

## **MATH1002 Linear Algebra**

**3 credit points**

*Assumed knowledge:* HSC Mathematics Extension 1

*Prohibition:* May not be counted with MATH1902 or MATH1012.

*Contact Hours:* 6 per week (Summer School), or 3 per week (Semester 1).

*Assessment:* One 1.5 hour examination and assigned work.

**Vectors.** Scalars and geometric vectors as objects having magnitude and direction. Addition: parallelogram rule and/or triangle rule. Examples: position vectors of points in space, velocities, forces, displacements.

Geometry using vectors. Vectors in the plane and space. Cartesian representation. Polar forms.

Scalar or dot product. Projection. Vector or cross product.

Application to trigonometry.

Applications of vectors to equations of lines and planes. Lines normal to planes in space; planes normal to lines in space; lines normal to lines in the plane.

**Linear Algebra.** Solving systems of linear equations by row reducing augmented matrix. Completely reduced matrices.

Addition and multiplication of matrices. Multiplication by a scalar.

Matrix algebra, identity matrix, inverse matrices. Solving linear equations using inverse matrices. Elementary matrices, finding inverses by row reduction. Expressing a non singular matrix and its inverse as products of elementary matrices. Determinants: expanding by the top row. Rules for evaluating determinants. Effect of elementary row operations. Determinant of: a product of two square matrices; the inverse of a matrix; scalar product of a matrix.

Eigenvectors, eigenvalues. The Leslie population model.

### ***Texts***

C J Durrant. *Lecture Notes for MATH1002/1902: Vectors.* School of Mathematics and Statistics, University of Sydney, 2000.

J Henderson, R Howlett et al. *Lecture Notes for MATH1002/1902: Linear Algebra.* School of Mathematics and Statistics, University of Sydney, 2000.

### ***Reference Book***

H Anton and C Rorres. *Elementary Linear Algebra with Applications.* Wiley, 1987.