



Mathematics Curriculum Map

Linear Algebra and Advanced Math Topics

Linear Algebra and Advanced Math Topics– At a Glance

NOTE: Mathematical standards are interwoven and should be addressed throughout the year in as many different units and tasks as possible in order to stress the natural connections that exist among mathematical topics.

Linear Algebra and Advanced Math Topics Curriculum Map				
Unit 1 Linear Equations and Matrices	Unit 2 Determinants	Unit 3 Vectors and Vector Spaces	Unit 4 Eigenvalues and Eigenvectors	Unit 5 Linear Transformations and Matrices
MCCD OCC 1 MCCD OCC 2 MCCD OCC 9	MCCD OCC 1 MCCD OCC 2 MCCD OCC 9	MCCD OCC 3 MCCD OCC 4 MCCD OCC 5 MCCD OCC 6 MCCD OCC 7	MCCD OCC 7 MCCD OCC 9	MCCD OCC 8 MCCD OCC 9
<i>Standards are Based on the MCCCCD Official Course Competencies</i>				

MCCCD Official Course Competencies

1. Analyze the existence and character of the solution(s) of a system of linear equations using a row-echelon form of the augmented matrix determinant.
2. Display knowledge of matrix and determinant operations and properties.
3. Use the Euclidean inner product and other inner products to define length and distance for vector spaces.
4. Determine whether a set of vectors is a vector space and whether a subset of vectors is a subspace.
5. Determine a basis for a vector space.
6. Use the Gram-Schmidt process to obtain an orthonormal basis for an inner product space.
7. Determine bases for the row space, column space, null space and possible Eigen-spaces of a matrix A .
8. Determine whether a transformation T is linear and find bases for the kernel and range of T .
9. Use current technology to solve problems in the context of the course.

Unit 1 – Linear Equations and Matrices

Essential Question(s):

- How can matrices be used to help us solve systems of equations?

Topic	MCCCD Core Competencies	Resources
Linear Systems	MCCCD Course Competencies #1 Analyze the existence and character of the solution(s) of a system of linear equations using a row-echelon form of the augmented matrix determinant.	Anton 1.1
Matrix Operations		Anton 1.2,1.3
Properties of Matrices	MCCCD Course Competencies #2 Display knowledge of matrix and determinant operations and properties.	Anton 1.3
Inverse of a Matrix	MCCCD Course Competencies #9 Use current technology to solve problems in the context of the course.	Anton 1.4,1.5
Solutions of Equations using Matrices		Anton 1.2,1.6

Unit 2 - Determinants

Essential Question(s):

- What is the role of a determinant in helping us solve systems of equations?

Topic	MCCCD Core Competencies	Resources
Definition and Properties of the Determinant	<p>MCCCD Course Competencies #1 Analyze the existence and character of the solution(s) of a system of linear equations using a row-echelon form of the augmented matrix determinant.</p> <p>MCCCD Course Competencies #2 Display knowledge of matrix and determinant operations and properties.</p> <p>MCCCD Course Competencies #9 Use current technology to solve problems in the context of the course.</p>	Anton 2.1
Cofactor Expansion and Row Reduction		Anton 2.1,2.2

Unit 3 – Vectors and Vector Spaces

Essential Question(s):

- How can we represent a vector in different coordinate systems?

Topic	MCCCD Core Competencies	Resources
Vectors in R2 and R3	MCCCD Course Competencies #3	Anton 3.1
Vectors in Rn	Use the Euclidean inner product and other inner products to define length and distance for vector spaces.	Anton 3.1,4.1
Vector Spaces and Subspaces	MCCCD Course Competencies #4 Determine whether a set of vectors is a vector space and whether a subset of vectors is a subspace.	Anton 4.2
Linear Independence	MCCCD Course Competencies #5 Determine a basis for a vector space.	Anton 4.3
Basis and Dimension	MCCCD Course Competencies #6 Use the Gram-Schmidt process to obtain an orthonormal basis for an inner product space.	Anton 4.4,4.5,4.6,4.7
Rank of a Matrix	MCCCD Course Competencies #7 Determine bases for the row space, column space, null space and possible Eigen-spaces of a matrix A.	Anton 4.8
Orthonormal Basis in Rn	MCCCD Course Competencies #9 Use current technology to solve problems in the context of the course.	Anton 6.3

Unit 4 – Eigenvalues and Eigenvectors

Essential Question(s):

- What is the role of the eigenvalue and eigenvectors in solving systems and transforming vectors?

Topic	MCCCD Core Competencies	Resources
Characteristic Polynomials and Equations for Square Matrices	MCCCD Course Competencies #7 Determine bases for the row space, column space, null space and possible Eigen-spaces of a matrix A.	Anton 5.1
Determining Eigenvalue and Eigenvectors for a Square Matrix	MCCCD Course Competencies #9 Use current technology to solve problems in the context of the course.	Anton 5.1
Diagonalization of a Matrix		Anton 5.2,7.2

Unit 5 – Linear Transformations and Matrices

Essential Question(s):

- How can we use matrices, and matrix multiplication to perform linear transformation of vectors?

Topic	MCCCD Official Course Competencies	Resources
Properties and Examples of Linear Transformations	MCCCDC Course Competencies #8 Determine whether a transformation T is linear and find bases for the kernel and range of T . MCCCDC Course Competencies #9 Use current technology to solve problems in the context of the course.	Anton 8.1
Kernel and Range of a Linear Transformation		Anton 8.1
Matrix of a Linear Transformation		Anton 8.2