



## **DEPARTMENT OF ACADEMIC UPGRADING**

### **COURSE OUTLINE – WINTER 2020**

#### **MA0131 (D3) - Mathematics Grade 12 Calculus Equivalent 5 (0-0-7.5) HS 112.5 hours for 15 Weeks**

**INSTRUCTOR:** Sukhvir Sandhu      **PHONE:** (780) 539-2810 or 2234

**OFFICE:** A205 or C11A      **E-MAIL:** ssandhu@gprc.ab.ca

**OFFICE HOURS:** 2:30 pm to 3:30 pm on Mon., Tues., & Thur.; or Appointment

#### **CALENDAR DESCRIPTION:**

This course includes limits of sequences, series, and functions, secants and tangents, derivatives from first principles, chain rule, product rule, quotient rule, implicit differentiation, curve sketching, maximum and minima applications, relates rates applications, anti-derivatives and area, limits, and derivatives of trigonometric functions.

#### **PREREQUISITE(S)/COREQUISITE:**

MA0120 or equivalent. Pre or Co-requisite: MA0130

#### **REQUIRED TEXT/RESOURCE MATERIALS:**

Text Book: Package of MA0131 modules, 2007;  
Scientific calculator, graphing paper, geometry set

#### **DELIVERY MODE:**

- MA0131 is a modularized math course divided into 9 separate units called modules. The instructions for each topic are given in the modules, followed by several examples and exercises. Study the instructions and work through the examples before starting each exercise. The answers for each exercise are given at the end of each module. Check your work often to make sure you understand each topic. The key to success in working with modules is to ask questions whenever you have difficulty understanding instructions, the examples, or the exercises. **Do not hesitate to ask for help.**

- **Module tests must be written as listed on page 6.** Follow these dates as closely as you can. You must revise and review the material thoroughly before taking Module test(s) / exam. You are encouraged to write a test early if you are prepared. When writing a test, be sure to show all of your work on the test paper. Marks are given for the method as well as the final answer. Even though 50% is a passing mark, a mark of **at least 60% in any section(s) test** is recommended.
- **One lowest test mark out of 5 test marks will be ignored. Best 4 test marks out of 5 test mark will be used for the final grade.**
- Upon completion of the first four modules, a midterm test will be written on or before **Monday, February 24**. If you miss this date, you will receive a mark of 0% on your midterm. Upon completion of all nine modules, you will write a three hour final exam. Be sure to leave time to prepare for this important exam! It is worth a large percentage of your final grade.
- **Consult your instructor immediately if you find yourself falling behind schedule.** Your instructor may ask you to spend more time in the Math Lab and get help often. **All tests must be written by Thursday, April 9**

## **COURSE OBJECTIVES:**

The Course introduces students to:

- the review of graphing of functions by applying transformations to the graphs of a known function
- the review of factoring expressions with integral and rational exponents, rationalize expressions, and the four basic operations
- the limit of a functions using the graph of the function and using the limit theorems
- concept of a continuous and discontinuous function
- definition of a derivative to determine the derivative of  $f(x) = x^n$  where  $n$  is a positive integer
- differentiation of a polynomial function and derivative to determine a rate
- chain rule in combination with a product and quotient rule to determine the derivative
- slope and equation of the tangent at a given point using the derivative of a function
- intervals where the derivative is greater than zero or less than zero
- use of the derivatives to determine maximum and minimum values for applications, and to solve rate of change applications

- anti-derivatives of polynomial, radical, and rational functions
- area between a curve and the x-axis over a given interval
- limit for a trigonometric function as the angle approaches a finite or infinite value
- derivative of three primary and three reciprocal trigonometric functions
- derivative of more complicated trigonometric functions using the power, chain, product, and quotient rules

### **LEARNING OUTCOMES:**

As a result of taking this course, students will gain the ability to:

- draw graphs of a functions by applying transformations to the graphs of known functions
- simplify rational expressions, using any of the four basic operations
- determine the limit of a functions for a given value using the graph of the function
- compute limits of functions, using definitions and limit theorems
- determine the slopes and equations of the tangent and the normal lines at a given point on a curve, using the definition of a derivative
- differentiate polynomial functions, using the derivative theorems for sum and difference
- determine the derivative of a combination function with the product and quotient using the chain rule
- differentiate a function using implicit differentiation
- sketch the graph of a function using first and second derivatives to find maxima, minima, and inflection point
- determine intervals where the derivative is greater than zero or less than zero in order to predict where the function is increasing or decreasing
- determine whether or not a critical point is a maximum or a minimum
- determine maximum or minimum values for application involving numbers, geometry, distance and time, economics, and science
- solve rate of change applications relating to science, area, volume, and related motion
- determine the area between a curve and the x-axis over a given interval
- determine velocity and displacement by finding the anti-derivatives of acceleration and velocity functions
- determine the limit for a trigonometric function as the angle approaches a finite or infinite value
- find the derivative of more complicated trigonometric functions using the power, chain, product and quotient rule

### **TRANSFERABILITY: N/A**

## EVALUATION CRITERIA:

Your final mark is determined by:

4 section tests	40 % (each test is worth 10%)
Midterm	20 %
Final Exam	40 %

## GRADING CRITERIA:

GRANDE PRAIRIE REGIONAL COLLEGE			
GRADING CONVERSION CHART			
Alpha Grade	4-point Equivalent	Percentage Guidelines	Designation
A <sup>+</sup>	4.0	90 – 100	EXCELLENT
A	4.0	85 – 89	
A <sup>-</sup>	3.7	80 – 84	FIRST CLASS STANDING
B <sup>+</sup>	3.3	77 – 79	
B	3.0	73 – 76	GOOD
B <sup>-</sup>	2.7	70 – 72	
C <sup>+</sup>	2.3	67 – 69	SATISFACTORY
C	2.0	63 – 66	
C <sup>-</sup>	1.7	60 – 62	
D <sup>+</sup>	1.3	55 – 59	MINIMAL PASS
D	1.0	50 – 54	
F	0.0	0 – 49	FAIL
WF	0.0	0	FAIL, withdrawal after the deadline

How to use a module:

1. Read the title of each module, table of contents page, and title of each section. You will observe a progressive growth of operations/concepts.
2. Read and thoroughly understand the concepts and terminology of a section.
3. Understand and do each example very carefully using the terminology.  
***If difficulties arise, meet with your instructor.***
4. Match each question in an exercise with the corresponding examples before the exercise. *If difficulties arise, return in your module and rework the examples.*
5. Attempt the exercise questions and check the answers before moving on to the next section. ***If difficulties arise, meet with your instructor.***
6. Review the terminology of the module(s) before taking any test/exam.

## Test Schedule for Winter 2020

### Topics / Tests / Exams

Test #	% Towards the final exam	Module's Title	Recommended Time & Test Date	Date written	Your mark
1	10%	Review & Limits	Wednesday January 22		
2	10%	The Derivative & More Derivatives	Wednesday February 12		
	<b>20%</b>	<b>MIDTERM</b> - must be written on or before	<b>Monday February 24</b>		
3	10%	Curve Sketching Applications: & Maximum/Minimum	Monday March 9		
4	10%	Applications: Rate of Change & Anti-derivatives and Area	Monday March 30		
5	10%	Derivatives of Trigonometric Functions	Thursday April 9		
<b>Final Exam</b>	40%	FINAL EXAM - 3 HOURS	<b>To be announced Apr. 15 - 25</b>		

## **STUDENT RESPONSIBILITIES:**

In addition to the *Student Rights and Responsibilities* as set out in the college website, the following guidelines will maintain an effective learning environment for everyone:

1. Regular attendance is expected of all students in all mathematics courses. Your success in math is directly linked to your attendance. Attendance will be taken daily.
2. Students are expected to be punctual. Arrive on time for classes and remain for the duration of scheduled classes.
3. Refrain from disruptive talking or socializing during class time.
4. Be respectful of others regarding food or beverages in the classroom. Clean up your eating area and dispose of garbage.
5. Recycle paper, bottles, and cans in the appropriate containers.
6. Children are not permitted in the classrooms.
7. Students are expected to notify the instructor of any extenuating circumstances.

## **ELECTRONIC DEVICES:**

Students are expected to turn off cell phones during class time or in labs. No unspecified electronic devices will be allowed in exams.

## **STATEMENT ON PLAGIARISM AND CHEATING**

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the College Admission Guide at <http://www.gprc.ab.ca/programs/calendar/> or the College Policy on Student Misconduct: Plagiarism and Cheating at [www.gprc.ab.ca/about/administration/policies/\\*\\*](http://www.gprc.ab.ca/about/administration/policies/**)

**\*\*Note:** All Academic and Administrative policies are available on the same page.

## **STUDENT PRINTING POLICY:**

Please refer to the College website (Home > Tuition and Fees) for the printing policy which limits the free use of paper; extra charges will be applied if the limit is exceeded.