**Extended Math Syllabus**

**2021 - 2022**

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Course description and Objectives:

Extended math is the math course for IB students who have completed MYP Algebra 2. This course is more than traditional pre-calculus. We include units on number theory and sets, limits, statistics and probability. These topics are not part of a traditional pre-calculus course. Further, students complete a series of MYP math assessments, which are required for the MYP certificate. Included in these assessments are;

**1) Broad based classroom tests and examinations;**

**2) Mathematical investigations and;**

**3) Real life problems.**

After completing this course, students are prepared to take Mathematics SL or Math Studies SL. Based on what we have learned in the past couple of years students who achieve a grade of B+ or higher in Extended Math are likely to be successful in Mathematics SL. Students who are not capable of achieving this level of performance should strongly consider enrolling in Math Studies SL in the following year

**COURSE OUTLINE**

**IB Objectives**

### There are five required content areas.

### Numbers and Algebra

### Functions

### Geometry and Trig

### Statistics

### Introductory Differential Calculus

All students complete a number of required assessments. For Tenth Grade students these will be used for consideration toward their MYP certificate. These math assessments include the semester exam, a trigonometry unit test, mathematical investigations, and real world problems. All students will complete the assessments as they will be helpful as you prepare to complete the Internal Assessments in either Math Analysis and Approaches SL or Math Applications and Interpretation SL. Additionally, students are expected to be completely familiar and fully versed in the application of topics from prior math courses that are described as “presumed knowledge.”

### Course Resources

### Text: Brown, 2003. Advanced Math: Precalculus with Discrete Mathematics and Data Analysis, Houghton Mifflin.

### Schoology

**PRIOR LEARNING**

#### Numbers and algebra

Routine use of addition, subtraction, multiplication and division using integers, decimals and fractions, including order of operations.

Example: 2(3+4×7)=62.

Simple positive exponents.

Examples: 23=8;(−3)3=−27;(−2)4=16.

Simplification of expressions involving roots (surds or radicals).

Examples: 27+75=83;3×5=15.

Prime numbers and factors, including greatest common factors and least common multiples.

Simple applications of ratio, percentage and proportion.

Definition and elementary treatment of absolute value (modulus), |a|.

Rounding, decimal approximations and significant figures, including appreciation of errors.

Expression of numbers in standard form (scientific notation), that is, a × 10k,1 ≤ a < 10, k∈ℤ.

Concept and notation of sets, elements, universal (reference) set, empty (null) set, complement, subset, equality of sets, disjoint sets. Operations on sets: union and intersection. Commutative, associative and distributive properties. Venn diagrams.

Number systems: natural numbers, ℕ; integers, ℤ; rationals, ℚ, and irrationals; real numbers, ℝ.

Intervals on the real number line using set notation and using inequalities. Expressing the solution set of a linear inequality on the number line and in set notation.

The concept of a relation between the elements of one set and between the elements of one set and those of another set. Mappings of the elements of one set onto or into another, or the same, set. Illustration by means of tables, diagrams and graphs.

Basic manipulation of simple algebraic expressions involving factorization and expansion.

Examples: ab+ac=a(b+c);(a±b)2=a2+b2±2ab;a2−b2=(a−b)(a+b);3x2+5x+2=(3x+2)(x+1);xa−2a+xb−2b=(x−2)(a+b).

Rearrangement, evaluation and combination of simple formulae. Examples from other subject areas, particularly the sciences, should be included.

The linear function y =mx+b and its graph, gradient and y-intercept.

Addition and subtraction of algebraic fractions with denominators of the form ax+b.

Example: 2x3x−1+3x+12x+4.

The properties of order relations: <,≤,>,≥.

Examples: a>b,c>0⇒ac>bc;a>b,c<0⇒ac<bc.

Solution of equations and inequalities in one variable including cases with rational coefficients.

Example: 37−2x5=12(1−x)⇒x=57.

Solution of simultaneous equations in two variables.

#### Geometry

Elementary geometry of the plane including the concepts of dimension for point, line, plane and space. Parallel and perpendicular lines, including m1=m2,and m1m2=−1. Geometry of simple plane figures. The function x↦ax+b:its graph, gradient and y-intercept.

Angle measurement in degrees. Compass directions and bearings. Right-angle trigonometry. Simple applications for solving triangles.

Pythagoras’ theorem and its converse.

The Cartesian plane: ordered pairs (x,y),origin, axes. Mid-point of a line segment and distance between two points in the Cartesian plane.

Simple geometric transformations: translation, reflection, rotation, enlargement. Congruence and similarity, including the concept of scale factor of an enlargement.

The circle, its centre and radius, area and circumference. The terms “arc”, “sector”, “chord”, “tangent” and “segment”.

Perimeter and area of plane figures. Triangles and quadrilaterals, including parallelograms, rhombuses, rectangles, squares, kites and trapeziums (trapezoids); compound shapes.

#### Statistics

Descriptive statistics: collection of raw data, display of data in pictorial and diagrammatic forms (for example, pie charts, pictograms, stem and leaf diagrams, bar graphs and line graphs).

Calculation of simple statistics from discrete data, including mean, median and mode.

Subject Overview:

Extended Math: Mr. Schwieder’s “proposed” subject overview is in the General Information folder in Schoology. Every class starts by circling back to the last class (or further). It is only intended to be a rough guide and as such is subject to change at any time.

**Classroom Conduct:**

I enjoy lively classroom discussions. I will work to ask more provocative questions to provoke more critical thinking, inquiry and speculation. Ideally discussions will be between individual students as much as they are between students and me.

I will ask a **lot** of questions during our discussions. Please work with me to create conversations and discussions. Please don't speak when someone else is speaking. I will manage the conversations and everyone who has a point of view will be given an opportunity to express it. Please don't repeat something that has already been said.

If you aren't paying attention, expect me to call on you. The material is being taught for your benefit and I will use every device at my disposal to ensure that you are involved in the learning. If you are embarrassed because you don't know the answer because you weren't paying attention - then pay attention!! I won't embarrass people who are striving to learn.
**Rules and Regulations:**

In general I will keep the rules to a minimum and will prefer to treat you like young adults. There are five basic guidelines that I will insist on however. These are:

**1) Be safe**

**2) Learn, help others learn, but don’t interfere with their learning**

**3) Help me teach, but don’t interfere with my teaching**

**4) In class, laptops are to be used for math. Cell phones can’t be used at all without permission. They must be in your book bag or purse at all times.**

**5) You are responsible for knowing, understanding and abiding by the IB Academic Honesty Policy as well as the related Code of Conduct policies. They will be enforced!**

If we commit to these guidelines then we will have a successful year.

If class specific rules are required we will develop those through the course of the year.

**Repercussions:**

Behavior that is inconsistent with the rules and regulations is a serious matter. It can endanger you or others, inhibit learning and prevent everyone from accomplishing what we set out to do (learn math!). I will deal with each situation individually if and when it arises.

In general I have an escalating series of steps that I will use to deal with disruptions. I will start with my patented "steely eyed glare". In extreme cases, I may ask a student to grab a chair and have a seat in the hall as a way of allowing me to teach and others to learn. I believe that my students are serious about their education and that these steps are sufficient to deal with most situations that arise. If necessary I may choose to involve a student's parents or an administrator. Behavioral or safety problems would need to be extreme for me to utilize this contingency, but I hold it out there just in case.

Inappropriate use of laptops in class will result in the confiscation of your laptop. They will then be given to the relevant administrator.

Inappropriate use of cell phones will also ultimately result in confiscation and their submission to an administrator. If I ask you to put your cell phone away that means that you must place it in your book bag or purse not in your pocket. I will ask twice. If I need to mention it a third time it will be confiscated. Subsequent incidents will be handled in accordance with the Code of Student Conduct.

I commit to being fair in my assessment of your actions.

I ask that students commit to creating a safe, respectful learning environment.

I ask parents and guardians to commit to supporting me as I make the decisions necessary to create a safe learning environment for the students you are responsible for. I may find it necessary to discuss some situations with parents. Please help me do what is best for all the students in the class.

**Materials and Supplies:**

I will distribute the text, *Advanced Math: Precalculus with Discrete Math and Data Analysis* written by Richard Brown and published by Houghton Mifflin during the first week of school. You will be responsible for the care and return of your text. I know we charge for a lost textbook ($76.95) so take care of it. The book is big and heavy so I won't generally require that you bring it to class. I will assign homework from the text so you will need to crack it open in order to pass the class ☺
Given my emphasis on communication I encourage you to read sections of the text. I have a couple of reasons for doing this. First, the book will supplement the approach I take in class and, for some of you, the approach the book takes may make certain concepts clearer. Secondly, it is important for each of you to learn how to "read" math. The text is written the way a mathematician writes. In order to learn how to communicate mathematically you must learn how to read the subject. Think about the first time you tried to read a science text. This is the same thing - only different.

I am a bit of a Luddite personally so it kills me to say that a calculator is necessary but it is an important tool to learn how to use. It will be particularly helpful as a tool to assist you in completing investigations. An investigation is essentially a search for patterns and a calculator will expedite your research and also provide alternative ways of viewing the output of various problems. I will try to ensure that everyone understands the concepts we are studying before introducing the calculator and its functionality. I don’t believe it serves anyone’s interests to learn how to "plug in numbers". In the quest to create life-long learners I will be challenging you to think first and then properly utilize technology.

You will have access to a Casio and Texas Instruments calculator on your laptop but you cannot take your laptop in to SAT, ACT, IB, or SOL tests so I strongly encourage you to purchase your own calculator. The Casio 9750 Series will do everything you will need to do in Extended Math and costs about $50. Texas Instruments also makes a complete line of graphing calculators. The TI calculators usually have more functionality then the Casio calculators but cost more. The TI-84 is currently priced at $100 at Staples. The additional functionality won't be required in high school math classes in Henrico County (at least not at the moment) but if you intend to take any math classes in college it might be worth the investment to get a TI now and avoid buying 2 calculators. I will support both calculators in class so it won’t matter which calculator you purchase. I will also have TI-84’s available in class for you to use.

I will also expect you to keep a **three ring binder** for your notes and in which you will store your homework, assignments, assessments, quizzes and tests. **I will collect the binders every nine weeks and your class work grade (10%) will be awarded based on the completeness, neatness and organization of the work in the binder.**  If there is a grade for something in the grade book then I will expect it to be in your binder. If it is missing then the grade for completeness will be reduced accordingly.
A general lesson will be structured as:

15 minutes warm-up from homework 2 classes ago

 5-30 minutes questions from last classes homework.

10-20 minutes present current lesson

20-45 minutes work (independently or in small groups)

I will use a mix of media and activities. I will post the PowerPoint notes in Schoology along with other electronic media, but not everything will be electronic so **bring something to take notes in, to class every day, preferably your binder!**

**Grading Policies:**
**I believe (strongly) that the foundation for mathematics is good communication - Mathematics is as much about reading, writing and speaking as your English, Spanish or French classes are.**

**In high school, and particularly in the IB program we have progressed beyond the point where the "right answer" is sufficient. I am interested in your thinking as represented in the work that supports your answers. In fact, for those of you who will be taking the External Assessments the correct answer is only worth partial credit. Explaining and justifying your work (mathematically of course) is required for complete credit.**

**As with any good communication your work needs to be clear, concise, neat, orderly and legible. You wouldn't turn in an essay that was illegible, misspelled, ungrammatical and disorganized and I won't accept math work that is in that condition. I will clearly model my expectations and then hold you accountable to complete work that meets those expectations.**

**Clear communication will allow me to read your work and I will award partial credit for clear, logical thinking that applies the appropriate concepts. The "right answer" unsupported isn't worth as much to me as a well told "story" with a simple mistake somewhere in the middle. If the work is done well and clearly communicated, the mistake will be found and easily corrected when you check your work. The right answer doesn't tell the story, doesn't help anyone understand and doesn't prove that you know what you are doing.**

Grades will be weighted as follows:
Tests: 35%
Quizzes: 30%
Homework: 10%
Classwork: 25%

**Tests** will include unit tests as well as assessments. Corrections must be completed for every test and will earn a separate test grade. Corrections must be completed on the test/quiz correction template that I have posted in the General Information folder in Schoology.

The county has mandated that some tests can be retaken if a failing grade has been earned. In order to earn the right to retake a test you will need to complete the corrections first. You have one week to complete the corrections for the test and to complete the retake. Complete, correct answers will be required on the retake in order to earn credit. The maximum grade that can be earned on retaking the test is 65%.

**Assessments will be categorized as tests and will carry substantial weight during the marking periods in which they are due. IB Assessments that are not in-class tests, including those which count for test grades, may NOT be retaken due to the exploratory and investigative nature of the tasks.**

**Quizzes** are formative assessments which serve the purpose of indicating to you and I how well you are doing. Quizzes are intended to be part of the learning process.

To assist with your learning, students will be allowed to submit corrections to the problems which were completed incorrectly on the original quiz. The corrections must be completed on the test/quiz correction template that I have posted in the General Information folder in Schoology and it must be attached to the front of the original quiz.

1) The corrections will be due within one week of when the quiz was returned to you.
2) All questions on the template must be thoroughly completed. Corrections must show all work and the work must be correct. Incomplete or incorrect work will result in no change in grade.

Corrections can earn up to half of the points that were originally deducted.
Students who earn a grade of less than 65% on a quiz can retake the quiz.

The maximum grade that can be earned on a quiz retake is 80%

1. In order to be allowed to retake a quiz, students must first correct every question for which full marks were not granted using the test/quiz correction template. Once I have reviewed this and returned it, you will be permitted to retake the quiz. The review may take me some time so plan accordingly.
2. Students will have one week from the date that the quiz is returned to complete the corrections and the retake.
3. The retake must be completed outside of normal class time.
4. As the retake will be the exact same quiz, the grading standard will be higher. I will expect the solutions to be **complete and correct**. This means that every step must be shown and must result in the correct answer.

Because quizzes are part of the learning process, students who are planning to retake a quiz can consult with other students or with me to ensure that they know how to correctly complete a problem. I encourage you to do so before you retake a quiz. Please don't waste your time or mine by not properly preparing to retake a quiz.

**Homework** will be assigned after every class (with exceptions for vacations etc.). I will expect you to complete as much of the homework as you need to in order to ensure mastery of the topic covered. I will generally assign only the odd numbered problems so you can check the answers at the back of the text to see if you have developed the correct result.

1. Near the beginning of the class period following the assignment I will check to ensure that you have attempted the homework assigned during the previous class. On the basis of this check I will award a completion grade if there has been an adequate attempt to solve every assigned problem. Incomplete or inadequate efforts will be rewarded accordingly.
2. After checking your work for completion you will have an opportunity to ask about any questions that gave you particular difficulty. I will answer any questions that may have arisen as you attempted to complete the homework assignment.

**Classwork**

Every class will begin with a warm up. The warm up questions will be chosen from the homework questions that were assigned 2 classes prior to this class. Thus you will have had at least three days to complete the problems and you will also have had an opportunity in the previous class to get assistance with any problems that caused particular difficulty. The warm up will have a time limit and will be completed under test-like conditions (no collaboration). The warm ups will be graded for accuracy and each of them will count towards your homework grade. I find that this process rewards students who regularly complete their homework, minimizes homework sharing and ensures that the class starts promptly.

In addition, classwork will be evaluated through the collection of your binder. I will collect binders every 9 weeks and they will be graded for completeness, neatness and organization. Anything that is in the grade book will be expected to be included in the binder in order to receive full credit. I will also expect you to include any notes that you have taken during class. Each student can choose how they will organize their work but then they will be assessed by how well they executed their organizational method.

**Absences and Late Work:**

Students who have an excused absence on a date when an assessment was due will be expected to submit the assessment on the second day to which they return to school. It doesn’t matter if they have my class on that day, they will be expected to submit the completed assessment unless other arrangements have been made in advance. A late assessment will still be graded for MYP purposes although rubrics may specify marking impacts for the submission of late work. Refer to the rubric for each assessment for more specific information.

Students who have an excused absence on a day when a test or quiz was given will be expected to complete the test during the first class period which they attend upon returning from the absence. This means coming back from absences prepared.

Students who have an excused absence and miss the opportunity for a homework grade on a warm up will be given a grade of “absent” and that warm up grade will not count toward the overall homework grade.

The grade book will show a “0” for all missed tests, quizzes, and assessments until the missing work has been completed. Once the missing work is submitted and graded I will update the grade book.

As notes and assignments are posted daily in Schoology, students who miss class for any reason are expected to make up missed work on their own and to be caught up upon returning to class. Students who miss class for any reason will still be expected to complete the warm up given on the day that they return and these warm up grades will count toward the overall homework grade. Likewise, students who miss class for any reason will be expected to write tests and quizzes that may be scheduled for the date upon which they return to class. Grace periods will not be granted unless they have been arranged in advance.