

MATH 2010

Linear Algebra

Credit Hours

3 credit hours

Course Description

Topics include vectors, matrices, systems of linear equations, determinants, inverses of matrices, vector spaces.

Prerequisite Course(s)

MATH 1910 (Calculus I)

Text

TBD

Other text or materials required

TBD

Prerequisite Competencies

It is expected that students have mastery of these prerequisite competencies. These topics will not be covered during class time. If assistance is needed regarding these topics, please use the services and materials provided by the Academic Assistance Center and Math Learning Center.

Competencies include but are not limited to:

- Use the definite integral to determine areas between curves, volume of solids and solve work problems
- Evaluate integrals using integration by parts, trig identities and trig substitution
- Evaluate integrals containing rational functions by partial fractions
- Approximate the value of a given integral
- Evaluate improper integrals
- Determine convergence or divergence of an improper integral
- Use integrals to calculate the length of a curve, area or surface of revolution and solve application problems
- Solve differential equations and separable differential equations
- Investigate direction fields and family of functions
- Use differential equations to determine exponential growth and decay
- Use the integral test and estimates of sums to determine convergence of an infinite series
- Use the comparison tests to determine convergence of an infinite series
- Determine if alternating series converge
- Determine if a series is absolutely convergent and use the ratio and root tests
- Find the radius of convergence of the power series
- Find a power series representation for a function
- Expand a function in a Taylor Series
- Investigate applications of Maclaurin and Taylor series

Exit Competencies:

Upon successful completion of this course, a student will demonstrate comprehension and application of the following competencies.

- Use Guassian and Guass-Jordan elimination to solve a linear system
- Use LU factorization to solve linear systems
- Perform matrix operations
- Determine if a matrix is invertible and if so, find its inverse
- Use row reduction and cofactor expansion to find the value of a determinant
- Find angles between vectors and vector lengths in 2- and 3-space
- Determine the orthogonal projection of a vector onto another vector or plane in 2- and 3-space
- Find norms and distances between vectors in Euclidean n-space.
- Determine if two vectors are orthogonal in n-space.
- Determine if a subset of a vector space is a subspace.
- Determine if a set of vectors in a vector space span the space
- Find bases and determine the dimension of finite-dimensional vector spaces
- Find bases for the row, column, and null space of a matrix
- Determine rank and nullity for a matrix
- For a matrix linear transformation, find its standard matrix, domain, and codomain
- Find compositions and inverse of linear transformations
- Understand the geometry of matrix operations on R^3 and R^2
- Use matrix methods to analyze dynamical systems and Markov Chains
- Compute eigenvalues and eigenvectors
- Use similar matrices to diagonalize a matrix
- Compute norms and distances in inner product spaces.
- Determine if two vectors are orthogonal in an inner product space
- Use the best approximation method to find a least-squares fit to paired data
- Identify orthogonal matrices
- Find the kernel and range of a general linear transformation
- Determine if a general linear transformation is one-to-one or onto
- Compute compositions and inverses of general linear transformations