



PINEWOOD – THE AMERICAN INTERNATIONAL SCHOOL OF THESSALONIKI, GREECE

NAME OF COURSE: IB 1 MATHEMATICS SL/ PRE-CALCULUS

GRADE LEVEL: 11 – 12

SCHOOL YEAR: 2011 – 2012

COURSE DESCRIPTION

Mathematics SL is a two-year course in the IB Diploma program. This is a demanding subsidiary level course designed to provide a sound mathematical basis for those students planning to pursue mathematically related subjects. The course focuses on introducing important mathematical concepts through the development of mathematical techniques. The intention is to introduce students to these concepts in a comprehensible and coherent way.

The course consists of 7 compulsory topics. Students must study all the sub-topics in each of the topics in the syllabus. Students are also required to be familiar with the topics listed as presumed knowledge (PK). The topics are:

Algebra; Functions and Equations; Circular Functions and Trigonometry; Matrices; Vectors; Statistics and Probability; and Calculus.

The internal assessment component of this course is the portfolio. This consists of two pieces of work assigned by the teacher and completed by the candidate. The students are expected to undertake work of an independent nature in the areas of mathematical investigation and modeling. The portfolio is internally assessed by the IB teacher and externally moderated by the IB Office.

Mathematics SL IB 1 is a rigorous course that provides a very strong foundation for a calculus course. Throughout the course great emphasis is placed on the use of the graphic calculator, quantitative reasoning and problem solving techniques.

Prerequisites: Algebra II and Geometry with a grade of B–(80%); teacher recommendation

LEARNING OBJECTIVES

Students must be able to:

- read, interpret and solve a given problem using appropriate mathematical terms
- organize and present information and data in tabular, graphical and/or diagrammatic forms
- know and use appropriate notation and terminology

- formulate a mathematical argument and communicate it clearly
- select and use appropriate mathematical strategies and techniques
- demonstrate an understanding of both the significance and the reasonableness of results
- recognize patterns and structures in a variety of situations, and make generalizations
- recognize and demonstrate an understanding of the practical applications of mathematics
- use appropriate technological devices as mathematical tools
- demonstrate an understanding of and the appropriate use of mathematical modeling.

SCOPE AND SEQUENCE *

QUARTER I

Topic 1 – Algebra

Sequences and series

- Types of Sequences
- Arithmetic Sequences
- Geometric Sequences
- Series and Sigma Notation
- Sums of Arithmetic and Geometric Series
- Infinite Geometric Series
- Applications: Compound Interest

Exponents and logarithms

- Laws of exponents and logarithms
- Change of Base and the Natural Base ‘e’
- Solving Logarithmic and Exponential Equations
- Applications

Binomial theorem

- Powers of Binomials
- The General Binomial Expansion

Topic 2 – Functions and relations

- Definitions and representations
- Graphing
- Linear functions; systems and inequalities
- Quadratic functions; quadratic equations and inequalities

QUARTER II

Topic 2 – Functions and relations (ctd)

- Reciprocal functions
- Hybrid functions and continuity
- Absolute functions: domain, range and graph
- Exponential functions $x \mapsto a^x$, $x \mapsto e^x$: domain, range and graph

- Logarithmic function as inverse $x \mapsto \log_a x$, $x \mapsto \ln x$: domain, range and graph
- Composite and inverse functions
- Practical problems (growth, compound interest, decay)
- Transformations of graphs
- Use of GDC to graph a variety of functions (Solution of equations graphically)

Topic 3 – Circular functions and trigonometry

- Definition of $\sin a$, $\cos a$ and $\tan a$; Pythagorean Theorem
- Special angles 30° , 45° , 60° and 90° ; trig values of these
- Solution of triangles
- Laws of sine and cosine
- Areas of triangles

QUARTER III

Topic 3 – Circular functions and trigonometry (ctd)

- Circles; radian measure of angles
- Length of an arc; area of a sector; area of segments
- Trig values of angles $> 90^\circ$ in terms of reference angle
- Double angle formulae, proofs
- Circular functions and their graphs
- Composite functions of the form $f(x) = a \sin[b(x + c)] + d$
- Solution of trigonometric equations
- Use of graphing software

Topic 4 – Matrices

- Definition of a matrix; terminology
- Algebra of matrices: equality; addition; subtraction; multiplication by a scalar
- Multiplication of matrices
- Identity and zero matrices
- Determinant of square matrices
- Calculation of 2×2 and 3×3 determinants
- Inverse of a 2×2 matrix
- Conditions for the existence of the inverse of a matrix
- Solution of systems of linear equations using inverse matrices

QUARTER IV

Topic 5 – Vectors

- Vectors as displacements in the plane and in 3-D; distance between points 3-D
- Components of a vector; column representation
- Sum and difference of vectors; zero vector
- Multiplication by a scalar
- Magnitude of vectors
- Unit vectors; base vectors
- Position vectors
- Scalar product of vectors
- Perpendicular and parallel vectors
- Angle between two vectors

**Note that the order in scope and sequence is subject to change during the school year.*

HOMEWORK POLICY

Frequent homework assignments, based on the day's lecture and assigned out of the main textbook or given in the format of a worksheet. All homework is to be collected and graded. Homework submitted late will lose 10% of the overall score for each day late, and will only be accepted up to two days after the due date.

ASSESSMENT

ASSESSMENT OUTLINE (PINWOOD CREDIT)

The students are evaluated on the following:

- Homework assignments, quizzes and tests.
- Class participation including board work, attentiveness of the student during the lecture, interest and effectiveness of the student in answering and asking questions about the lecture, and general classroom behavior of the student.
- Three to four tests per quarter, testing the student's overall knowledge and comprehension of a specific chapter or a number of sections. Where possible, the questions will be based on past IB questions.
- The Math Department will not be giving any re-take tests, therefore thorough preparation is expected.

GRADING POLICY

TESTS, QUIZZES AND PROJECTS: 60% of the Quarter grade

HOMEWORK: 30% of the Quarter grade

CLASS PARTICIPATION: 10% of the Quarter grade

- 4% PARTICIPATION
- 3% EFFORT
- 3% BEHAVIOR / ATTITUDE

Semester I grade: 40% Quarter I grade + 40% Quarter II grade + 20% Exam I

Semester II grade: 40% Quarter III grade + 40% Quarter IV grade + 20% Exam II

FINAL GRADE: 50% SEMESTER I GRADE + 50% SEMESTER II GRADE

RESOURCES

- Mathematics SL (3rd edition) – IBID press
- Mathematics Standard Level – Smedley and Wiseman, Oxford Press
- Pure Mathematics – Cambridge University Press
- Pure Mathematics – Oxford Press

- Statistics – Cambridge University Press
- Pure Mathematics – The Jacaranda Press
- Pure Mathematics for Advanced Level, 2nd Edition – Heinemann Educational Books
- Calculus with Analytic Geometry - Holt, Rinehart and Winston
- TI-83/4 work booklets
- Math GV software & autograph

ACADEMIC HONESTY

Academic honesty is fundamental to the integrity and operation of our school. Acts of academic dishonesty, including plagiarism (the act of presenting others' words and ideas as one's own without crediting the source), stealing in quizzes and tests, copying work from other students or allowing their own work to be copied, or using notes during a test, are considered serious offences. The consequences of academic dishonesty will be a zero grade on the specific test/assignment, and additional disciplinary action. The said student will be ineligible or removed from the National Honor Society.