Edron Maths Department
Maths Standard Level Core Syllabus

(for further details please refer to individual IB syllabi)

Algebra
Arithmetic sequences and series, geometric sequences and series, sum of arithmetic series, sum of finite and infinite geometric series. Applications of series
Exponentials and logarithms, laws of exponentials, laws of logarithms. Applications of logs and exponentials
The binomial theorem (Pascal's triangle and calculator method) expansion of $(ax+b)^n$

Functions and equations
Concept of function: $f:x \ f(x)$: domain, range, image(value). Composite functions $fog(x)$, identity function, inverse function $f'(x)$ Domain restrictions. The graph of a function, its equation y =f(x).
The graph of a function, it's equation y = f(x) Function graphing skills; use of a graphical calculator to graph a variety of functions. Appropriate use of window, use of zoom, and trace) or equivalent= to locate points to a given accuracy, use of connected and dot (or equivalent) modes as appropriate. Solution of f(x)=0 to a given accuracy..
Transformations of graphs, translations , stretches, reflections in the axes. The graph of f as a reflection in the line y=x of the graph of f
The function f(x)=ax+b, its graph, gradient and intercept (alternate forms of finding y=ax+b)
The reciprocal function y =1/x, x = 0, its graph and self inverse nature.
The quadratic function $y=ax^2+bx+c$, its graph. The form $y=a(x-h)^2+kx+c$, $a\neq0$, vertex (h,k) y intercept (0,c) The form y=a(x-p)(x-q) , x intercepts (0,p) (0,q)
The solution of ax2+bx+c, a≠0. The quadratic formula. Solution of f(x)=g(x), f and g linear or quadratic.
The exponential function $y=a^x$, a>0, its domain and range. The inverse function $y= \log_a x$. Graphs of $y=a^x$ and $y=\log_a x$. Solution of $a^x=b$
The functions $y=e^x$ and y=lnx. Applications to the solutions of equations based on problems of growth and decay.

Circular functions and Trigonometry
The circle. radian measure of angles, length of an arc, area of a sector.
Definition of (cos(x), sin(x)) in terms of the unit circle. The identity $\cos^2x +\sin^2x=1$ Definition of tan(x) as sin(x)/cos(x) Double angle formulae, sin2x=2sinxcosx, $\cos2x=\cos^2x-\sin^2x$ (without proof)
The circular functions y=sinx, y=cosx, and y=tan x, their domains and ranges, their periodic nature, and their graphs. The inverse functions y=arcsin x, y=arccos x and y=arctan x, domains and ranges. Composite functions of the form y=asinb(x+c) solutions of f(x)=k in a given finite region. Solutions of equations leading to quadratic or linear equations in sinx etc. Graphical representation of the above.
Solutions of triangles. The cosine rule $c^2=a^2+b^2-2ab\cos C$ The Sine rule. Area of a triangle as $\frac{1}{2}ab\sin C$

Matrices
Definition of a matrix, the terms, element, row, column and order, using matrices to store data
Algebra of matrices, equity, addition, subtraction, multiplication by a scalar. Multiplication of matrices. Identity and zero matrices
Determinant of a square matrix. (2x2 and 3x3) Inverse of a 2x2 matrix by hand or using the GDC Inverse of a 3x3 matrix using the GDC Conditions for the existence of the inverse of a matrix.
Solution of systems of linear equations with a unique solution using inverse matrices – max of 3x3.

Vector Geometry
Vectors as displacements ina a 2-d plane. Components of a vector, column representation. The sum of two vectors, the zero vector, the inverse vector (**-*v***). Multiplication by a scalar. Magnitude of a vector $\|\boldsymbol{v}\|$. Position vector **OA**=**a**
The scalar product of 2 vectors $\boldsymbol{u.v=u_1v_1+u_2v_2}$ Properties of the scalar product $\boldsymbol{v.w=w.v}$, $\boldsymbol{u.(v.w)=u.v+u.w}$, $\boldsymbol{(kv).w=k(v.w)}$ where k is a scalar. $\boldsymbol{v.v=\|v\|^2}$ Perpendicular and parallel vectors. Angles between two vectors
Representation of a line in the plane as $\boldsymbol{r=p+td}$. Elimination of $\boldsymbol{t}$ to obtain the Cartesian equation of a line as ax + by = g where a,b and g are scalars. Angle between 2 lines. Common point of two lines, parallel lines, coincident lines.

Statistics and Probability
Concepts of population and sample. Discrete data and continuous data. Frequency tables.
Presentation of data. Grouped data. Mid-interval values. Interval width, upper and lower interval boundaries. Frequency histograms.
Measures of central tendency. Sample mean, median, mode, percentiles
Cumulative frequency, cumulative frequency graphs, quartiles, percentiles, box and whisker plots, calculator usage.
Measures of dispersion; range; interquartile range; standard sample deviation s_n.
Sample space, *U;* the event A. The probability of an event A as P(A)=n(A)/n(U) The complementary events A and A´(not A); the relation P(A) +P(A¨)=1
Combined events A∩B and A∪B. The relation P(A∪B)=P(A)+P(B)-P(A∩B) Mutually exclusive events; the relation P(A∩B)=0
Conditional probability; the relation p(A| B)=P(A∩B)/P(B) Independent events; the events P(A| B)=P(A)=P(A| B´)
Use of Venn diagrams, tree diagrams and tables of outcomes to solve problems. Applications.
Random discrete variables and their probability distributions. E(X) for discrete data.
Binomial distribution and its mean
Normal distribution, standardised normal distribution, use of GDC to find probabilities and limits using the reverse process.

Calculus
Informal ideas of limit and convergence Derivation of $x \Rightarrow x^n$, $n \in Q$, $x \Rightarrow \sin x$, $x \Rightarrow \cos x$, $x \Rightarrow e^x$, $x \Rightarrow \ln x$ Differentiation of a sum and a real multiple of the above functions. Chain rule for composite functions.
Applications of the first derivative to tangents, maximum and minimum problems, kinematical problems involving displacement, s velocity, ds=v, and acceleration dv=a
Product and quotient rules, second derivative
Local maximum and minimum points, use of first and second derivative in optimization problems.
Integration, indefinite integral of a polynomial, sinx, cos x, 1/x and ex. The composites of any one of these with the linear function ax + b
Finding C, definite integrals, areas under curves, volumes of rotation about the x axis.
Graphical behaviour of functions, tangents and normals.
Points of inflexions with zero and non-zero gradients.