

SALISBURY UNIVERSITY DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE
 SYLLABUS (*Tentative*)
 MATH 490 *Special Topics: Affine Transformations*

Objective: To introduce students to a topic that serves as a bridge from the linear to the nonlinear realm of mathematics. To deepen their understanding of vector spaces, bases, and linear transformations. To enable them to extend to affine transformations important results about linear transformations.

Intended for: Majors in Mathematics.

Prerequisite: A one-semester course in linear algebra (MATH 306) with a grade of C or better.

Text: None (notes will be distributed by the instructor).

	Weeks
<i>Fundamental Aspects of Affine Transformations, 1</i>	3
Constant-functions. Definition of <i>affine transformation</i> . Linear spaces of affine transformations. The algebra of affine transformations.	
<i>Fundamental Aspects, 2: The Finite-Dimensional Setting</i>	1
Bases for various function-spaces. Matrices and transformations. The dimension of the linear space of all affine transformations on a finite-dimensional Euclidean space.	
<i>“Inflating” an Affine Transformation into a Linear One</i>	3
Homogeneous co-ordinates and “standard affine n -space.” The inflation of an affine transformation. The determinant of an affinity. Inflating products, and inverses, of affinities.	
<i>Spectral Theory of Affine Transformations</i>	3
The eigenvalues and spectra of linear and affine transformations, and connections among them. Eigenvectors and eigenpairs.	
<i>Diagonalization</i>	3
Diagonal matrices and transformations. The value of diagonalizability. Diagonalizing linear and affine transformations. Necessary and sufficient conditions for diagonalizability.	
<i>Inner-Product Spaces and Adjoints</i>	1
Definitions of <i>inner product</i> and <i>inner-product space</i> . The adjoint of an affinity. Self-adjointness.	
<i>(Optional topics, as time permits)</i>	
Norms, normed linear spaces, and Lipschitzian affinities. Differentiability. Rigid motions in the plane. Affine combinations.	

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EVALUATION

Portfolio	10 - 30%
Presentations at the Board	30 - 70%
Midterm examination	0 - 15%
Final examination	0 - 15%

**Graduate students will be assigned special projects.