

MCV4U - Calculus and Vectors

Delivery Model:

- 32 hours synchronous (Zoom) - 16 classes, 2 hours each (Tuesdays & Thursdays)
- 74 hours asynchronous (independent learning) - Moodle, Video lessons, IXL, Desmos, and teacher-assigned work
- Total: 110 hours (Ontario course requirements)

Course Structure Overview:

Unit - Title	Timeline	Focus Topics	Delivery Breakdown
1 - Vector Foundations	Oct. 23 - 31	Representation, magnitude, direction, and components of vectors in 2D/3D	4 hours Zoom 10 hours independent
2 - Vector Operations and 3D Applications	Nov. 5 - 14	Vector addition/subtraction, dot & cross products, equations of lines and planes	6 hours Zoom 12 hours independent
3 - Rate of Change	Nov. 19 - 26	Rate of change, secant vs tangent, slope of curve, introduction to limits	4 hours Zoom 10 hours independent
4 - Limits, Derivatives, and First Principles	Nov. 28 - Dec. 3	Limit definition of derivative, derivative notation, first principles	4 hours Zoom 10 hours independent
5 - Rules of Differentiation & Trig/Exp Derivatives	Dec. 5 - 10	Power, sum, product, quotient, and chain rules; derivatives of sin, cos, and e^x	6 hours Zoom 16 hours independent
6 - Applications of Derivatives	Dec. 10 - 12	Curve sketching, concavity, optimization, motion, real-world modelling	4 hours Zoom 16 hours independent
Review & Evaluation	Dec. 16 - 18	Comprehensive review and final exam	4 hours Zoom 10 hours independent

Assessment Plan

Category	Weight	Timing	Description
Weekly Tests (8)	40%	Thursdays (except first class)	Concept-based tests to reinforce current topics
Participation & Homework	10%	Ongoing	Engagement in Zoom discussions, collaboration, and completion of assigned problem sets
Project 1: Vectors in the Real World	10%	Launch Oct. 31 → Due Nov. 14	Real-world 3D vector modelling (e.g., navigation, intersection, torque) using GeoGebra or manual diagrams
Project 2: Calculus in Action	10%	Launch Dec. 5 → Due Dec. 12	Derivative or optimization-based modelling project (e.g., minimizing cost, maximizing area, rate problems)
Final Exam	30%	Dec. 18	Comprehensive written or hybrid exam covering Vectors and Calculus

Assessment Breakdown by Skill

Category	Description	Weight Distribution
Knowledge & Understanding	Mastery of key concepts, rules and formulas	25%
Thinking & Inquiry	Problem-solving, reasoning, and model creation	25%
Communication	Clarity of written work, diagrams, and explanations	25%
Application	Real-world use of vectors and calculus to solve problems	25%

Tools & Teaching Strategies

Platform / Tool	Purpose
Zoom	Live instruction, breakout discussion, polls, annotations
IXL	Concept reinforcement, independent study, formative assessment, exam preparation
Desmos	Graphing derivatives, slopes, optimization, and curve analysis
GeoGebra (2D/3D)	Vector visualization, planes, and spatial modelling
PhET Simulations	Interactive exploration (e.g., Vector Addition, Calculus Grapher)
Moodle	Assignments, test delivery, and rubric-based feedback
In-Person Integration	Hands-on models (3D vectors, optimization prototypes)

Coordination Roles

Task	Zoom Teacher	In-Person Support Teacher
Instruction	Deliver conceptual explanations and demonstrations	Reinforce topics and support group practice
Activities	Manage digital tools and breakout sessions	Facilitate small group engagement and assist struggling students
Assessment	Create, distribute, and mark digital tests/projects.	Supervise in-class assessments and confirm submissions.
Projects	Provide feedback, rubrics, and virtual consultations	Support with visuals, diagrams, and real-world examples
Final Exam	Prepare and grade assessment	Proctor and ensure exam integrity