School of Mathematics

Course 113 — Linear Algebra 2007-08
(JF Mathematics
JF Theoretical Physics
JF TSM Mathematics)

Lecturer: Dr. Vladimir Dotsenko

Requirements/prerequisites: None.

Duration: 24 weeks

Number of lectures per week: 3

Assessment:

End-of-year Examination: 3-hour examination

Description:

Further information about the course can be found at `http://www.maths.tcd.ie/~vdots/index113.html`

1. Systems of simultaneous linear equations. Examples.
2. Gauss–Jordan elimination. Fredholm's alternative. Applications.
3. Numerical methods in linear algebra. LU-decomposition.
4. Determinants. Permutation groups.
5. Cramer's rule for systems of linear equations.
6. Coordinate vector space.
7. Fields: rationals, reals, and complex.
8. Abstract vector spaces.
9. Linear independence: criteria.
10. Bases and dimensions.
11. Linear operators. Matrices.
12. Change of basis.
13. Characteristic polynomials.
14. Eigenvalues and eigenvectors. Diagonalisation of a semisimple operator.
15. Cayley–Hamilton theorem. Minimal polynomial of a linear operator.
16. Normal form for a nilpotent operator. Jordan normal form.

17. Bilinear Forms.
18. Orthonormal bases; Gram–Schmidt orthogonalisation procedure.
19. Spectral Theorem for symmetric/Hermitian/normal operators.

October 5, 2007