

Course End Date: April 11, 2025

Academic Term and Year: Winter, 2024-2025

Official Course Outline Information

Course Name:	Calculus I		
Course Code:	MATH 1001	Version #: V1 A02/H02	
Instructor:			
Email:			
Office Hours:	Check misiwe pehtâkwan		
How to Contact Your Instructor: Email			

Official College Calendar Description:

This course introduces the basic principles and fundamentals of calculus and helps students develop logical, creative- and critical-thinking, and problem-solving skills for various mathematical problems. Students will learn about rectangular coordinates, analytic geometry, transcendental functions, inverse functions, limits, continuity, derivatives and applications, Taylor polynomials, integration, and applications. The examples and problems to solve are taken from various areas, such as physics, mechanics, chemistry, energy consumption, meteorology, seismology, biology, ecology, sociology, economics, business, industry, engineering, probabilities, and statistics.

Course Overview:

This course introduces the learner to the main mathematical functions and how they are described and transformed to obtain new functions; descriptive, graphical, numerical, and algebraic meaning of the limits, infinity, and continuity of functions; descriptive and algebraic meaning of derivatives, differentials, and rates of change in math and science; differentiating all the basic functions and inverse functions by applying differentiation rules and implicit differentiation; applying differentiation to investigate the shape and minimum and maximum points of a function; finding derivatives of indeterminate functions; applying first and second derivatives to investigate the shape of functions and their local minimum, maximum, and inflection points; antiderivatives and applying differentiation to optimization problems; definite integrals as sums of areas and the fundamental theorem of calculus; indefinite integrals, their relation to definite integrals, and the application of both definite and indefinite integrals in math, natural and social sciences, economics, and engineering; the application of integration to calculate areas between curves and the volumes of solids of various shapes, size, and orientation.

This course adheres to all college policies (see the college calendar).

Page 1 of 11



Credits: 3

Total Course Hours:45 Hrs

Structure of Hours: Lecture: 45 hrs Lab: 13 hrs Other: 0 Hrs

Note: Course hours are based on the number of credits. Students may need to budget two to three times this number of hours to complete the course successfully.

Total Number of Weeks: 16

Course Meeting: Lecture: CELT 3-213 and Lab: SCFL 4-013

Delivery Mode: HyFlex

Faculty: Faculty of Arts and Sciences

Program: Arts & Sciences Diploma Program

Course Goals/General Learning Outcomes:

Upon successful completion of this course, students will be able to

- 1. Apply polynomial, exponential, logarithmic, hyperbolic, trigonometric, and inverse functions.
- 2. Define limits, continuity and infinity of mathematical sequences and functions, and function domains and ranges.
- 3. Explain tangent lines, slopes, and rules of differentiations.
- 4. Determine maximum, minimum and mean values, and the shape of graphs by differentiation.
- 5. Calculate areas, distances, and volumes by integration.
- 6. Explain the relationship between derivatives and definite integrals.
- 7. Solve various mathematical, physical, and statistical problems by derivation and integration.

Course Units/Topics:

This course consists of the following units/topics:

- 1. Functions and Models
- 2. More Functions, Old and New Functions
- 3. Limits and Continuity
- 4. Derivatives and Differentiability
- 5. Differentiation Rules

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Course Name: Calculus I



- 6. More on Differentiation
- 7. Differentiation and Shapes of Graphs
- 8. More Applications of Differentiation
- 9. Antiderivatives and Integrals, Definite Integrals
- 10. More on Definite Integrals, Indefinite Integrals
- 11. Useful Techniques of Integration, Areas and Volumes

Required Textbooks, References, Materials:

- Stewart, J., Clegg, D., & Watson, S. (2021). *Calculus: Early transcendentals.* Boston, MA: Cengage Learning.
- Stewart, J., Clegg, D., & Watson, S. (2021). Student solutions manual for Stewart/Clegg/Watson's Calculus: Early transcendentals. (9th ed.) Boston, MA: Cengage Learning. E-book

Recommended Resources:

See above.

Course Evaluation:

Mark distribution for the course will be as follows:

Total	100%
Final Exam	40%
Midterm 3	20%
Midterm 2	20%
Midterm 1	20%



Passing Level/Grading Scale:

The passing grade for this course is 50% (D).

Marking and Grade Conversion

Letter Grade (post-secondary programs)	Grade Point Value (post-secondary programs)	Percentage Scale (Alberta Education)	Description
A+	4.0	95–100	
А	4.0	90-94	Excellent
A-	3.7	85-89	
B+	3.3	80-84	
В	3.0	75–79	Good
В-	2.7	70–74	
C+	2.3	67–69	
С	2.0	64-66	Satisfactory
C-	1.7	60-63	
D+	1.3	55-59	
D	1.0	50-54	Poor
F	0.0	0-49	Failure

Inclusive Culture:

At NorQuest College, we are committed to fostering a space where both learners and staff can engage in honest conversations in a respectful, responsible, and thoughtful manner without fear of repercussions. A NorQuest education is inclusive, and our learners are supported and preparing to meet the needs of a diverse society with hands-on training with people from a variety of cultures, religions, and genders. For some learners, this may challenge your values and beliefs. We understand and have supported many learners to stretch their comfort zones to find a balance between job success and cultural or religious beliefs.

As part of the NorQuest community, in your programs, classrooms, labs, clinical work, work-integrated learning (WIL), and practicums, you will encounter and work with individuals from other cultures and religious backgrounds and of all genders and gender identities, including those who are part of the 2SLGBTQIA+ community. You will also meet and work with people with sensory sensitivities, who are neurodivergent, or who have different abilities, as well as individuals who may differ significantly in age or may have special considerations or restrictions around clothing and jewellery. Our community also includes people from a variety of socio-economic classes, castes, and income levels.

We celebrate our differences, and we value continuous growth and learning from each other. We create a sense of belonging where we do not judge anyone based on gender

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Page 4 of 11

identity or expression, biological sex, sexual orientation, race/ethnicity, religion, linguistic and/or cultural background, age, physical or mental ability, or any other aspect of one's person. NorQuest does not tolerate bullying, racism, or harassment. If you or another learner or staff member are subjected to any of these actions, your voice will be heard and taken seriously. It is everyone's responsibility to nurture a space where each person can feel safe and respected.

NorQuest College is committed to providing an environment that expects and promotes ethical behaviour in all aspects of college activities. This includes ensuring that employees, learners, and volunteers can confidentially and without fear of retaliation seek advice and/or disclose alleged wrongdoing or improper activity. The Office of Safe Disclosure provides a safe space to hear NorQuest community members' equity, human rights, and discrimination concerns, and other reports of wrongdoing or improper activity. All learners, employees, and other members of the NorQuest community are welcome to access these services.

To contact the Safe Disclosure Office, individuals are encouraged to make an appointment to meet with an advisor by emailing <u>disclosure@norquest.ca</u>.

Anti-Racism Statement

NorQuest College is working towards becoming an anti-racist institution. As such, we are making efforts to develop anti-racist curriculum and classroom learning experiences. This means using resources from multiple perspectives and equity deserving groups, learning from each other's lived experiences, and discussing anti-racism in our classrooms.

Integrating an anti-racist approach in the way we frame and implement courses and programs is central to achieving our desired state as an institution. It aligns with our college vision and *Deans' Joint Commitment to Anti-Racism for Equity*. Embedding antiracism in teaching and learning practice will contribute to anti-oppressive and equitable learning experiences and outcomes for all learners. Everyone is invited to support our learners to succeed in a diverse and multicultural learning space, workplace, and society.

Skills of Distinction:

At NorQuest College, learners develop Skills of Distinction as a part of belonging to the NorQuest community. Through the Circle of Courage, learners build competence in Resilience, Inclusion, and New Ways of Thinking. These human skills prepare all learners for the changing workforce and the changing world.

Course Policies and Expectations:

Statement of Conduct and Expectations

NorQuest College is committed to maintaining high standards of non-academic and academic performance and integrity in order to foster a learning environment conducive to the personal, educational, and social development of its students. This commitment is founded upon the principles of fairness, trustworthiness, honesty, respect, and responsibility. The college expects that its students will be guided at all times by these principles in the work that they submit and the behaviour in which they engage.

It is the student's responsibility to be familiar with and follow NorQuest College policies and procedures, including the <u>Student Code of Conduct</u>. Student policies can be viewed on the <u>college website</u>. Policies specific to a program will be in the student program manual. If you have questions, please ask your instructor.

Academic Integrity

NorQuest College is committed to maintaining high standards of academic performance and integrity, and it is the responsibility of all members of the college community to uphold these standards. Academic misconduct may be defined broadly as the giving, taking, or presenting of information that dishonestly aids an individual or group in the determination of academic merit or standing. Common examples include, but are not limited to, plagiarism and cheating, which includes the unethical use of generative artificial intelligence (AI) tools (such as ChatGPT, Grammarly, etc). Allegations of academic misconduct are serious and may lead to sanctions such as mark reduction, course failure, or withdrawal from the course or program.

Plagiarism

Plagiarism is a form of academic misconduct that occurs when someone presents, as one's own, work that has been created by another. It is a serious offence and can result in suspension or expulsion from the college.

There is no tolerance for academic misconduct in this course. Any student caught plagiarizing will be penalized, and the incident will be recorded in the student's file. Multiple offences may result in the student's withdrawal from the course and/or program. Students are encouraged to familiarize themselves with the NorQuest College <u>Student</u> <u>Judicial Affairs Policy</u> and avoid any behaviour that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts, and/or participation in an offence.



Student Misconduct

<u>Academic misconduct</u> may be defined broadly as the giving, taking, or presenting of information that dishonestly aids an individual or group in the determination of academic merit or standing. Examples include, but are not limited to, plagiarism and cheating.

<u>Non-academic misconduct</u> may be defined broadly as any behaviour that adversely affects the learning of others or the college's educational mission, violates civil or criminal statutes, threatens the safety or well-being of members of the NorQuest community, or violates the ethical standards set by professional associations or the workplace standards set by practicum, clinical, or volunteer placement agencies.

Allegations of academic or non-academic misconduct will be adjudicated according to Student Judicial Affairs Policy and procedures, and may result in sanctions ranging from mark reduction, remediation, course failure, or withdrawal from the course or program. For more information, please talk to your instructor or contact the Office of Student Judicial Affairs at <u>osja@norquest.ca</u>

Use of Generative AI

Since critical reading, writing, and thinking skills are fundamental to the learning outcomes of this course, <u>all assignments must be prepared by the student</u> and thereby demonstrate original work. Developing strong competencies in these areas will prepare you for your future studies and careers. Therefore, use of ChatGPT or any other generative AI tools to complete assignments is <u>not permitted</u> and will be treated as plagiarism. Assignments containing characteristics of AI-generated text or generated solutions <u>will not receive credit</u> and may be reported to the OSJA for misconduct.

Attendance Policy

Students are expected to arrive on time, and to remain for the duration of the class. Please come to class having completed any assigned homework/tasks and prepared with the appropriate materials. If you are absent from class, it is your responsibility to complete the assigned homework/tasks listed in the course schedule and to check for any new information, documents, or materials.

Learning Technologies

This course uses misiwe pehtâkwan (formerly called Moodle), NorQuest's online Learning Management System, as a repository for course materials (<u>http://myclass.norquest.ca</u>). Upon registration, you will receive login information via your NorQuest email account. Course materials may include review materials, handouts, course outline, PowerPoints, notices from your instructor, reading schedule, assignments, and exams. It is important that you log in and review the course materials and information regularly. For technical support, please contact the <u>Student Service Desk</u>.

Student Support

Students who have a disability affecting mobility, vision, hearing, learning, or mental or physical health and who require accommodations in this course are advised to discuss their needs with a Student Support Specialist at NorQuest College <u>Student Services</u>.

Technology and Electronics Policy

Please note that the use of laptops, mobile phones, and other electronic devices during class and exams for private/personal information or communications is <u>not permitted</u>, as it is disruptive to the learning environment. Misuse of electronics during class time will result in the deduction of participation marks. Students who persist in disruptive behaviours during class will be asked to leave.

How to Submit Assignments

Your instructor will provide specific submission instructions for each assignment.

Late Assignment Submissions

Assignments are due on the scheduled date, per the course schedule and assignment instructions. Late assignments will be deducted 5% per day, including weekends. Exceptions will only be made in cases of illness or personal emergency. Please contact the instructor via email as soon as possible so accommodations can be made. Note: extensions cannot be granted retroactively (ie: after the assignment deadline has passed), and assignments will not be accepted after the class set has been marked and returned. <u>Please see the misiwe Course Calendar and Course Schedule for assignment due dates</u>.

Communications Policy

Email: Email is the official method of communication between students and instructors, and for most interactions at the College. Instructors check their NorQuest email accounts routinely during regular business hours, and will respond within 24-48 hours when possible. Please ensure you use appropriate etiquette and include your full name, course section, and student ID when corresponding with instructors and other College personnel.

MS Teams (and other direct messaging tools): Direct messaging through MS Teams or any other platform is not an official or appropriate method of communicating with your instructor. Please note that any direct messages sent through Teams or other applications will not receive a response

Meetings: If course questions/concerns cannot be resolved through email, the instructor is available to meet with students on a limited basis. To request a meeting with an

Course Name: Calculus I



instructor, please email them to arrange a date, time, and platform/location in advance. Note that the instructor may not be available for in-person meetings outside of class.

Course Schedule:

Please note that this schedule is subject to change. Any changes or cancellations will be communicated by your instructor. It is your responsibility to check your NorQuest email account for relevant messages.

Date/Class	Unit/Topic/Reading	Assessment
Date: 09 Jan 2024	Course Introduction: Course Outline (misiwe)	
Lecture 1 (2 classes)	 Unit 1. Functions and Models Chapter 1: Sections 1.1-1.4 (textbook) 	
Lab 1 (1 class)	 Unit 1: Essential Functions Chapter 1: Sections 1.1–1.3 (textbook exercises) 	Homework (not for marking)
Lecture 2 (2 classes)	 Unit 2. More on Functions, Old and New Functions Chapter 1: Sections 1.4–1.6 (textbook) 	
Lab 2 (1 class)	Units 2: Transformation of Functions. Exponential, Logarithmic, Inverse Functions Chapter 1: Sections 1.4–1.6 (textbook exercises)	Homework (not for marking)
Lecture 3 (2 classes)	 Unit 3. Limits and Continuity Chapter 2: Sections 2.1–2.6 (textbook) 	
Lab 3 (1 class)	• Unit 3. Calculating Limits, Finding Asymptotes Chapter 2: Sections 2.1–2.6 (textbook exercises)	Homework (not for marking)
Lecture 4 (2 classes)	 Unit 4. Derivatives and Differentiability Chapter 2: Sections 2.7–2.8 (textbook) 	
Lab 4 (1 class)	 Units 4. Finding Rates of Change, Calculating Derivatives Chapter 2: Sections 2.7-2.8 (textbook exercises) 	Homework (not for marking)
Lecture 5 (2 classes)	Unit 5. Differentiation Rules Chapter 3: Sections 3.1-3.4 (textbook)	
Midterm Exam 1 (1 class) Date: 10 Feb 2024	 Units 1-4: Chapter 1: Sections 1.1-1.6 (textbook) Chapter 2: Sections 2.1–2.8 (textbook) 	Exam (20%)
Lecture 6 (2 classes)	 Unit 6. More on Differentiation Chapter 3: Sections 3.5-3.6, 3.8, 3.11 (textbook) 	
Lab 5 (1 class)	 Units 5 & 6. Applying Differential Rules, Implicit and Logarithmic Differentiation, Growth & Decay Chapter 3: Sections 3.1-3.6, 3.8 (textbook exercises) 	Homework (not for marking)
Lecture 7 (2 classes)	• Unit 7. Differentiation and Shapes of Graphs Chapter 4: Sections 4.1-4.3 (textbook)	

Date/Class	Unit/Topic/Reading	Assessment
Lab 6 (1 class)	 Unit 7. Min and Max Values, Increasing and Decreasing, Concavity, Sketching Graphs Chapter 4: Sections 4.1-4.3 (textbook exercises) 	Homework (not for marking)
Lecture 8 (2 classes)	 Unit 8. More Applications of Differentiation Chapter 4: Sections 4.4-4.5, 4.7–4.8 (textbook) 	
Midterm Exam 2 (1 class) Date: 10 Mar 2024	 Units 5-7 Chapter 3: Sections 3.1–3.6, 3.8 (textbook) Chapter 4: Sections 4.1-4.3 (textbook) 	
Lecture 9 (2 classes)	 Unit 9. Antiderivatives and Integrals, Definite Integrals Chapter 4: Section 4.9 Chapter 5: Sections 5.1-5.2 (textbook) 	
Lab 7 (1 class)	 Units 8 & 9. The L'Hospital's Rule, Newton's Method, Antiderivatives Chapter 4: Sections 4.4, 4.8, 4.9 (textbook exercises) 	Homework (not for marking)
Lecture 10 (2 classes)	 Unit 10. More on Definite Integrals, Indefinite Integrals Chapter 5: Sections 5.2–5.4 (textbook) 	
Lab 8 (1 class)	 Units 9 & 10. Solving Definite and Indefinite Integrals Chapter 5: Sections 5.1–5.4 (textbook exercises) 	Homework (not for marking)
Practice (2 classes)	 Units 8-10 Chapter 4: Sections 4.4-4.5, 4.7-4.9 Chapter 5: Sections 5.1-5.4 (textbook) 	
Midterm Exam 3 (1 class) Date: 24 Mar 2024	 Units 8-10 Chapter 4: Sections 4.4-4.5, 4.7-4.9 Chapter 5: Sections 5.1-5.4 (textbook) 	Exam (20%)
Lecture 11 (2 classes)	 Unit 11. Useful Techniques of Integration, Areas and Volumes Chapter 5: Section 5.5 Chapter 7: Section 7.1 Chapter 6: Sections 6.1-6.2 (textbook) 	
Lab 9 (1 class)	 Unit 11. Integration by Substitution Rule and by Parts, Calculating Areas and Volumes Chapter 5: Section 5.5 Chapter 7: Section 7.1 Chapter 6: Sections 6.1-6.2 (textbook) 	Homework (not for marking)
Practice (2 classes)	Units 1-11 Chapters 1-7	Homework (not for marking)



Date/Class	Unit/Topic/Reading	Assessment
Final Exam	Units 1-11 Chapter 1: Sections 1.1-1.6	
Date: 10 Apr. 2024	Chapter 1: Sections 1:1-1:0 Chapter 2: Sections 2:1–2:8 Chapter 3: Sections 3:1–3:6, 3:8 Chapter 4: Sections 4:1-4:5, 4:7-4:9 Chapter 5: Sections 5:1–5:5 Chapter 6: Sections 6:1-6:2 Chapter 7: Section 7:1 (textbook)	Exam (40%)

Final Exam Date and Location: TBD

Bring to Final Exam: Student ID, standard scientific calculators, and pens

Additional Information:

Homework: At the end of each lab class, students may be assigned homework. The homework is not for credit and will not be marked, however, it is highly recommended that the students do it timely, on their own time, for the purposes of better preparation and mastering the material. For the same reason, students are also encouraged to solve as many problems as possible at the end of each covered in lectures unit/chapter/topic of the required/recommended resources above.

Originated By: Dr. Abiy Nedie

Last Revised By: Dr. Abiy Nedie

Revision Date: December 11, 2024

Approved By (Program Chair or Dean): Dana Wight, PhD

Minimum Instructor Requirements: Master's degree in Mathematics

Prior Learning Assessment Recognition (PLAR): Yes

Credit can be awarded for this course through PLAR

Methods of Obtaining PLAR: Transfer Credit

Transferability to Other Institutions: See <u>ACAT</u> for course transferability details

NOTE: Students are advised to keep course outlines in personal files for future use. These may be used to apply for transfer of credit to other educational institutions. A fee may be charged for additional or replacement copies.

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