

**Syllabus.**  
**G111 Algebra 1, Fall 2007.**

**Instructor: Jerzy Weyman, 530 NI, ext. 5513, j.veyman@neu.edu.**

**Office hours: by appointment.**

**Time: Mon, Wed, 5:50-7:20 5 KA**

**Text: We will follow the Notes.**

**Complementary readings.**

S. Lang, Linear Algebra

S. Lang, Algebra

M. Artin, Algebra (for exercises in problem sessions).

This is a standard linear algebra course. We will start with refreshing basic topics: vector spaces, linear maps, Gauss-Jordan elimination, rank of a linear map, basis, dimension. We will also cover the determinants and Cramer rule.

Talking about determinants will give us an opportunity to talk a little about finite groups and their basic properties. We will cover permutation groups, sign and length of the permutation.

Next we will move to multilinear algebra: tensor products, symmetric and alternating products of vector spaces and their universality properties. We will also cover the Jordan canonical form of the endomorphism of a vector space.

We will stress the invariant formulations of the results, i.e. the statements that do not depend on a choice of basis of a vector space.

The remaining part of the course will be devoted to quadratic and alternating forms. We will cover the classification of quadratic forms over the complex and real numbers, Sylvester Theorem, signature, Hermitian forms, Witt theorems, spectral theorems.

Sometimes part of the class will be run as a problem session.

Grading will be based on take-home homework assignments. There will be five or six of them. The problems might be on a difficult side, so do not get discouraged if you cannot do all the problems.