

Calculus 12

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Course Description

This Calculus 12 course follows the BC Provincial curriculum and satisfies the requirements for graduation and entrance into many post-secondary institutions or programs. This course examines the concept of slope in a linear function and then generalizes it to cover the slopes of the graphs. It provides an insight into the changing slopes of the non-linear functions and by introducing the concept of derivatives, which determines the instantaneous rate of change. The second part deals with the Integral Calculus. Integral Calculus is a powerful concept in finding the area under the graph and the volumes of revolution about (X) about (Y) axis.

Big Ideas

The concept of a limit is foundational to calculus.	Differential calculus develops the concept of <u>instantaneous rate of change</u> .	Integral calculus develops the concept of determining a product involving a <u>continuously changing</u> quantity over an interval.	Derivatives and integrals are <u>inversely related</u> .
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Course Materials

- A scientific calculator
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- A binder or lined paper, or a notebook and file
- Microsoft Teams to find handouts, notes and announcements

Evaluation Scheme

Homework	10%
Quizzes	25%
Major Assignment	20%
Unit Test	25%
Final Exam	20%

****Any student caught cheating on homework, assignments, or tests will receive a 0 on the work. A second incident of cheating will result in parents and the principal being contacted****

*****Any student with an unexcused absence on the day of a test or quiz, will receive a mark of zero unless a note is provided from a parent, excusing the student from the missed class*****

Homework

I will check homework at the beginning of each class. I will give you one of the following marks.

0 --- incomplete, copied, or poor effort

0.5 --- complete, but poorly done OR about half of the questions are complete

1 --- a good effort was put into the homework, most of the questions are completed

Quizzes

I will have short quizzes about 1 or 2 times each week. The quizzes are for me to check your understanding, and for you to practice what you have learned.

EXPECTATIONS:

- Adhere to the academic integrity policy
- Contact your teacher when help is needed
- Review feedback from assignments and tests, where applicable
- Work to complete the course in a timely manner
- Communicate respectfully

Cell Phones and Technology in the Classroom

Please hand in your cell phone before the class begins. You are allowed to use it when you told to do so.

I expect to have your full attention during class, just like you expect to have my full attention when talking to me.

Cheating and Plagiarism

Plagiarism and cheating will NOT be tolerated. First offence everyone involved gets zero. Second offence everyone involved will be asked to leave the course. I will often ask you to work together, but you cannot copy each other's work. When working together, you must show all your work and have individual responses to questions.

And most importantly: Own your learning. At the end of the day, **YOU** are the one who controls your success in this course. Stay on top of your work, recognize when you need to ask for help, and give it your all.

RECOMMENDED RESOURCES

- Student looking for an extra resources should look at [Center for Education in Mathematics and Computing](#) from U of Waterloo.
- Also, for review and enrichment there are outstanding Mathematics videos and assignment on the website: [Khan Academy](#)
- For Canadian Contest exam information from the University for Waterloo please see this site: Canadian Challenge Mathematics Exam

Content

Unit	Topic	Content
1	Functions	<ul style="list-style-type: none"> ✧ Review of some of the important topics in pre-calculus 12, such as: <ul style="list-style-type: none"> — Polynomial functions — Rational functions — Transformations — Trigonometry — Exponential functions — Logarithms
2	Limits and Continuity	<ul style="list-style-type: none"> ✧ limits: <ul style="list-style-type: none"> — from table of values, graphically, and algebraically — one-sided versus two-sided — end behaviour — intermediate value theorem
3	Differentiation	<ul style="list-style-type: none"> ✧ differentiation: <ul style="list-style-type: none"> — history — definition of derivative — notation ✧ rate of change: <ul style="list-style-type: none"> — average versus instantaneous

		<ul style="list-style-type: none"> – slope of secant and tangent lines ✧ differentiation rules: – power, product; quotient and chain – transcendental functions: logarithmic, exponential, trigonometric
4	Applications of Derivatives	<ul style="list-style-type: none"> ✧ applications: – relating graph of $f(x)$ to $f'(x)$ and $f''(x)$ – increasing/decreasing, concavity – differentiability, mean value theorem – Newton's method – problems in contextual situations, including related rates and optimization problems
5	Integration	<ul style="list-style-type: none"> ✧ integration: – definition of an integral – notation – definite and indefinite ✧ approximations: – Riemann sum, rectangle approximation method, trapezoidal method ✧ methods of integration: – antiderivatives of functions – substitution – by parts
6	Applications of Integrals	<ul style="list-style-type: none"> ✧ applications: – area under a curve, volume of solids, average value of functions – differential equations

		<ul style="list-style-type: none">— initial value problems— slope fields
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