



Diploma Programme Course Outline

Name of the DP subject	Mathematics Analysis and Approaches	
Level	Higher  Standard 	
YEAR 2		
UNIT	TOPIC/CONCEPT	ASSESSMENT COMPONENTS
Unit 5 CALCULUS	<p>5.9- Kinematics</p> <p>5.12 - HL- Informal understanding of continuity and differentiability of a function at a point.</p> <ul style="list-style-type: none"> - Understanding of limits(convergence and divergence). - Definition of derivative from first principles - Higher Derivatives 	
	<p>5.10- Indefinite integral of x^n, $\sin x$, $\cos x$, $1/x$, e^x</p> <ul style="list-style-type: none"> -The composites of any of these with the linear function $ax+b$ - Integration by inspection or substitution <p>5.13- HL- The evaluation of limits using l'Hopital's or the Maclaurin series.</p> <ul style="list-style-type: none"> - Repeated use of l'Hopital rule. 	

	<p>5.11- Definite integrals including analytical approach</p> <ul style="list-style-type: none"> - Areas of a region enclosed by a curve $y = f(x)$ and the x-axis, where $f(x)$ can be positive or negative, without the use of technology. - Areas between curves <p>5.14- HL- Implicit differentiation</p> <ul style="list-style-type: none"> --Related rates of change - Optimisation problems 	
UNIT	TOPIC/CONCEPT	ASSESSMENT COMPONENTS
<p>Unit 4</p> <p>Statistics and Probability</p> <p>Calculus</p>	<p>4.1- Concepts of population, sample, random sample, discrete and continuous data.</p> <p>5.15- HL- Derivatives of $\tan x$, $\sec x$, $\operatorname{cosec} x$, $\cot x$, a^x, $\log_a x$, $\arcsin x$, $\arccos x$, $\arctan x$</p> <ul style="list-style-type: none"> - Indefinite integrals of the derivatives of any of the above functions. 	<p>Test on Integration</p> <p>Test on limits, implicit differentiated and related rate of change</p>

	<ul style="list-style-type: none"> - The composites of any of these with a linear function. - Use of partial fractions to rearrange the integrand 	
<p>Statistics and Probability</p> <p>Calculus</p>	<p>4.2- Interpretation of outliers</p> <ul style="list-style-type: none"> - Histogram - Cumulative Frequency graphs - (use to find median, quartiles, percentiles, range and interquartile range. - Box and whisker plots - Using box and whisker to compare two distributions using symmetry, median, interquartile range or range. <p>5.16- - Integration by substitution</p> <ul style="list-style-type: none"> - Integration by parts - <i>Repeated integration by parts</i> 	
<p>Statistics and Probability</p> <p>Calculus</p>	<p>4.3 - Measures of dispersion</p> <ul style="list-style-type: none"> - Standard Deviation - Variance - Effect of constant changes on the original data - Using TI-84 to find quartiles. Compare the values of quartiles found by hand and that by technology <p>5.17- HL- Area of the region enclosed by a curve and the y-axis in a given interval</p> <ul style="list-style-type: none"> - Volumes of revolution about the x-axis and y-axis 	

<p>Statistics and Probability</p> <p>Calculus</p>	<p>4.4- Linear correlation of bivariate data</p> <ul style="list-style-type: none"> - Pearson's product-moment correlation coefficient, r - Scatter diagrams, lines of best fit, by eye, passing through the mean point - Use of the equation of the regression line for prediction purposes - Interpret the meaning of the parameters, a and b, in a linear regression $y = ax + b$ <p>5.18- HL- First order differential equations using Euler's method</p> <ul style="list-style-type: none"> - Variable separable - Homogenous differential equation - Solution of differential equations using the integrating factor. 	<p>Worksheet on Statistics</p>
<p>Statistics and Probability</p> <p>Calculus</p>	<p>4.5- Concepts of trial, outcome, equally likely outcomes, relative frequency, sample space (U) and event.</p> <ul style="list-style-type: none"> - The probability of an event A is $P(A) = \frac{n(A)}{n(U)}$ - The complementary events A and A'(not A) - Expected number of occurrences <p>5.19- HL-Maclaurin series to obtain expressions for $e^x, \sin x, \cos x, \ln(1+x), (1 + x)^p$</p> <ul style="list-style-type: none"> - Use of simple substitution, products, integration and differentiation to obtain other series 	

	<ul style="list-style-type: none"> - Maclaurin series developed from differential equations - Maclaurin series developed from differential equations. 	
UNIT	TOPIC/CONCEPT	ASSESSMENT COMPONENTS
Statistics and Probability	<p>4.6- Use of Venn diagrams, tree diagrams, sample space diagrams and tables of outcomes to calculate probabilities</p> <ul style="list-style-type: none"> - Combined events: - $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ - Mutually exclusive events: $P(A \cap B) = 0$ <p>4.13 – HL- Use of Baye’s theorem for a maximum of three events</p>	
Statistics and Probability	<p>4.7- Conditional Probability: $P(A/B) = \frac{P(A \cap B)}{P(B)}$</p> <ul style="list-style-type: none"> - Independent events: $P(A \cap B) = P(A) P(B)$ - Concept of discrete random variables and their probability distributions. - Expected value(mean), for discrete data - Applications <p>4.14- Variance of a discrete random variable</p> <ul style="list-style-type: none"> - Continuous random variables and their probability density functions - Mode and median of continuous random Variables 	<p>Test on Statistics</p> <p>Test on Maclaurin series</p>

Statistics and Probability	<p>4.8- Binomial distribution</p> <ul style="list-style-type: none"> - Mean and variance of the binomial distribution <p>4.14- Mean, variance and standard deviation of both discrete and continuous random variables.</p> <ul style="list-style-type: none"> -The effect of linear transformations of X 	
Statistics and Probability	<p>4.9- Equation of the regression line of x on y.</p> <ul style="list-style-type: none"> - Use of the equation for prediction purposes - Formal definition and use of the formulae: - $P(A/B) = \frac{P(A \cap B)}{P(B)}$ - $P(A/B) = P(A) = P(A/B')$ for independent events <p>4.14- HL- Review of :</p> <ul style="list-style-type: none"> - Variance of a discrete random variable - Continuous random variables and their probability density functions 	<p>Problem Set on Binomial Distribution</p> <p>Problem set on Baye's Theorem and Discrete Random Variables</p>
Statistics and Probability	<p>4.10- Equation of the regression line of x on y.</p> <ul style="list-style-type: none"> - Use of the equation for prediction purposes. 	
UNIT	TOPIC/CONCEPT	ASSESSMENT COMPONENTS

Statistics and Probability	4.11- Formal definition and use of the formulae: $P(A/B) = \frac{P(A \cap B)}{P(B)}$ $P(A/B) = P(A/B')$ for independent events.	
Statistics and Probability	4.12- Standardization of normal variables(z values) - Inverse normal calculations where mean and standard deviation are unknown	Test on Statistics and Probability

All Diploma Programme courses are designed as two-year learning experiences.