines.
Determine whether two lines intersect, are parallel, or are perpendicular. Sec. 1.2
3. Apply linear functions as mathematical models Sec. 1.3

UNIT 2 - Linear Systems

Main Objectives: The student will be solve systems of linear equations by Gauss-Jordan elimination and by using inverse matrices.

Enabling Objectives: The student should be able to:

1. Solve linear systems by substitution and elimination. Sec. 2.1
2. Construct an augmented matrix for a linear system of equations and carry out row operations. Sec. 2.2
3. Solve systems of linear equations by Gauss-Jordan elimination. Sec. 2.3
4. Find the sum or difference of two matrices. Sec. 2.4
5. Find the of product two matrices. Sec. 2.5
6. Find the inverse of a square matrix. Sec. 2.6
7. Leontief Applications. (OPTIONAL) Sec. 2.7

UNIT 3 - Linear Programming

Main objective: The student will be able to solve linear programming problems graphically and by the simplex method.

Enabling objectives: The student should be able to:		Text References
1.	Graph linear inequalities.	Sec. 3.1
2.	Graph systems of linear inequalities.	Sec. 3.2
3.	Solve linear programming problems graphically.	Sec. 3.3
4.	Set up LP problems with more than two variables.	Sec. 3.4
5.	Recognise standard linear programming problems, introduce slack variables, and set up initial tableaus.	Sec. 4.1
6.	Solve standard linear programming problems using the Simplex Method.	Sec. 4.2
7.	Solve minimum linear programming problems by constructing and solving dual problems.	Sec. 4.3
8.	Solve non-standard problems with mixed constraints.	Sec. 4.4
9.	Understand the cases where unique solutions do not exist.	Sec. 4.5
10.	Understand the correspondence between variable values, corner points, and feasible solutions.	Sec. 4.6

UNIT 4 - Sets and Counting

Main objective: The student will be able to draw Venn diagrams, apply the fundamental counting principle, and compute permutations and combinations.

Enabling objectives: The student should be able to:		Text References
1.	Perform operations on sets.	Sec. 5.1
2.	Draw and use Venn diagrams.	Sec. 5.2
3.	Use the fundamental counting principle to count.	Sec. 5.3
4.	Compute the number of permutations for r out of n objects.	Sec. 5.4
5.	Compute the number of combinations of r out of n objects.	Sec. 5.5
6.	Analyse a counting problem and determine the appropriate techniques.	Sec. 5.6

UNIT 5 - Probability

Main Objective: The student will be able to apply probability in the solution of business, biology, and social science problems.

Enabling Objectives: The student should be able to		Text References
1.	Produce a sample space to represent all possible outcomes of an experiment and assign probabilities to events.	Sec. 6.1
2.	Compute probabilities when events are equally likely.	Sec. 6.2
3.	Apply basic properties to compute probabilities.	Sec. 6.3
4.	Compute conditional probabilities.	Sec. 6.4
5.	Compute probabilities for independent events	Sec. 6.5
6.	Compute conditional probabilities using Bayes's formula	Sec. 6.6
7.	Compute probabilities for Bernoulli experiments.	Sec. 6.7
8.	Determine the transition matrix, compute probability vectors and determine the steady state for a Markov chain.	Sec. 6.8

UNIT 6 - Statistics

Main Objective: The student will be able to determine measures of central tendency and dispersion, and be able to solve problems using the standardised random variable and the normal distribution..

Enabling Objectives: The student should be able to:		Text References
1.	Organize data into frequency tables, histograms and pie charts.	Sec. 7.1
2.	Calculate the mean, median, and mode for numerical data.	Sec. 7.2
3.	Calculate range, variance, and standard deviation.	Sec. 7.3
4.	Determine the random variable, its values and corresponding probabilities.	Sec. 7.4
5.	Calculate the expected value of a random variable	Sec. 7.5
6.	Solve problems involving the normal distribution.	Sec. 7.6
7.	Solve problems involving the binomial distribution.	Sec. 7.7
8.	Calculate confidence intervals for a proportion. (OPTIONAL)	Sec. 7.8

UNIT 7 – Mathematics of Finance

Main Objective: The student will be able to find the present value of an annuity or amortization.

Enabling Objectives: The student should be able to:

1. Solve simple and compound interest problems. Sec. 8.1 and 8.2
2. Find the amount of each periodic payment of an annuity. Sec. 8.3
3. Find the present value of an annuity or amortization. Sec. 8.4

EVALUATION

Fourteen weeks of five hours per week:

In-class presentation and discussion	60
In-class term tests and assignments	5
Review	1
Holidays, reading break	4
	70
A final examination in the examination week.	

GRADING:

To be announced by the instructor.

TEXTS AND REFERENCES

Howard L. Rolf, *Finite Mathematics*, 4th edition, Saunders, 1999.