NORTHWESTERN POLYTECHNIC

DEPARTMENT OF ACADEMIC UPGRADING

COURSE OUTLINE –Winter 2023

MA0131 (A3, B3): Mathematics Grade 12 Calculus Equivalent–5 (0-0-7.5) HS
112.5 Hours for 15 Weeks

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

INSTRUCTOR:	Doris LaChance	**PHONE:**	(780)539-2810 or 2234
OFFICE:	A205 or C202	**E-MAIL:**	dlachance@nwpolytech.ca
OFFICE HOURS:	TBD or by 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:

Package of MA0131 modules, 2007;
Non-graphing scientific calculator (TI-30XIIS recommended)

DELIVERY MODE(S):

MA0131 is a modularized math course.

COURSE OBJECTIVES:

Introducing 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 thee 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:

This course is listed in the Alberta Transfer Guide. It is accepted at colleges and universities in Alberta as equivalent to Math 10C. Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page http://www.transferalberta.ca.

** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. **Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability.**

EVALUATIONS:

4 section tests (best 4 out of 5)	40 %
Midterm	20 %
Final Exam	40 %

**Note: Even though 50% is a passing mark, a mark of at least 65% is recommended for success in future courses.

GRADING CRITERIA:

Alpha Grade	4-point Equivalent	Percentage Guidelines		Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100		C+	2.3	67-69
A	4.0	85-89		C	2.0	63-66
A-	3.7	80-84		C-	1.7	60-62
B+	3.3	77-79		D+	1.3	55-59
B	3.0	73-76		D	1.0	50-54
B-	2.7	70-72		F	0.0	00-49

COURSE SCHEDULE/TENTATIVE TIMELINE:
See table on last page.

STUDENT RESPONSIBILITIES:

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

- 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.
- Students are expected to be punctual. Arrive on time for classes and remain for the duration of scheduled classes.
- Refrain from disruptive talking or socializing during class time.
- Be respectful of others regarding food or beverages in the classroom. Clean up your eating area and dispose of garbage.
- Recycle paper, bottles, and cans in the appropriate containers.
- Children are not permitted in the classrooms.
- Students are expected to notify the instructor of any extenuating circumstances.
- 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 Northwestern Polytechnic Calendar at https://www.nwpolytech.ca/programs/calendar/ or the Northwestern Polytechnic Policy on Student Misconduct: Plagiarism and Cheating at https://www.nwpolytech.ca/about/administration/policies/index.html

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

How to use the book:

1. Read the title of each chapter, 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.

Ma0131 Tentative Test Schedule

Test #	% towards final grade	Topics	Recommended Test Date	Date written	Mark
1	10%	Review & Limits	January 17		
2	10%	The Derivative & More Derivatives	February 8		
Midterm Exam	20%	All of the Above	February 13		
3	10%	Curve Sketching & Maximum/Minimum	March 7		
4	10%	Applications: Rate of Change & Anti-derivatives and Area	March 24		
5	10%	Derivatives of Trigonometric Functions	April 10		
Final Exam	40%	All of the Above	TBA (April 14-24) 3 hour exam		

***All tests must be completed by April 10th.**

***Midterm must be completed by February 27th.**