

Finite Mathematics

This course integrates the mathematics of algebra, geometry, trigonometry, data analysis, and discrete mathematics. Students study four central topics. They focus on developing higher level mathematics skills while they make conjectures, analyze, verify, and integrate the mathematical concepts with applications of daily life.

Content Strand:

Functions and Algebra

Data, Statistics, and Probability

Process Strand:

Problem solving, Reasoning, and Proof

Communication, Connections, and Representation

MAJOR STEMS:

Sequences and Series and Finance

Probability and Statistics

One Variable Statistics and the Normal Curve

Two variable Statistical Analysis and Curve Fitting

FINITE COURSE COMPETENCIES

1. Identifies, extends, and generalizes a variety of patterns.
2. Identifies arithmetic and geometric sequences and finds the n th term; then uses the generalization to find a specific term.
3. Computes partial sums of infinite arithmetic sequences, determines when an infinite geometric series converges, and finds its sum.
4. Analyzes patterns, trends, of distributions in data in a variety of contexts by Determining, using, or analyzing measures of dispersion (standard deviation, variance and percentiles)
5. Analyzes patterns, trends, of distributions in data in a variety of contexts by Determining, using, or analyzing measures of central tendency, dispersion, outliers, quartile values, estimated line of best fit, regression lin, or correlation coefficient to solve problems.
6. Analyzes and interprets measure of dispersion and central tendency for normal distribution and interprets the correlation coefficient in the context of data.
7. Organizes and displays one- and two- variable data using a variety of representations.
8. Uses technology to explore the method of least squares for linear regression.

9. Uses counting techniques to solve problems involving combination or permutations using a variety of strategies.
10. Solves probability problems by applying concepts of counting, random variables, independence/dependence of events, and conditional probabilities.

FINITE COURSE PROCESS COMPETENCIES

1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content.
2. Students will communicate their understanding of mathematics.
3. Students will create and use representations to communicate mathematical Ideas and to solve problems.
4. Students will recognize, explore, and develop mathematical connections.

Functions and Algebra Strand-Stem 1

Sequences and Series and Finance

Topics	Arithmetic and geometric sequences and series; Sums of Infinite geometric series; present and future value of an annuity; depreciation
Competencies	<ol style="list-style-type: none"> 1. Identifies, extends, and generalizes a variety of patterns. 2. Identifies arithmetic and geometric sequences and finds the nth term; then uses the generalization to find a specific term. 3. Computes partial sums of infinite arithmetic sequences, determines when an infinite geometric series converges, and finds its sum.
Knowledge/Skills	<ul style="list-style-type: none"> • Identify arithmetic and geometric sequences and find a formula for their n^{th} term • Find the sum of the first n terms of an arithmetic or geometric sequence • Find the sum of an infinite geometric series if it exists • Represent series using sigma notation • Apply the rules of arithmetic or geometric series to: <ul style="list-style-type: none"> ▪ find compound interest ▪ find the value of an annuity with compound interest over n years ▪ find the monthly payment for a car including interest ▪ use a depreciation table (straight line, double declining balance, and sum of the

	<p>year's digits) to find the value of an item in n years</p> <ul style="list-style-type: none"> ▪ find the monthly payment, total interest, taxes, and total payment for a home over a 20 - 30 year payment plan • Complete a project involving the financing of a home, the purchase of a car, the depreciation of a car, and the value of an annuity in n years
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will communicate their understanding of mathematics. 3. Students will create and use representations to communicate mathematical Ideas and to solve problems. 4. Students will recognize, explore, and develop mathematical connections.

Data, Statistics, and Probability- Stem 2

Probability and Statistics

Topics	Union, intersection, and complement of sets; counting ; permutations and combinations
Competencies	<ol style="list-style-type: none"> 9. Uses counting techniques to solve problems involving combination or permutations using a variety of strategies. 10. Solves probability problems by applying concepts of counting, random variables, independence/dependence of events, and conditional probabilities
Knowledge/Skills	<ul style="list-style-type: none"> • Use Venn diagrams to illustrate intersection and union of sets • Solve counting problems using Venn diagrams • Use simulations to estimate probabilities • Predict the outcome and find the probability of a simple probability experiment • Interpret probabilities in real world situations • Use tree diagrams to demonstrate the sample space of events • Use counting techniques such as permutations , combinations, the fundamental counting principle, and the binomial theorem to solve

	probability problems <ul style="list-style-type: none"> • Solve problems involving circular permutations
Process Skills	2. Students will communicate their understanding of mathematics. 3. Students will create and use representations to communicate mathematical Ideas and to solve problems. 4. Students will recognize, explore, and develop mathematical connections.

Data, Statistics, and Probability- Stem 3

One Variable Statistics and the Normal Curve

Topics	Measures of central tendency; measures of dispersion; standard scores
Competencies	4. Analyzes patterns, trends, of distributions in data in a variety of contexts by determining, using, or analyzing measures of dispersion (standard deviation, variance and percentiles) 5. Analyzes patterns, trends, of distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency, dispersion, outliers, quartile values, estimated line of best fit, regression lin, or correlation coefficient to solve problems. 7. Organizes and displays one- and two- variable data using a variety of representations.
Knowledge/Skills	<ul style="list-style-type: none"> • Compare the mean, median and mode and its representation to the center of a distribution • Analyze data to determine frequency and compute relative frequency • Illustrate the spread of data using a histogram and a frequency polygon • Calculate the measures of dispersion such as deviation, variance, and standard deviation • Apply measures of central tendency, dispersion, and correlation to analyze sets of data • Compare the results of data collection relative to the normal curve • Use a graphing calculator to find the standard deviation of a set of data • Program a graphing calculator or use a computer spreadsheet to calculate z-scores for

	<p>a set of data</p> <ul style="list-style-type: none"> • Understand the differences and similarities between percentile scores and z-scores and their uses • Use z-scores to normalize a set of data • Conduct an experiment in which the data should have a normal distribution, analyze the data, find the standard deviation, and explain the results
Process Skills	<ol style="list-style-type: none"> 2. Students will communicate their understanding of mathematics. 3. Students will create and use representations to communicate mathematical Ideas and to solve problems. 4. Students will recognize, explore, and develop mathematical connections.

Data, Statistics, and Probability- Stem 4

Two variable Statistical Analysis and Curve Fitting

Topics	Best fit line/curve; Least-squares line, exponential regression, and power curves; correlation coefficient
Competencies	<ol style="list-style-type: none"> 6. Analyzes and interprets measure of dispersion and central tendency for normal distribution and interprets the correlation coefficient in the context of data. 7. Organizes and displays one- and two- variable data using a variety of representations. 8. Uses technology to explore the method of least squares for linear regression
Knowledge/Skills	<ul style="list-style-type: none"> • Collect, organize, describe, graph, and interpret data • Use a variety of techniques to analyze data and make predictions • Understand sampling and recognize its role in statistical claims • Linearize data to determine an appropriate regression equation (i.e. linear, quadratic, logarithmic, exponential) • Use regression equations to make predictions • Use technology to collect, record, and analyze data (CBL and a graphing calculator) • Use spreadsheets and the computer for analysis and graphic representation of data

	<ul style="list-style-type: none"> • Design a statistical experiment to study a problem, conduct an experiment, interpret, and communicate outcomes using statistical analysis
<p>Process Skills</p>	<ol style="list-style-type: none"> 2. Students will communicate their understanding of mathematics. 3. Students will create and use representations to communicate mathematical Ideas and to solve problems. 4. Students will recognize, explore, and develop mathematical connections.