

Key Stage 5 – A Level Further Maths
Curriculum Map for Students

	Core Pure 1 (AS)	Core Pure 2 (A level)	Mechanics (AS)	Mechanics (A Level)	Decision (AS)	Decision (A level)
Topic Overview	<p>Complex Numbers Argand Diagrams Series Roots of Polynomials Volumes of Revolution Matrices, Transformations Proof, Vectors</p>	<p>Complex Numbers Series Methods in Calculus Volumes of Revolution Polar Coordinates Hyperbolic Functions Methods and Modelling with Differential Equations</p>	<p>Momentum and Impulse Work, energy and power Elastic collisions in one dimension</p>	<p>Momentum and impulse Elastic strings and springs Elastic collisions in two dimensions.</p>	<p>Algorithms Graphs and Networks Algorithms on Graphs Route Inspection Linear Programming Critical Path Analysis</p>	<p>Graphs and Networks Route Inspection The travelling Salesman Problem The Simplex Algorithm Critical Path Analysis</p>
Focus	<p>Multiplying complex numbers, complex conjugation, solving quadratic, cubic and quartic equations. Modulus and argument, Loci and regions in argand diagrams. Sum of natural numbers, sums of squares and cubes. Roots of quadratic, cubic and quartic equations, Expressions relating to roots of polynomials Volume of revolutions around the x and y axis, add/subtract volumes, modelling. Matrix multiplication, determinates, inverting and solving. Reflection, rotation, enlargements, stretching and inverse linear transformations. Proving divisibility results and matrices. Equation of line and plane, scalar product, perpendiculars.</p>	<p>Exponential form, multiplying and dividing, De Moivre's theorem, trig identities, sum of series, nth roots. Methods of differences, higher derivatives, Maclaurin series, compound functions. Improper integrals, mean value, differentiating and integrating inverse trigonometric functions, integrating partial fractions. Revolutions around the x and y axis, parametrically defined curves and modelling. Polar coordinates and equations, sketching, area enclosed and tangents. Hyperbolic functions, inverse functions, identities and equations, differentiating and integrating. First and second order differential equations, using boundary conditions. Modelling first order, simple, damped and forced harmonic motion, coupled first order simultaneous differential equations</p>	<p>Momentum in one direction, Conservation of momentum Work done, kinetic and potential energy, conservation of mechanical energy and the work-energy principle, power. Direct impact and Newton's law of restitution, direct collisions with a smooth plane, Loss of Kinetic energy, Successive direct impacts.</p>	<p>Momentum as a vector. Hooke's law and equilibrium problems, Hooke's law and dynamics problems, elastic energy Problems involving elastic energy. Oblique impact with a fixed surface, successive oblique impacts, oblique impacts of smooth spheres,</p>	<p>Flow charts, bubble sort, quick sort, bin packing algorithm, order of algorithms Modelling with graphs, graph theory, special graphs, graphs using matrices. Kruskal's algorithm, Prim's algorithm, distance matrix, Dijkstra's algorithm Eulerian graphs Using route inspections Linear programming problems, graphical methods, locating optimal points. Modelling a project, dummy activities, early and late events, critical activities, the float of an activity, Gantt charts</p>	<p>The planarity algorithm Floyd's algorithm Networks with more than four odd nodes The classical and practical travelling salesman problem Using minimum spanning tree to work out upper and lower bounds. Nearest neighbour algorithm Formulating linear programming problems, the simplex method, problems requiring integer solutions, two-stage simplex method, the Big-M method. Resource histograms Scheduling diagrams.</p>