



St. John's College

80 Paris Road, Brantford, Ontario N3R 1H9
Course Information Sheet (Revised February, 2012)



Course Title: Calculus and Vectors

Course Code: MCV4U1

Department: Mathematics

Level: University Preparation

Grade: 12

Credit Value: 1

Prerequisite: MHF4U1 (or at same time)

Teacher: A. Gesjorskyj

COURSE DESCRIPTION:

This course builds on students' previous experience with functions and their developing understanding of rates of change. Students will solve problems involving geometric and algebraic representations of vectors and representation of vectors and representations of lines and planes in three-dimensional space; broaden their understanding of rates of change to include the derivatives of polynomial, sinusoidal, exponential, rational and radical functions and apply these concepts and skills to the modelling of real-world relationships. Students will also refine their use of the mathematical processes necessary for success in senior mathematics. This course is intended for students who choose to pursue careers in fields such as science, engineering, economics and some areas of business including those students who will be required to take a university-level calculus, linear algebra or physics course.

OVERALL EXPECTATIONS:

- Demonstrate an understanding of rate of change by making connections between average rate of change over an interval and instantaneous rate of change at a point, using the slopes of secants and tangents and the concept of the limit;
 - Graph the derivatives of polynomial, sinusoidal and exponential functions and make connections between the numeric, graphical and algebraic representations of a function and its derivative;
 - Verify graphically and algebraically the rules for determining derivatives; apply these rules to determine the derivatives of polynomial, sinusoidal, exponential, rational and radical functions and simple combinations of functions and solve related problems;
 - Make connections graphically and algebraically between the key features of a function and its first and second derivatives and use the connections in curve sketching;
 - Solve problems, including optimization problems that require the use of concepts and procedures associated with the derivative, including problems arising from real-world applications and involving the development of mathematical models;
 - Demonstrate an understanding of vectors in two-space and three-space by representing them algebraically and geometrically and by recognizing their applications;
 - Perform operations on vectors in two-space and three-space, and use the properties of these operations to solve problems, including those arising from real-world applications;
 - Distinguish between the geometric representations of a single linear equation or a system of two linear equations in two-space and three-space, and determine different geometric configurations of lines and planes in three-space;
 - Represent lines and planes using scalar, vector and parametric equations and solve problems involving distances and intersections.
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HOW THIS COURSE SUPPORTS THE ONTARIO CATHOLIC GRADUATE EXPECTATIONS:

This course encourages the Catholic learner to develop his/her God-given gifts and abilities to promote growth toward personal responsibility in preparation for a chosen career path. Throughout this course, emphasis will be placed on moral, ethical, and realistic decision-making in an effort to build responsible citizenship. The classroom environment will attempt to instill a spirit of cooperation, rather than competition amongst students, and will foster a collaborative sense of community. This course provides many opportunities for students to work effectively as interdependent team members and to acknowledge and respect others for their opinions.

TEXTBOOK/RESOURCES:

Textbook: Vectors and Calculus (Nelson)
TI-83+ Graphing Calculator

Replacement Value: \$79.95
Replacement Value: \$100.00

TOPICS AND TIME ALLOCATIONS:

UNIT #	UNIT TITLE	APPROXIMATE # OF PERIODS
1	Introduction to Calculus	9
2	Derivatives	9
3	Derivatives and Their Applications	8
4	Curve Sketching	9
5	Derivatives of Exponential and Trigonometric Functions	9
6	Introduction to Vectors	12
7	Applications of Vectors	11
8	Equations of Lines and Planes	10
9	Relationships Between Points, Lines and Planes	10

Evaluation:

Term Work (70% of the final grade)		Final Evaluation (30% of the final grade)	
Category	Weight	Task	Weight
Knowledge/Understanding (Knowledge of content, Understanding of content)	20%	Exam	30%
Thinking (Use of planning skills, processing skills and critical/creative thinking processes)	20%		
Communication (Expression and organization of ideas and information, communication for different audiences, use of conventions, vocabulary and terminology of the discipline in oral, visual and written forms)	10%		
Application (Application of knowledge and skills in familiar contexts, transfer to new contexts, making connections within and between various contexts)	20%		
Final Grade = Term Work (70%) + Final Evaluation (30%)			

Learning Skills: Learning skills are crucial to academic, career and personal success. Students will be assessed continually on the learning skills:

- 1) **Responsibility**
 - fulfils responsibilities and commitments within the learning environment;
 - completes and submits class work, homework, and assignments according to agreed-upon timelines;
 - takes responsibility for and manages own behaviour
- 2) **Organization**
 - devises and follows a plan and process for completing work and tasks;
 - establishes priorities and manages time to complete tasks and achieve goals;
 - identifies, gathers, evaluates, and uses information, technology, and resources to complete tasks.
- 3) **Independent Work**
 - independently monitors, assesses, and revises plans to complete tasks and meet goals;
 - uses class time appropriately to complete tasks;
 - follows instructions with minimal supervision.
- 4) **Collaboration**
 - accepts various roles and an equitable share of work in a group;
 - responds positively to the ideas, opinions, values, and traditions of others;
 - builds healthy peer-to-peer relationships through personal and media-assisted interactions;
 - works with others to resolve conflicts and build consensus to achieve group goals;
 - shares information, resources, and expertise and promotes critical thinking to solve problems and make decisions.
- 5) **Initiative**
 - looks for and acts on new ideas and opportunities for learning;
 - demonstrates the capacity for innovation and a willingness to take risks;
 - demonstrates curiosity and interest in learning;
 - approaches new tasks with a positive attitude;
 - recognizes and advocates appropriately for the rights of self and others.
- 6) **Self-regulation**
 - sets own individual goals and monitors progress towards achieving them;
 - seeks clarification or assistance when needed;
 - assesses and reflects critically on own strengths, needs, and interests;
 - identifies learning opportunities, choices, and strategies to meet personal needs and achieve goals;
 - perseveres and makes an effort when responding to challenges.

Considerations for Program Planning:

Students with Special Education Needs:

The development of each student's abilities and potential is a shared responsibility. A collaborative model between the classroom teacher and Special Education Department provides services which are delivered primarily within the regular classroom through the classroom teacher. Accommodations such as specialized supports and services will be provided to help the student achieve the expectations, in keeping with the IEP. Students are responsible for working with specific classroom teachers for precise accommodations and responsibilities in each class.

School, Department and Classroom Policies:

- Assignments are due on the date assigned by the classroom teacher. Assignments handed in after this date will be recorded as incomplete and can adversely affect the student's final mark.
- Students who, at the end of the semester, have not successfully completed the course, must repeat it or take a course at a different level of difficulty.
- This course is very heavy on content. It is crucial for students to maintain good attendance throughout the course.