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**Salisbury University Department of Mathematical Sciences**
**MATH 306 : Linear Algebra  
Syllabus (Tentative)**

**Description:** Basic concepts of linear algebra: linear equations and matrices, vector spaces and subspaces, similar matrices, basis and dimension, linear transformations, eigenvalues, determinants, orthogonality, coordinate systems, and applications to geometry. 4 Hours Credit: Meets four hours per week.

**Prerequisites:** C or better in MATH 202.

**Intended Audience:** Mathematics and Computer Science majors, students interested in the dual degree engineering transfer program, and other students seeking continued and demanding study in mathematics beyond calculus.

**Objective:** To develop the theory of vector spaces, linear transformations, matrix algebra, inner products, etc. with an emphasis on both proof and applications.

**Textbooks:** *Linear Algebra and Its Applications*, by David C. Lay; Addison-Wesley Publishing Company, 6th Edition.

| Topic  | Weeks     |
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| <b>Chapter 1: Linear Equations</b>   | 3.5       |
| Systems of linear equations: existence, uniqueness, elementary row operations; Gauss-Jordan row reduction and echelon forms; vector equations; linear independence; linear transformations; spanning sets; applications of linear systems. |           |
| <b>Chapter 2: Matrix Algebra</b>   | 2.5       |
| Matrix operations; inverse of a matrix; characteristics of invertible matrices; subspaces of $\mathbb{R}^n$ .  |           |
| <b>Chapter 3: Determinants</b>   | 1         |
| Introduction to determinants; properties of determinants; Cramer's rule, volume, and linear transformations.   |           |
| <b>Chapter 4: Vector Spaces</b>  | 1.5       |
| Vector spaces and subspaces; null spaces, column spaces, and linear transformations; linearly independent sets and bases; coordinate systems; dimensions of a vector space; rank.  |           |
| <b>Chapter 5: Eigenvalues and Eigenvectors</b>   | 1.5       |
| Eigenvectors and eigenvalues; the characteristic equation; diagonalization, eigenvectors & linear transformations, complex eigenvalues   |           |
| <b>Chapter 6: Orthogonality and Inner Product</b>  | 1.5       |
| Inner product, length, and orthogonality; orthogonal sets; orthogonal projections.   |           |
| <b>Optional Topics, Review, Tests, Group Work</b>  | 2.5       |
| Including, but not restricted to: Eigenvectors and linear transformations; complex eigenvalues; Gram-Schmidt process; least square problems; applications in computer graphics.  |           |
| <b>Total</b>   | <b>14</b> |

**Evaluation**

|                   |          |
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| Tests             | 40 – 50% |
| Homework/Projects | 20 – 40% |
| Final Exam        | 20 – 30% |

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- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.

- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**
- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.