UBC Math 100
2024 WT1

ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xʷməθkʷəy̓əm (Musqueam). The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on culture, history, and traditions from one generation to the next.

If you would like to know more about the joint history of UBC and Musqueam, one place to start is at UBC's Indigenous portal.

COURSE INFORMATION

Course Title	Course Code Number	Credit Value
Differential Calculus with Applications	MATH 100	3

MATH 100 involves both topics from differential calculus as well as multi-variable calculus. Students will learn the basic ideas, tools and techniques that they can use to solve problems with real-life applications.

CONTACTS

Do not email your instructor directly with questions, you are encouraged to attend office hours, and ask questions during lectures and especially during small classes. For questions about mathematics and homework, use the Piazza forum. The Math Learning Centre is also available for additional homework help.

For questions and issues regarding personal or administrative matters, use the Calculus Contact Form. This form can be found on your class Canvas site or here.

For office hours, please see Canvas → Calculus Common Room (Office hours).

INSTRUCTORS

The large class instructors:

MATH 100A	MATH 100B	MATH 100C
Lior Silberman	Mark Mac Lean	Brian Wetton
Andrew Rechnitzer	Adam Martens	

COURSE STRUCTURE

There are three "flavours" of MATH 100, each with different applications.
Flavour "A" includes applications to Physical Sciences and Engineering.
Flavour "B" includes applications to Biology and Life Sciences.
Flavour "C" includes applications to Commerce and Social Sciences.

All flavours share a similar style of homework, tests and exams. The underlying concepts taught in each flavour will largely be the same, but the context they are referenced in may be different, hence the distinction by "flavour".

Most weeks, you will attend one 2-hour lecture taught by the professor, and one 1-hour small class taught by a small class instructor and TA. There will be group work in small classes so attendance is mandatory, and will be taken.

SCHEDULE OF TOPICS

A tentative schedule of topics is included at the end of this document, it is subject to change throughout the semester and will be updated to reflect these changes.

LEARNING MATERIALS

Our course materials are linked to UBC's learning management system, Canvas.

This course uses the UBC MATH 100 textbook. This is a free online textbook created by UBC professors for UBC students; there are no physical copies available but the PDF file is easily printable (given the link, copy shops will print and bind). There may be some reference to the CLP-1, OIL, or Differential Calculus for the Life Sciences textbooks; also free and available online.

Assessments of Learning

GRADE CALCULATION

Your provisional course grade will be calculated as follows:

10% WeBWorK assignments
20% Tests
10% Group Projects
10% Engagement
50% Final exam

The instructional team reserves the right to scale test grades and all failing grades are double-checked before they are submitted.

WeBWorK ASSIGNMENTS

There are 13 scored WeBWorK assignments, of these only your 11 best scoring WeBWorK assignments will be considered when calculating your provisional grade. This is intended to account for technical difficulties, illness, and other personal situations.

WeBWork questions come in a number of different formats, and some questions will require you to type out an exact answer in order for the question to be correct. These answers are not always numbers, so making a typo could cost you marks. It is suggested that you click the PREVIEW ANSWERS button before you submit your work. If you have questions about formatting while you are doing your assignments or practicing, ask them on Piazza.

If you would like to get more familiar with WeBWorK, it is also encouraged that you complete the **optional** "WeBWorK Tutorial" quiz. **The "WeBWorK Tutorial" is not scored, and does not contribute to your course grade.**

If you would like to get some Precalculus practice, it is encouraged that you do some Pre-Calculus WeBWorK lessons in the Precalculus Review course that you can find in Canvas courses. **These lessons are not scored, and do not contribute to your course grade.**

TESTS

There are two in-term tests in MATH 100, each worth 10% of your provisional grade; both are written individually, not in groups. Information required to sit the in-term tests will be published on the Canvas "Tests" page.

GROUP PROJECTS

There are three group projects, that together make up 10% of your final grade. These projects explore and extend core concepts. They may be challenging: it is normal to spend several days

on each one. Assignments are graded on clarity and coherence as well as correctness. They must be well written, clearly presented, and typed; handwritten submissions will receive a grade of 0.

It is expected and encouraged for your group to work with other groups on these assignments. However, your group must write up its assignment independently, and any ideas inspired by discussions with students outside your group must be acknowledged in your submission.

Students are largely expected to resolve interpersonal issues themselves, iPeer should be used to help you do this by expressing concerns to your team members anonymously. If there are major dysfunctions in your group, you can report them via the Calculus Contact Form, this should be done as early as possible in the semester.

ENGAGEMENT

Engagement is worth 10% of your final grade.

Small classes: Engagement means not only attendance, but active participation: asking and answering questions, contributing in team problem solving, and refraining from unrelated activities (e.g. checking your phone). Small class time is not the time for you to work on WeBWorK or the group projects. You may skip one small class without penalty. This is intended to account for illness and other personal situations; otherwise you will lose 1 engagement point for every small class you are absent or unengaged.

Reflection questions: Each group project includes a reflection section. Reflection is an important ingredient of success, especially given the significant differences between high school and university-level mathematics. You will lose 1 engagement point for every reflection question you do not answer.

Diagnostic test: This is a test written on WeBWorK to ensure you can access the necessary resources and navigate the WeBWorK assignments. You will lose 1 engagement point if you do not submit an answer for every question on the diagnostic test.

You are required to complete a WeBWorK Diagnostic Test to check in on your precalculus skills. By answering as true to your current ability as possible, without any external aids, you will gain useful information about what precalculus skills you may need to brush up on in order to succeed in this course. **This test is not for marks** and does not count as one of your 11 WeBWorK assignments; you will not be penalized for incorrect answers, nor rewarded for correct ones. However, **completion of the Diagnostic test contributes to your course engagement**; if you do not complete it your engagement score will be penalized.

iPeer evaluations: After submitting each group project you will be asked to complete an evaluation of the other members of your group through iPeer. You will lose 1 engagement point if you do not complete an evaluation for all other members of your group.

Other engagement grades: There may be other opportunities to participate throughout the term. In some cases, failing to complete an engagement task will result in a penalty.

FINAL EXAM

The final exam is an evaluative assessment of your understanding of the course material, information relating to the exam will be published on Canvas. The date and time of the exam will be published on Workday later in the semester; please do not make travel arrangements prior to its announcement.

Final exams are not returned, but if you would like to view yours, you need to fill out the exam viewing form and follow the instructions provided.

UNIVERSITY POLICIES

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available here.

Classes may be cancelled under extreme weather (most commonly heavy snowfall), cancellation will always be announced on Canvas in accordance with weather advisory posted by UBC. You can check official campus notifications here.

MATH 100 ACADEMIC POLICIES

This is a long-winded and exhaustive description of the academic policies governing this course. It complements the usual academic policies governing all courses at UBC listed under "University Policies".

LATE SUBMISSIONS, MISSED ASSESSMENTS & MISSED CLASSES

Group projects will be accepted up to 24 hours after the submission deadline, assignments submitted during this window are subject to a 15% penalty. Group projects will not be accepted more than 24 hours after the submission deadline.

WeBWorK assignments will not be accepted after the submission deadline. Only the highest scoring 11 of the first 13 WeBWorK assignments are considered in the calculation of your final grade, this is intended to reduce administrative burden while accounting for illness, injury and other personal circumstances that prevent students from completing these assignments.

Tests are written in-class. If you are unwell or other personal circumstances unavoidably prevent you from writing an in-term test, please request concession via the Calculus Contact Form. Circumstances which warrant concession are described in CONCESSIONS. Short term illnesses are self-declared; medical documentation from a physician is not required.

The **final exam** for this course is a major assessment, no-one in the Math department (instructors, staff, TA's, the department head) can grant concession for this assessment. If you are unwell or other personal circumstances create a substantial and unavoidable obstacle in writing the final exam, do not start writing it, instead contact your faculty's advising office as soon as possible. The process for obtaining a concession on the final exam differs by faculty (Science, Arts, APSC, etc.), though it is typically more rigorous than obtaining an in-term concession; be prepared to provide documents (e.g. a medical certificate) supporting your request.

If you are absent from a **large class** you do not have to inform anyone of your absence. It is expected that you will be responsible for your own learning and catch up on the material missed in your own time; helpful resources such as lecture notes (or for some sections, recordings) are posted on Canvas.

Small classes are where you earn your engagement points. **You do not need to inform anyone of your first small class absence**: All students can be absent from one small class without consequence, this small class, despite not appearing as 'excused' in the Canvas Gradebook, will not affect your engagement score for this class. The policy of forgiving one absence is intended to ease administrative burden and will be used to account for the first instance of illness, injury or other personal circumstance that prevents you from attending class.

If you are absent from additional small classes please complete the calculus contact form, briefly describing which small class you missed and why you were absent; in most cases of illness/injury supporting documentation is not required. Again it is expected you will be responsible for your own learning and catch up on missed material in your own time.

CONCESSIONS

Requests for in-term concessions are to be directed to the Calculus Contact Form and will be treated in accordance with the UBC senate rulings for academic concession. Grounds for academic concession may exist when a student's personal circumstance unexpectedly or unavoidably hinders or prevents them from fulfilling the requirements of a course in a timely manner.

Concessions for missed assessments are considered and offered on a case-by-case basis, no two students will be undertaking the academic load of this course in the same way, and as such require different consideration; a friend or fellow class member receiving concession for an assessment does not guarantee the same or any concession will be offered to you.

Concessions cannot be offered to students where grounds for concession depend upon long-term conditions (chronic injuries, illnesses, mental health conditions, etc.) without endorsement from the student's administering faculty or the Centre for Accessibility (CfA).

Requests for concession must be delivered in a reasonable time, unreasonably late requests will be deferred to your administering faculty.

Falling ill on the day of an assignment deadline (excluding tests) or experiencing technical issues in general does not qualify for concession or waiving of any late penalties; this is something you should plan around and take precautions against.

Group projects are made available for an extended time (normally 2-3 weeks) and are completed in groups, these factors generally preclude them from concession however, requests will be considered on a case-by-case basis. The standard concession offered to students who qualify is to replace the score of the missed group project with the average score of the student's remaining group projects.

WeBWorK assignments are available for a week each, are completed online, and can be completed from anywhere, the high accessibility of these assignments generally preclude them from concession however, requests are considered on a case-by-case basis. The standard concession offered to students who qualify is to replace the score of the missed WeBWorK assignment with the average score of the student's remaining WeBWorK assignments.

Tests are major assessments in this course, each worth 10% of your final grade. If you are absent for an in-term test, with valid grounds for concession, the standard concession provided is to shift the weight of that test to the final exam. Being absent for both in-term tests is cause for concern, upon requesting concession for your second in-term test you will be directed to request concession from your administering faculty's advising office (or equivalent).

The **final exam** is not an in-term assessment. As described in LATE SUBMISSIONS & MISSED ASSESSMENTS instructors and staff in the Math department cannot offer concession on the Final Exam; you will be directed to request concession from your administering faculty. Obtaining a Standing Deferred (SD) status in MATH 100 is the only concession available for the Final Exam, and may only be granted by the advising office of your administering faculty, read more about standing deferred status here

REGRADE REQUESTS

Unless announced otherwise regrade requests should be submitted via the Calculus Contact Form.

Regrade requests for **Group projects** can be submitted up to 48 hours after the marked assignment is returned.

Regrade requests for **WeBWorK assignments** will not be accepted. If an error exists in a WeBWorK question you should check Piazza for a post that describes the error, or if no post exists you should create one describing the error.

The process for requesting a regrade of **tests** will be described on the "in-term exams" page on Canvas, and announced upon release of in-term test grades.

Requesting a regrade of the **final exam** is a formal process requested via enrolment services, known as a review of assigned standing (more information here). It is recommended that you request a viewing of your final exam prior to requesting a review of assigned standing.

TENTATIVE SCHEDULE OF TOPICS

Week #	Large class date (by section)			Topics
	1A_	1B_	1C_	
1	Sept. 4	Sept. 5	Sept. 6	Comparing power, logarithmic, exponential and trigonometric functions; basic curve sketching; introduction to limits
2	Sept. 11	Sept. 12	Sept. 13	Limits; horizontal and vertical asymptotes; continuity; slopes of lines
3	Sept. 18	Sept. 19	Sept. 20	The derivative; tangent lines; linear approximations; the exponential function
4	Sept. 25	Sept. 26	Sept. 27	The linearity of differentiation; the Power, Product and Quotient Rules; trigonometric functions and their derivatives
5	Oct. 2	Oct. 3	Oct. 4	The chain rule; logarithmic differentiation; implicit differentiation
6	Oct. 9	Oct. 10	Oct. 11	**test 1** ; Inverse trigonometric functions; derivatives of inverse trigonometric functions
7	Oct. 16	Oct. 17	Oct. 18	Related rates; l'Hopital's rule
8	Oct. 23	Oct. 24	Oct. 25	Sketching graphs; curve sketching
9	Oct. 30	Oct. 31	Nov. 1	Optimization; linear approximation
10	Nov. 6	Nov. 7	Nov. 8	Higher degree approximations

Tentative schedule of topics cont.

Week #	Large class date (by section)			Topics
	1A_	1B_	1C_	
11	Nov. 13 (no class)	Nov. 14	Nov. 15	(A): Error in Taylor polynomials (B): differential equations: verifying solutions; Initial value problems; first-order linear differential equations; slope fields (C): Introduction to multivariable functions; partial derivatives
12	Nov. 20	Nov. 21	Nov. 22	(ALL): **test 2** (A): Newton's Method (B): Numerical methods for solving differential equations; Euler's method (C): Critical points and optimization in two variables
13	Nov. 27	Nov. 28	Nov. 29	(A): differential equations: verifying solutions; initial value problems; first-order linear differential equations; Qualitative analysis of differential equations (B): Qualitative Analysis of differential equations: phase portraits; logistic equation (C): Constrained Optimization; into to Lagrange multipliers
14	Dec. 4	Dec. 5	Dec. 6	(A): Numerical methods for solving differential equations (B): Disease Dynamics; tank mixing (C): Method of Lagrange multipliers