Calculus and Vectors, Grade 12, (MCV4U)
R.H. King Academy, TDSB

2017-2018

	Ontario Ministry of Education *www.edu.gov.on.ca* /eng/		**Toronto District School Board** *www.tdsb.on.ca*		**R.H. KING ACADEMY** *http://schools.tdsb.on.ca/ rhking/*

COURSE OF STUDY OUTLINE				
Department	*Mathematics*	**Course Type**		*University (U)*
Curriculum Leader	*B. Leszcz*	**Grade**		*12*
Course Title	*Calculus*	**Credit Value**		*One*
Course Code	*MCV4U*	**Prerequisites** *-or-* **Co-requisite MHF4U**		*MCR3U; MHF4U*
Ministry Document	*The Ontario Curriculum. http://www.edu.gov.on.ca/eng/curriculum/secondary/math.html*			
Learning Resources	Advanced Functions 12, Nelson 2009			

Curriculum Leader: B. Leszcz

Policy Document: *The Ontario Curriculum Grade 11 and 12 (2007 Revised)*

Prerequisites: Advanced Functions Grade 12, (MHF4U) must be taken prior to or concurrently with Calculus and Vectors (MCV4U)

Value: 1 Credit

Textbook: Calculus and Vectors   Nelson 2009

Overall Goals   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 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 modeling 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.

Curriculum:

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, 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 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.

Learning Skills: The learning skills (Responsibility, Organization, Independent Work, Collaboration, Initiative, and Self Regulation) are critical for the achievement of the curriculum expectations and student success. Students are expected to attend every class, complete all homework and insure that assignments are completed and handed in on time.

Strategies: Students will have the opportunity to learn in a variety of ways –individually, cooperatively, independently, with teacher direction, through hands-on experience, and through examples followed by practice. The approaches and strategies used in the classroom to help students meet the expectations of this curriculum will vary according to the objectives of the learning and the needs of

the students. It is important for students to take every opportunity to learn the material covered prior to the evaluation.

Evaluation: Seventy per cent of the grade will be based on evaluations conducted throughout the course. Evaluations will be in the form of tests, quizzes, and assignments. Assignments for evaluation may include rich performance tasks, demonstrations (board work), and projects. This portion of the grade will reflect the student's most consistent level of achievement throughout the course.

Thirty per cent of the grade will be based on a final assessment administered towards the end of the course. The final exam allows the student an opportunity to demonstrate comprehensive achievement of the overall expectations for the course.

Students will be given numerous and varied opportunities to demonstrate the full extent of their achievement of the curriculum expectations (content standards) across all four categories of knowledge and skills.

Teachers will ensure that student learning is assessed and evaluated in a balanced manner with respect to these four categories:

1. **Knowledge and Understanding**   Subject specific content acquired in each course, and the comprehension of its meaning and significance.
2. **Thinking**   The use of critical and creative thinking skills and/or processes.
3. **Communication**   The conveying of meaning through various forms.
4. **Application**   The use of knowledge and skills to make connections within and between various contexts.

Term Grades for Provincial Reports Throughout the Year:

The midterm mark will be based on the evaluations that have been conducted to that point in the course and will be preliminary and tentative. This mark will be based on the most consistent level of achievement to that point in time, but some of the overall expectations, strands, and units will not have been addressed and the student's grades will most likely change when the student's entire work is evaluated by the end of the course.

Evaluation Plan

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Term Work- 70%   Final Evaluation – 30%

- Quizzes, assignments, projects   10%
- Tests   50%
- Independent Study Assignments* 10%

*At RH King one of our unique features is a focus on ISUs, or Independent Study Units. In Grade 12 Mathematics, an ISU is a small assignment that is given to students to complete 4-5 times through the semester. The assignments are based upon extensions of the content being learned in the classroom at the time the assignment is given. In most cases students are given a week to complete the 1-1.5 hour worksheet. Support is provided during Clinic, after school, or even during class time, at the students' request. The intent is to facilitate learning the responsibility required to complete a task, on time, and learning to seek out help, should it be needed, to be able to complete the task. These skills promote the students' growth towards becoming independent learners.

Course Work

Unit 1: Review/Enhancement Prerequisite Skills   (1 week)

Unit 2: Limits   (2 weeks)

Unit 3: Derivative   (2 weeks)

 Unit 4: Applications of Derivatives: Optimization   (1 week)

Unit 5: Curve Sketching   (2 weeks)

Unit 6: Derivatives of Exponential, Logarithmic, and Trigonometric Functions   (1 week)

Unit 7: Vectors   (2 weeks)

Unit 8: Applications of Vectors   (2 weeks)

Unit 9: Equations of Lines and Planes   (2 weeks)

Unit 10: Points, Lines, and Planes   (2 weeks)

Review and Preparation for Evaluations: (1 week)