Course Start Date: Click here to enter a date.

Course End Date: Click here to enter a date.

Academic Term and Year: 2023-2024

Official Course Outline Information

Course Name: Calculus II

Course Code: MATH 1002 **Version #:**

Instructor:

Office: Click here to enter text.

Email: Click here to enter text.

Phone: Click here to enter text.

Office Hours: Click here to enter text.

How to Contact Your Instructor: Click here to enter text.

Official College Calendar Description:

This course is continuation of Calculus I and builds further upon the principles and fundamentals of calculus to help students develop logical and creative thinking and problem-solving skills for critical analysis of various mathematical problems. Students will learn about techniques and strategies of integration, its application for calculating arc lengths and areas of surfaces of revolution, separable and linear differential equations, infinite and power series, Taylor and Maclaurin series, and representations of functions as series, functions of several variables, their limits and continuity, partial derivatives, and maximum and minimum values. The focus is towards mathematical application in physical and computer sciences, machine learning, and engineering. Examples from biology, ecology, chemistry, energy consumption, economics, probabilities, and statistics, will be addressed too.

Course Overview:

This course introduces the learner to the main methods of integration, integration of trigonometric functions by trigonometric identities and substitution, integration of rational functions by partial fractions; approximate integration; improper integrals on infinite and discontinuous intervals, and their evaluation; the application of integration to calculate areas between curves, areas of surfaces or revolution, arc lengths, and volumes of solids of various shapes, size, and orientation; separable differential equations, and their application in calculating orthogonal trajectories, solving mixing problems, and modelling population growth; linear differential equations, and their application in electricity, mechanics, and modelling predator-pray systems; divergent and convergent infinite sequences, limits and properties of infinite sequences; series as sums of numbers in a sequence, various convergence tests for series, strategies for testing series; power series and representing functions as power series, series of Taylor and Maclaurin, and their application in math, science and engineering; functions of several variables, their limits and continuity; partial derivatives, tangent planes and linear approximations, differentials, local and absolute maximum and minimum values of functions of two variables; partial derivatives, linear approximations, and differentiability of functions of three or more variables.

Credits: 3

Prerequisites: MATH 1001 Calculus I or equivalent

Co-Requisites: None

Total Course Hours: 61.5 hrs

Structure of Hours: **Lecture:** 45 hrs **Lab:** 16.5 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:	15
Course Meeting:	Click here to enter text.
Delivery Mode:	In person/Blended
Faculty:	Faculty of Arts and Sciences
Department:	University Transfer
Program:	Arts & Science, Open Studies

Course Goals/General Learning Outcomes:

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

1. Solve various integrals of trigonometric and rational functions by substitution and partial fractions, and improper integrals.
2. Calculate areas, volumes, and lengths by integration.
3. Solve first-order linear and separable differential equations in math, physics, and biology.
4. Explain sequences and series, and functions as power series.
5. Apply Taylor and Maclaurin series in various problems of math, physics, and engineering.
6. Define functions of several variables, their limits and continuity, and partial derivatives.

Explain tangent planes and linear approximations, maximum and minimum values of functions of several variables.

Course Units/Topics:

This course consists of the following units/topics:

1. Integration By Substitution and By Parts, Areas and Volumes
2. Integration of Trigonometric and Rational Functions
3. Strategy for Integration, Approximate Integration, Improper Integrals
4. More Applications of Integration
5. Separable Differential Equations
6. Linear Differential Equations
7. Sequences and Series
8. Convergence Tests for Series
9. Power Series, Functions as Power Series
10. Taylor Series and Maclaurin Series
11. Functions of Several Variables, Limits and Continuity
12. Partial Derivatives, Tangent Planes and Linear Approximations
13. The Chain Rule and Extreme Values of Functions of Two Variables

Required Textbooks, References, Materials:

Stewart, J., Clegg, D., & Watson, S. (2020). *Calculus: Early transcendentals*. Boston, MA: Cengage Learning.

Stewart, J., Clegg, D., & Watson, S. (2020). *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:

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

Passing Level/Grading Scale:

Grades for each component will be added together at the end of the term. The final total will be translated to NorQuest College's four-point grading scale below.

Marking and Grade Conversion

Letter Grade (post-secondary programs)	Grade Point Value (post-secondary programs)	Percentage Scale (Alberta Education courses / preparatory)	Description
A+	4.0	95–100	
A	4.0	90–94	Excellent
A–	3.7	85–89	
B+	3.3	80–84	
B	3.0	75–79	Good
B–	2.7	70–74	
C+	2.3	67–69	
C	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

Safe Space Statement

At NorQuest College, we are committed to fostering a space where both students and staff can engage in honest conversations in a respectful, responsible, and thoughtful manner without fear of repercussions. 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 biological sex, sexual orientation, gender identity or expression, 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 student 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.

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 Student Code of Conduct. Student policies can be viewed on the college website at https://www.norquest.ca/resources-services/student-life/student-policies.aspx. Policies specific to a program will be in the student program manual. If you have questions, please ask your instructor or tutor.

Skills of Distinction

The course content and assessments develop logical, creative, and critical thinking of the students and their active engagement in problem-solving activities, in alignment with the New Ways of Thinking and Resilience. The course activities promote Inclusion by bridging diversity and individuality.

Academic Integrity

NorQuest College is committed to maintaining high standards of academic performance and integrity, and it is incumbent upon 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. 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 the program. Students are encouraged to familiarize themselves with the NorQuest College Student Judicial Affairs Policy and avoid any behaviour that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts, and/or participation in an offence.

Student Misconduct

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.

Non-academic misconduct 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 osja@norquest.ca

Inclusive Culture

A NorQuest education is inclusive, and students are supported and prepared to meet the needs of a diverse society with hands-on training with individuals of other cultures, religions, and genders. Although this may challenge the values and beliefs of some students, the college will assist them to stretch their comfort zones and find a balance between job success and cultural or religious beliefs.

During their programs, classrooms, labs, clinical settings, and practicums, students will encounter and work with individuals

1. From a variety of cultures and religious backgrounds
2. Who identify as female or male, as well as those who identify as LGBTQ+
3. Who have special considerations or restrictions around clothing and jewellery
4. With disabilities
5. From a different socio-economic class, caste, and/or income level
6. Who may differ significantly in age

Attendance Policy

Students are expected to attend lectures and labs at designated time and locations.

Learning Technologies

This course uses Moodle, NorQuest College's online learning management system, for course materials (http://myclass.norquest.ca). Upon registration, you will receive login information via your MyMail account. Course materials may include review materials, handouts, course outline, PowerPoints, notices from your instructor, schedule of readings, assignments, and exams. It is important that you log in and review the course materials and information regularly. For technical support, refer to this link: http://www.norquest.ca/resources-services/resources/student-tools-support/moodle-support.aspx

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 Student Services.

Technology and Electronics Policy

For many learning activities, laptops, smartphones, and other electronic devices are valuable learning tools. Your instructor will identify times when the use of these devices is not appropriate.

How to Submit Assignments

Submit a paper copy of your assignments in class.

Late Assignment Submissions

Please see the attached schedule for courses readings and due dates. Late assignments will be deducted <<%>> per day, including weekends. Exceptions will be made in cases of illness (supported by appropriate medical documentation) or with prior arrangement with the instructors. Applications for extension must be made in writing (including email) in advance of the due date.

Course Schedule:

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

Date / Class	Unit / Topic	Readings	Assessment
Lecture 1 (2 classes) **Date:**	Unit 1. Integration by Substitution and by Parts. Areas and Volumes	• Chapter 5: Section 5.5 • Chapter 6: Sections 6.1–6.3 • Chapter 7: Section 7.1 (textbook)	
Lecture 2 (2 classes) **Date:**	Unit 2. Integration of Trigonometric and Rational Functions	• Chapter 7: Sections 7.2–7.4 (textbook)	Quiz 1 on previous unit (1%)
Lab 1 (1 class) **Date:**	Units 2: Calculating Trigonometric Integrals and Integrals of Rational Functions	• Chapter 7: Sections 7.2–7.4 (textbook exercises)	Homework (not for marking)
Lecture 3 (2 classes) **Date:**	Unit 3. Strategy for Integration, Approximate Integration, Improper Integrals	• Chapter 7: Sections 7.5, 7.7–7.8 (textbook)	Quiz 2 on previous unit (1%)
Lab 2 (1 class) **Date:**	Unit 3. Calculating Proper and Improper Integrals by Various Methods	• Chapter 7: Sections 7.5, 7.7–7.8 (textbook exercises)	Homework (not for marking)

Date / Class	Unit / Topic	Readings	Assessment
Lecture 4 (2 classes) **Date:**	Unit 4. More Applications of Integration	• Chapter 8: Sections 8.1–8.5 (textbook)	Quiz 3 on previous unit (1%)
Lab 3 (1 class) **Date:**	Units 4. Arc Lengths, Area Surfaces, and Their Application	• Chapter 8: Sections 8.1–8.5 (textbook exercises)	Homework (not for marking)
Lecture 5 (2 classes) **Date:**	Unit 5. Separable Differential Equations	• Chapter 9: Sections 9.1, 9.3-9.4 (textbook)	Quiz 4 on previous unit (1%)
Lab 4 (1 class) **Date:**	Units 5. Modelling Population Growth	• Chapter 9: Sections 9.1, 9.3-9.4 (textbook exercises)	Homework (not for marking)
Lecture 6 (2 classes) **Date:**	Unit 6. Linear Differential Equations	• Chapter 9: Sections 9.5-9.6 (textbook)	Quiz 5 on previous unit (2%)
Lab 5 (1 class) **Date:**	Unit 6. Applications of Linear Differential Equations	• Chapter 9: Sections 9.5-9.6 (textbook exercises)	Homework (not for marking)
Midterm Exam 1 (1 class) **Date:**	Units 5-6	• Chapter 7: Sections 7.2-7.5, 7.7-7.8 • Chapter 8: Sections 8.1–8.5 • Chapter 9: Sections 9.1, 9.3–9.6 (textbook)	**Exam (20%)**
Lecture 7 (2 classes) **Date:**	Unit 7. Sequences and Series	• Chapter 11: Sections 11.1-11.2 (textbook)	Quiz 6 on previous unit (2%)
Lab 6 (1 class) **Date:**	Unit 7. Limits of Sequences and Sums of Series	• Chapter 11: Sections 11.1-11.2 (textbook exercises)	Homework (not for grading)
Lecture 8 (2 classes) **Date:**	Unit 8. Convergence Tests for Series	• Chapter 11: Sections 11.3-11.7 (textbook)	Quiz 7 on previous unit (2%)
Lab 7 (1 class) **Date:**	Unit 8. Testing for Convergence and Estimating Sums of Series	• Chapter 11: Sections 11.3-11.7 (textbook exercises)	Homework (not for grading)
Lecture 9 (2 classes) **Date:**	Unit 9. Power Series, Functions as Power Series	• Chapter 11: Sections 11.8-11.9 (textbook)	Quiz 8 on previous unit (2%)
Lab 8 (1 class) **Date:**	Unit 9. Power Series and Functions	• Chapter 11: Sections 11.8-11.9 (textbook exercises)	Homework (not for grading)
Lecture 10 (2 classes) **Date:**	Unit 10. Taylor Series and Maclaurin Series	• Chapter 11: Sections 11.10–11.11 (textbook)	Quiz 9 on previous unit (2%)

Date / Class	Unit / Topic	Readings	Assessment
Lab 9 (1 class) **Date:**	Unit 10. Application of Taylor Series and Maclaurin Series	• Chapter 11: Sections 11.10–11.11 (textbook exercises)	Homework (not for marking)
Midterm Exam 2 (1 class) **Date:**	Units 7-10	• Chapter 11: Sections 11.1-11.11 (textbook)	**Exam (20%)**
Lecture 11 (2 classes) **Date:**	Unit 11. Functions of Several Variables, Limits and Continuity	• Chapter 14: Sections 14.1-14.2 (textbook)	Quiz 10 on previous unit (2%)
Lab 10 (1 class) **Date:**	Unit 11. Limits and Continuity of Functions of Two and Three Variables	• Chapter 14: Sections 14.1-14.2 (textbook)	Homework (not for marking)
Lecture 12 (2 classes) **Date:**	Unit 12. Partial Derivatives, Tangent Planes and Linear Approximations	• Chapter 14: Sections 14.3-14.4 (textbook)	Quiz 11 on previous unit (2%)
Lab 11 (1 class) **Date:**	Unit 12. Calculating Partial Derivatives and Tangent Planes	• Chapter 14: Sections 14.3-14.4 (textbook)	Homework (not for marking)
Lecture 13 (2 classes) **Date: 09 Aug 2023**	Unit 13. The Chain Rule and Extreme Values of Functions of Two Variables	• Chapter 14: Sections 14.5 and 14.7 (textbook)	Quiz 12 on previous unit (2%)
Final Exam **Date:**	Units 1-10, 14	• Chapter 7: Sections 7.2 - 7.5, 7.7 - 7.8 • Chapter 8: Sections 8.1 – 8.5 • Chapter 9: Sections 9.1, 9.3 - 9.6 • Chapter 11: Sections 11.1 – 11.11 • Chapter 14: Sections 14.1 – 14.5, 14.7 (textbook)	**Exam (40%)**

Final Exam Date and Location: TBD

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

Additional Information: **This document may be subject to change.**

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 as possible problems at the end of each covered in lectures unit/chapter/topic of the required/recommended resources above.

Exams: For this course, all examinations (midterm and final exams) must be written in person. As e-proctoring services are not able to adequately capture the complexity of these exams, in order to maintain our high standards of academic integrity and to preserve transfer credit agreements with other post-secondary institutions, in-person examination is required for all students, including HyFlex. If you have any concerns about this exam requirement (for example, if you do not live in

Edmonton and cannot write your exams on campus), please contact the Arts & Sciences Program Chair directly to inquire about exam accommodation. Please note that proof of address or other supporting documentation may be required.
Student ID is required during all the midterm and final exams. Students must arrive punctually. If a student is late for an exam, the instructor has the discretion to decide whether or not the student will be allowed to write the exam. Once the exam has commenced, students must remain in the room for at least 30 minutes before they can leave. Only calculators approved by the instructor will be allowed in the exam room. The exams are not open book. Any devices capable of external communication, e.g. cellphones, iPods, or Bluetooth-enabled devices, cannot be used for exams of any type. Laptops, other computer devices, and Internet are not allowed during the exams of any type. Students should bring their own pens/pencils. Exam booklets will be provided. Permission to use the washroom during exams is at the discretion of the instructor and may require accompaniment.

Missed Midterm Exams: A student who misses a midterm exam must contact the instructor either directly or via email at the earliest possible time, and in all cases within 24 hours of the missed exam, with a valid explanation, supported with appropriate documentation if needed. If a student's absence is excused, the student may be given a chance to write a deferred exam with the Testing Services within the next five (5) days, or the weight of the midterm exam may be transferred to the final exam. A mark of zero will be given in situations where unsatisfactory explanation and/or no supporting documentation is available.

Deferred Final Exam: Students with valid reasons, e.g. documented, serious, and/or immediate family, personal, or health crises may request an exam deferral via email or official form from the instructor, who may escalate the request to the Department Chair for consideration.

Minimum Instructor Qualifications:	Master's degree in Mathematics
Last Revised By:	Dr. Dimitre Dimitrov, Maths and Stats Instructor
Revision Date:	MM DD, 2023
Approved by (Program Chair or Dean)**:**	Dr. Dana Wight
Methods of Obtaining PLAR:	Transfer Credit
Transferability to Other Institutions:	Bow Valley, Concordia, King's, MacEwan, U Alberta, U Regina

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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