

## IB Diploma Course Outline

**Course Title: IB Math Studies**

**School Year: 2016-2017**

**School: Pueblo East High School**

**Instructor: Dora Davis**

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**I. Course description:** IB Math Studies is a two-year program for the standard level of the IB program.

This program caters to students with varied backgrounds and abilities. It is designed to build confidence and encourage an appreciation of mathematics. The course concentrates on mathematics that can be applied to contexts related as far as possible to other subjects being studied, to common real-world occurrences and to topics that relate to home, work, and leisure situations. The goal of this course is to prepare students for the IB Math Studies test after completion of the two-year program. **The expectation of the school is that all students enrolled in IB courses will take those IB exams.**

**II. Aims of the Course:**

The aims of this course are to enable students to:

- enjoy mathematics, and develop an appreciation of the elegance and power of mathematics
- develop an understanding of the principles and nature of mathematics
- communicate clearly and confidently in a variety of contexts
- develop logical, critical and creative thinking, and patience and persistence in problem-solving
- employ and refine their powers of abstraction and generalization
- apply and transfer skills to alternative situations, to other areas of knowledge and to future developments
- appreciate how developments in technology and mathematics have influenced each other
- appreciate the moral, social and ethical implications arising from the work of mathematicians and the applications of mathematics
- appreciate the international dimension in mathematics through an awareness of the universality of mathematics and its multicultural and historical perspectives
- appreciate the contribution of mathematics to other disciplines, and as a particular “area of knowledge” in the TOK course.

**III. Objectives of the Course:**

Problem-solving is central to learning mathematics and involves the acquisition of mathematical skills and concepts in a wide range of situations, including non-routine, open-ended and real-world problems. Having followed a DP mathematical studies SL course, students will be expected to demonstrate the following:

- Knowledge and understanding: recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of familiar and unfamiliar contexts.
- Problem-solving: recall, select and use their knowledge of mathematical skills, results and models in both real and abstract contexts to solve problems.
- Communication and interpretation: transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardized notation.
- Technology: use technology, accurately, appropriately and efficiently both to explore new ideas and to solve problems.

- Reasoning: construct mathematical arguments through use of precise statements, logical deduction and inference, and by the manipulation of mathematical expressions.
- Investigative approaches: investigate unfamiliar situations involving organizing and analyzing information or measurements, drawing conclusions, testing their validity, and considering their scope and limitations.

#### IV. Inclusion of Internationalism and the Learner Profile Attributes:

The aim of all IB programmes is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world. Students in this course will be encouraged to develop the attributes of the IB Learner Profile through various activities including collaboration, inquiry based lessons and reflection. IB Learners strive to be inquirers, knowledgeable, thinkers, communicators, principled, open-minded, caring, risk-takers, balanced, and reflective.

#### V. Connections to Theory of Knowledge:

IB Diploma students are enrolled in a Theory of Knowledge course in which they learn about the four ways in which knowing occurs. Students in the Math Studies Course will spend time exploring how Mathematics connects to the Theory of Knowledge.

#### VI. IB Math Studies Standard Level: Two-Year Sequence

Syllabus Component	Hours of Instruction
<b>Number and Algebra</b>	20
<b>Descriptive Statistics</b>	12
<b>Logic, Sets, and Probability</b>	20
<b>Statistical Applications</b>	17
<b>Geometry and Trigonometry</b>	18
<b>Mathematical Models</b>	20
<b>Introduction to Differential Calculus</b>	18
<b>Project</b> The project is an individual piece of work involving the collection of information or the generation of measurements, and the analysis and evaluation of the information or measurements.	25
<b>Total Teaching</b>	150

**VII. Unit Sequence for this Course:****Math Studies I (Year One)**

<b>Unit or Topic of Study</b>	<b>Duration</b>
<b>Unit 1:</b> Number Properties, Measurement, and Algebraic Laws	Approximately 4 Weeks
<b>Unit 2:</b> Linear, Simultaneous Equations, and Coordinate Geometry	Approximately 4 Weeks
<b>Unit 3:</b> Right Triangles, Pythagorean Theorem, and Trigonometry	Approximately 3 Weeks
<b>Unit 4:</b> Function Introduction and Linear Functions	Approximately 2 Weeks
<b>Mini Project</b>	Approximately 2 Weeks
<b>Unit 5:</b> Quadratic Algebra and Functions	Approximately 4 Weeks
<b>Unit 6:</b> Sets, Venn Diagrams, and One Variable Statistics	Approximately 4 Weeks
<b>Unit 7:</b> Probability	Approximately 3 Weeks
<b>Unit 8:</b> Logic	Approximately 4 Weeks

**Math Studies 2 (Year Two)**

<b>Unit or Topic of Study</b>	<b>Duration</b>
<b>Unit 1:</b> Perimeter, Area, and Volume	Approximately 3 Weeks
<b>Unit 2:</b> Sequences, Series, and Financial Math	Approximately 4 Weeks
<b>Unit 3:</b> Two Variable Statistics	Approximately 4 Weeks
<b>Unit 4:</b> Exponential Functions	Approximately 2 Weeks
<b>Unit 5:</b> Differential Calculus	Approximately 3 Weeks
<b>Unit 6:</b> Unfamiliar Functions	Approximately 3 Weeks
<b>Unit 7:</b> Miscellaneous Problems/Review/Examination Preparation	Approximately 7 Weeks

## VIII. Proposed Process and Expected Assessment:

### Assessment

1. Summative assessment: These are assessments set at the end of the grading period to determine a student's performance in that reporting period. This may include major unit tests, major projects, etc. Questions from unit tests will be pulled from question banks issued by the IB to mirror the external assessment as much as possible. This will account for 60% of the weighted report card grade.
2. Formative assessments: These are a variety of tests and assignments set by the school as part of the teaching and learning process. This may include quizzes, mini projects, or parts of project work. This will account for 40% of the weighted report card grade.
3. Final assessment: These are the assessments determined by the IB for this course (taken from the Subject Guide). It includes both External Assessments and Internal Assessments.

Report card grades will be determined as follows:

#### \*Honors Grading Scale

92%-100%	A
82%-91%	B
72%-81%	C
65%-71%	D
65%<	F

*\* To receive Honors credit (weighted grade), students must complete all course requirements, including internal and external assessments and IB exams. Failure to do so will result in the loss of Honors credit and the student will earn their grade at standard credit.*

**The final IB assessment is weighted as follows:**

#### **External Assessments**

Examinations given at the end of year two and determined by the IB:

Paper 1 and Paper 2

90 marks each

#### **Internal Assessments**

Math Studies Project

20 marks

Students will choose a topic of interest in which they will gather data and/or measurements, perform mathematical procedures to evaluate the data or measurements, make inferences, draw conclusions about the project, and comment on the validity of the project. Students will be given some time to work on the project in class, however, it is expected that the students will also put forth a commitment to the project outside of class. The project will be broken up into smaller components so as to provide students with a structure to manage the heavy work load that is inherent to the Diploma Program. The project will be scored by the teacher using scoring criterion provided by the IB, and it will then be submitted to IB for moderation. The assessment criteria are as follows:

Criterion A: Introduction

Criterion B: Information/measurement

Criterion C: Mathematical processes

Criterion D: Interpretation of results

Criterion E: Validity

Criterion F: Structure and communication

Criterion G: Notation and terminology

### **Weighting**

The externally assessed component, paper 1 and paper 2 (90 marks) accounts for 80% of the weighted score, and the internally assessed component, the project (20 marks) accounts for 20% of the weighted grade. Grade boundaries are then applied, to determine the band (from 1 to 7) to which the student's performance in Math Studies falls. Students receiving a score between 4 and 7 are considered to be passing and are awarded college credit by many universities.

## **IX. Course Texts Books/Resources/Requirements**

Mathematics for the International Student: Mathematical Studies SL (2012) Owen et al.

Mathematical Studies Course Companion (2007) Bedding et al.

It is strongly recommend that students have a TI-84 graphing calculator. We will use these often, and students will need to use these when completing homework. They will also use these calculators on the IB examination. It is crucial for them to be comfortable and familiar with the calculator. While a classroom set is available, calculators cannot be checked out to students for use at home as students only attend class every other day.

## **X. Other Course Outline Components:**

### **Attendance and Tardies:**

Attendance is required. There is a direct correlation between high student achievement and good attendance.

### **Absences:**

Please refer to the East High School Handbook <http://east.pueblacityschools.us/> for school policy regarding absences from school. Extended absences will be reviewed on an individual basis. In the case of an excused absence on a test day, student must take the missing test the day of return to school. Make-up work will only be allowed for excused absences. Students are responsible for any content missed due to absences. An excused absence does not mean students are not required to make up assignments and assessments.

### **Tardies:**

Please refer to the East High School Handbook <http://east.pueblacityschools.us/> for school policy regarding tardies to school and class.

### **Behavior:**

Respect is expected at all times for the instructor, substitute instructor, all students and their ideas. Please refer to the Pueblo City Schools Student Conduct Code for student guidelines. The standard dress code will be enforced in my class room, so students should come to class dressed appropriately.

**CELL PHONES** will not be permitted for use during class time. According to research, “heavier smartphone use has been linked to lower-quality sleep and lower GPAs” and “more than 75 percent of students reported texting while in class, and in-class texting was linked to an average drop of half a letter grade or more.” Therefore, students will not be allowed to be on cellphones during class time unless specifically instructed by the teacher for a learning activity. In an effort to enforce this policy students will be required to place their phones in a caddy at the front of the classroom each day. This will serve as the means for the instructor to take attendance. Students who do not have cellphones will be given a card for their parents to sign confirming that they do not have a cell phone and they will use this card in place of a cell phone for attendance purposes. Parents needing to reach their students in the event of an emergency during class may do so by calling the main office at 549-7222. Thank you for your support of this effort and your cooperation in not texting or phoning your student during class time.

### **Academic Honesty:**

Any kind of cheating will not be tolerated on homework, quizzes, projects, or exams. Cheating will result in a zero for all parties involved and possible removal from the class.

Please see the Academic Honesty Policy for additional information.