OTTAWA CATHOLIC SCHOOL BOARD

Grade 12 Calculus and Vectors MCV4U

Inspired education. Inspiring students.

Prerequisite Course: Functions, Grade 11, University Preparation

Description and Overall Expectations: 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, lines and planes in three-dimensional space; broaden their understanding of rates of change; 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.

Math Processes: problem-solving, reasoning and proving, reflecting, selecting tools and computational strategies, connecting, representing, and communicating.

Rate of Change: 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.

Derivatives and their Applications: make connections 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 the concepts and procedures associated with the derivative, including problems arising from real-world applications and involving the development of mathematical models.

Geometry and Algebra of Vectors: 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.

Course Resources: See teacher and school for the list of key resources, digital tools, sites, passwords, including replacement cost for resources if lost or damaged.

Catholic Graduate Expectations: Our goal for all students is to experience an education based on our Catholic Graduate Expectations.
We work in community to develop graduates that are:

- Discerning Believers Formed in the Catholic Faith Community
- Effective Communicators
- Reflective and Creative Thinkers
- Self-Directed, Responsible, Life-Long Learners
- Collaborative Contributors
- Caring Family Members
- Responsible Citizens

http://www.iceont.ca

Assessment, Evaluation and Reporting: The primary purpose of assessment and evaluation is to improve student learning. Students will understand what is expected of them, using learning goals, and success

criteria, based on the overall expectations. Feedback (self, peer, teacher) supports learning, and plays a critical role in academic achievement and success.

The development of learning skills and work habits is a key indicator of future success. The following learning skills and work habits will be developed, assessed, and reported during this course:

1. Responsibility — fulfills responsibilities and commitments *(e.g. accepts and acts on feedback)*
2. Organization — manages time to complete tasks and achieve goals *(e.g. meets goals, on time)*
3. Independent work — uses class time appropriately to complete tasks *(e.g. monitors own learning)*
4. Collaboration — works with others, promotes critical thinking *(e.g. provides feedback to peers)*
5. Initiative — demonstrates curiosity and an interest in learning *(e.g. sets high goals)*
6. Self-Regulation — sets goals, monitors progress towards achieving goals *(e.g. sets, reflects goals)*

Group work supports collaboration, an important 21st century skill. This will be assessed only as a learning skill. Homework may also be assessed as a learning skill. Evaluation completed in class will be based only on individual student work. Regular attendance is important to support group work, various forms of feedback, and to allow students to demonstrate evidence of their learning. Students are responsible for providing evidence of their own learning (with references where required), in class, within given timelines. Next steps in response to academic integrity issues, such as lack of work completion, plagiarism, or other forms of cheating, range from providing alternate opportunities, to a deduction of marks.

The achievement chart identifies four levels, based on achievement of the overall expectations:

Level 1	achievement falls below the provincial standard	(50-59%)
Level 2	achievement approaches the provincial standard	(60-69%)
Level 3	achievement is at the provincial standard	(70-79%)
Level 4	achievement surpasses the provincial standard	(80-100%)

The report card grade will be based on evidence of student performance, including observations, conversations and student products. Consideration will be given to more recent evidence (skill development) and the most consistent level of achievement.

Mark Breakdown:

Term Work (70%) will include a variety of rich assessment tasks designed to demonstrate students' development in their knowledge and understanding, thinking and inquiry, communication and application, of all overall expectations.

Summative evaluation (30%) takes place towards the end of the semester, is completed in class, and provides the final opportunity for students to demonstrate what they know, and the skills they have learned, based on the overall expectations. In Calculus and Vectors 4U, the summative evaluation will consist of a final exam (30%).

Awarding of Course Credit: Students who demonstrate evidence of achievement of overall expectations, ***and*** earn a mark of 50% or greater, will earn one credit for the course with the following exception:

Students who do not complete their summative evaluation (exam and/or end of year performance task) will not earn their credit regardless of their mark.

Student and Parent/Guardian Acknowledgement

We have read the above course outline and are aware of the student responsibilities to attend class on a regular basis and to provide evidence of learning within the established timelines.

Student's Name (print): _____ Student's Signature: _____

Parent/Guardian Name (print): _____ Parent/Guardian Signature: _____