**Math 341, Elementary Linear Algebra**

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**Text**: Linear Algebra, David C.Lay.

**Prerequisites**: Math 253 or the instructor's consent.

**Tentative course outline** :

1. Systems of linear equations: 1.1-1.3;
2. Matrix equations and solutions: 1.4, 1.5;
3. Linear transformations: 1.7-1.9;
4. Matrices, operations, invertible matrices: 2.1-2.3;
5. Determinants, their properties: 3.1-3.3;
6. Vector spaces and subspaces: 4.1, 4.2.
7. Bases and coordinates: 4.3, 4.4.
8. Dimension and rank: 4.5, 4.6.

**Exams**: Usually 3 exams are given: the first midterm on week 5, the second midterm on week 9 and the final exam.

**In order to pass the course the students should be able to perform the following tasks.**

1. Solve systems of linear equations (LS) using row reduction.
2. Convert a LS to the matrix equation and write the solution in the matrix form.
3, Figure if a set of vectors is linear independent.
4. Perform operations on matrices.
5. Relate properties of linear transformations to solutions of LS.
6. Calculate the determinant of a matrix choosing the method most appropriate for the matrix.
7. Check if a given subset of a vector space is its subspace.
8. Figure if a vector lies in the span of several vectors.
9. Find kernels and ranges of linear transformations.
10. Calculate coordinates of a vector with respect to a given basis.
11. Determine dimensions of spans.

**The main idea of the course is that several abstract mathematical notions reduce in one way or another to solving systems of linear equations.**