DAWOOD PUBLIC SCHOOL
SYLLABUS FOR THE YEAR 2014-15
ADDITIONAL MATHEMATICS (4037)
CLASS X(S, C)

Syllabus Aims

The course should enable students to:

1. Consolidate and extend their elementary mathematical skills, and use these in the context of more advanced techniques.
2. Further develop their knowledge of mathematical concepts and principles, and use this knowledge for problem solving.
3. Appreciate the inter connectedness of mathematical knowledge.
4. Acquire a suitable foundation in mathematics for further study in the subject or in mathematics related subjects.
5. Devise mathematical arguments and use present them precisely and logically.
6. Integrate information technology to enhance the mathematical experience.
7. Develop the confidence to apply their mathematical skills and knowledge in appropriate situations;
8. Develop creativity and perseverance in the approach to problem solving.
9. Derive enjoyment and satisfaction from engaging in mathematical pursuits, and gain an appreciation of beauty, power and usefulness of mathematics.

Assessment Objectives

The examination will test the ability of candidates to:

1. Recall and use manipulative technique.
2. Interpret and use mathematical data, symbols and terminology.
3. Comprehend numerical, algebraic and spatial concepts and relationships.
4. Recognize the appropriate mathematical procedure for a given situation.
5. Formulate problems into mathematical terms and select and apply appropriate techniques of solution.

Examination Structure

There will be one paper, of 2 hours and 30 minutes and of 100 marks, in each of Midterm and Final term Examinations.
Paper will consist of approximately 10-12 questions of various lengths. There will be no choice of question in the paper.

Electronic Calculators

The use of silent electronic calculators is expected in O level Additional Mathematics (4037).Calculators with any of the following facilities are prohibited, unless specifically stated otherwise in the syllabus.
- Graphic display
- Data banks
- Dictionaries
- Language translators
- Retrieval or manipulation of text or formulae
- QWETRY keyboards
- Built–in symbolic algebraic manipulations
- Symbolic differentiation or integration
- Capability of remote communication with other machines.

Mathematical Instruments

Apart from the usual mathematical instruments, candidates may use flexicurves in this examination.

Detailed Syllabus

Knowledge of the content of Ordinary level Syllabus D is assumed. Ordinary level material which is nor repeated in the syllabus below will not be tested directly but it may be required in response to questions on other topics.
Proof of results will not be required unless specifically mentioned in the syllabus.

Syllabus Book

Ho Soo Thong et. Al 2002; *New Additional Mathematic (Revised 2002)* Singapore, Paramount Publisher

Syllabus contents	Pg no	Month	Curriculum objectives	Assessment
1. Functions	196-229	Aug	Understand the terms function, domain, range (image set), one-one function, inverse function and composition of functions. Use the notation $f(x) = \sin x$, $f: x \mapsto \lg x$, $(x > 0)$, $f^{-1}(x)$ and $f^2(x)$ $[=f(f(x))]$. Understand the relationship between $y = f(x)$ and $y = \mid f(x) \mid$, where $f(x)$ may be linear, quadratic or trigonometric. Explain in words why a given function is a function or why it does not have an inverse. Find the inverse of a one-one function and form composite functions. Use sketch graphs to show the relationship between a function and its inverse.	• Assignment will be given.
2. Trigonometry	237-277	Aug/Sep	Know the six trigonometric functions of angles of any magnitude (sine, cosine, tangent, secant, cosecant, cotangent); Understand amplitude and periodicity and the relationship between graphs of e.g. $\sin x$ and $\sin 2x$; Draw and use the graphs of $y = a\sin(bx) + c$, $y = a\cos(bx) + c$, $y = a\tan(bx) + c$, where a, b are positive integers and c is an integer;	• Test will be taken.

Syllabus contents	Pg no.	Month	Curriculum objectives	Assessment
			Use the relationships $\dfrac{\sin A}{\cos A} = \tan A$, $\dfrac{\cos A}{\sin A} = \cot A$, $\sin^2 A + \cos^2 A = 1$, $\sec^2 A = 1 + \tan^2 A$, $\csc^2 A = 1 + \cot^2 A$, and solve simple trigonometric equations involving the six trigonometric functions and the above relationships (not including general solution of trigonometric equations) Prove simple trigonometric identities.	
3. Circular measure	280-292	Sep/Oct	Solve problems involving the arc length and sector area of a circle, including knowledge and use of radian measure.	• Test will be taken.
4. Permutations and combinations	296-311	Oct	Recognize and distinguish between a permutation case and a combination case; Know and use the notation n!, (with 0! = 1), and the expressions for permutations and combinations of n items taken r at a time; Answer simple problems on arrangement and selection (cases with repetition of objects, or with objects arranged in a circle or involving both permutations and combinations, are excluded	• Test will be taken. • Assignment will be given.

Syllabus contents	Pg no.	Month	Curriculum objectives	Assessment
5. Binomial expansions	314-324	Nov	Use the Binomial Theorem for expansion of $(a + b)^n$ for positive integral n; Use the general term $\begin{pmatrix} n \\ r \end{pmatrix} a^{n-r} b^r$, $0 \prec r \leq n$ (Knowledge of the greatest term and properties of the coefficients is not required).	• Assignment will be given.
		Dec		• Midterm Examinations
6. Differentiation and its techniques	330-353	Jan	Understand the idea of a derived function; Use the notations f '(x), $\dfrac{dy}{dx}$. Differentiate products and quotients of functions; Apply differentiation to gradients, tangents and normal's.	• Assignment will be given.
7. Rates of change	355-370	Feb	Apply differentiation to connected rates of change and small increments.	• Assignment will be given.
		Mar		• Final Examinations

Mathematical Notation

The list which follows summarizes the notation used in the CIE's Mathematics examinations

1. Miscellaneous Symbols

$=$	is equal to
$\neq$	is not equal to
$\equiv$	is identical to or is congruent to
$\approx$	is approximately equal to
$\cong$	is isomorphic to
$\propto$	is proportional to
$<$	is less than
$>$	is greater than
$\leq$	is less than or equals to
$\geq$	is greater than or equals to
∞	infinity

2. Operations

$a + b$	a plus b
$a - b$	a minus b
$a \times b$, ab, $a.b$	a multiplied by b
$a \div b$, a/b	a divided by b
$a : b$	the ratio of a to b
$\sqrt{a}$	the positive square root of the real number a
$|a|$	the modulus of the real number a
$n!$	n factorial for $n \in N$ (0! = 1)
$\begin{pmatrix} n \\ r \end{pmatrix}$	the binomial coefficient $\dfrac{n!}{r!(n-r)!}$,for n, rεN, 0≤r≤ n

3. Functions

f	function f
$f(x)$	the value of the function f at x
$f : A \rightarrow B$	f is a function under which each element of set A has an image in set B
$f : x \mapsto y$	the function f maps the element x to the element y
f^{-1}	the inverse of the function f
$g \circ f$, gf	the composite function of f and g which is defined by $(g \circ f)(x)$ or $gf(x) = g(f(x))$
$\dfrac{dy}{dx}$	the derivative of y with respect to x

4. Exponential and Logarithmic Functions

e	base of natural logarithms
e^x,	exp x exponential function of x
$\log_a x$	logarithm to the base a of x
$\ln x$	natural logarithm of x
$\lg x$	logarithm of x to base 10

5. Matrices

M	a matrix M
M^{-1}	the inverse of the square matrix M
M^T	the transpose of the matrix M
$\det M$	the determinant of the square matrix M

Reference Booklist

O Level Additional mathematics 4037

Suggested Books

Backhouse, J K and Houldsworth S P T Essential Pure Mathematics: A First Course
(Longman, 1991) 0582066581

Backhouse, J K and Houldsworth S P T Pure Mathematics: A First Course (Longman, 1985)
0582353866

Bostock L and Chandler S Mathematics: Core Maths for Advanced Level (Nelson Thornes, 2000)   0748755098

Bostock L and Chandler S Mathematics: Pure Mathematics 1 (Nelson Thornes, 1978)
0859500926

Emanuel, R Pure Mathematics 1 (Longman, 2001) 0582405505

Harwood Clarke, L Additional Pure Mathematics (Heinemann, 1980) 0435511874

Talbert, J F Additional Maths Pure and Applied (Longman, 1995) 0582265118