Determinants, matrices and linear equations (H.T. 1998)

(Prof. I.J.R. Aitchison)

This is a short course of four lectures, for Mathematics II. Some prior knowledge of simple aspects of simultaneous linear equations, matrices and determinants would obviously be an advantage - for example, familiarity with the solution of simultaneous linear equations for two variables, and the use of 2x2 matrices and determinants.

Aim of the course: to provide a simple introduction to the use and properties of matrices and determinants, as specified in the examination syllabus (page 105 of Examination Decrees, 1997, lines 7-9):
"Linearity and its importance in physics. Elementary properties of two- and three-dimensional matrices (addition, multiplication, inverse, determinant) with application to the solution of linear equations. Linear independence".

A slightly expanded version of this syllabus is given on page 20 of the Undergaduate Course Handbook 1997-8 (the "Blue Book"),in the second paragraph under "Mathematics:2".

The approximate lecture-by-lecture schedule will be:-

1. Linear relations in physics. Matrices: addition, subtraction, multiplication.

2. Transpose. Suffix notation. Transpose of product. Examples.

3. Solution of simultaneous linear equations. Determinants. Geometrical interpretation of solution of simultaneous linear equations in two and in three variables. Matrix notation.Linear dependence and independence.

4. Properties of determinants. The inverse matrix. Solution of linear homogeneous equations. Coupled oscillations.

Book Chapter 3 of Boas' book "Mathematical Methods in the Physical Sciences" is adequate.