

## Essential mathematics 1 (MST124) content listing

Unit 1 <i>Algebra</i>	Numbers, algebraic expressions, factors, multiples and fractions Roots and powers, equations Writing mathematics
Unit 2 <i>Graphs and equations</i>	Plotting graphs: straight-line and parabolic graphs and their equations, solving simultaneous equations and quadratic equations Introduction to Maxima, a computer algebra system, which you'll continue to use in later units
Unit 3 <i>Functions</i>	Introduction to functions, graphing functions, inverse functions, translations and scaling of graphs, exponential and logarithmic functions, inequalities
Unit 4 <i>Trigonometry</i>	Right-angled triangles, trigonometric functions, sine and cosine rules, trigonometric identities
Unit 5 <i>Coordinate geometry and vectors</i>	The distance between two points, midpoints and perpendicular bisectors of a line, equation of a circle, points of intersection, working in three dimensions Vector algebra, vectors in component form, magnitude and direction, scalar product
Unit 6 <i>Differentiation</i>	An introduction to calculus, gradients of graphs, derivatives of simple functions, using differentiation to find rates of change, stationary points, second derivatives
Unit 7 <i>Differentiation methods and integration</i>	Further differentiation, product rule, quotient rule, chain rule, optimisation problems Integration of power functions, reciprocal functions, exponential functions and trigonometric functions, using integration to find rates of change, constant multiple rule, sum rule
Unit 8 <i>Integration methods</i>	Definite integrals, fundamental theorem of calculus, integration by substitution, integration by parts, trigonometric integrals
Unit 9 <i>Matrices</i>	Matrix manipulation and operations, networks, matrix inverses, solving simultaneous equations using matrices
Unit 10 <i>Sequences and series</i>	Arithmetic and geometric sequences, series, sigma notation, the binomial theorem
Unit 11 <i>Taylor polynomials</i> [optional]	Linear Taylor polynomials, quadratic Taylor polynomials, higher order Taylor polynomials Taylor series: adding, subtracting, multiplying, differentiating and integrating Taylor series
Unit 12 <i>Complex numbers</i>	Arithmetic with complex numbers, the complex plane, modulus, argument, polar form De Moivre's formula, Euler's formula, roots of complex numbers, the fundamental theorem of algebra