

# Syllabus for MATH 110 Differential Calculus

## Textbook

We use two free online open education resources (OERs) by Matthew Boelkins:

- APC: Active Prelude to Calculus (<https://activecalculus.org/prelude/book-1.html>)
- AC: Active Calculus (<https://activecalculus.org/single/book-1.html>)

## Office hours

**MWF 10:00 am-11:00 am. Monday and Wednesday office hours will online (on Zoom) whereas Friday ones will be in-person at my office, Math 235.** This way, if you have questions from the class material, you can think about it a little to understand on your own, and if you are still confused, you can login to the office hours and I can answer your questions, whether they are on the topics we covered in class that day, or about the other topics you need clarifications on.

If you cannot make it to the office hours and still have questions or just want to chat about math, university, and/or random stuff, don't hesitate to send me an email, I can either try to answer your question over the mail, or if it is too complicated to explain over the mail, I can try to schedule an extra office hour for you.

I also have open door policy, meaning that if my door is open and I am not working on something urgent, you are welcome to come in and ask your questions even when it is not my office hours.

## Contact Information

My office is in the Math Building, room 235.

If you want to send me an email, please use the Canvas' email client.

## Course components

There are 5 main component to the course.

1. **Pre-week work:** There is going to be a short video (10-20 mins-ish) that would be a little reminder of some of the pre-calculus material that we are going to need, or would be important to remind ourselves. Even though watching these videos is not mandatory, they will be followed by a very short multiple-choice quiz (which will be graded) that helps us remember some important math skills. I will also be posting the learning objectives for the week to help you self-regulate your studying more efficient.

2. **Lectures:** The lectures are going to be in-person. While I am not going to check attendance, it is ***strongly recommended*** to attend lectures regularly. We are going to have some in class activities, discussions and maybe even demonstrations that would be very beneficial to you. I will also be recording the lectures over Panopto (link is on Canvas). Please keep in mind that the streaming is one way. So there will not be a chat option for you to ask questions if you have some if you stream the lecture. In addition to the live stream, the recordings will be available for you to watch after class on the same link.

I will also provide written notes after each lecture.

3. **Homework:** There are going to be weekly homework assignments that will be very helpful for you to apply the things you have learned that would solidify your knowledge. Homework will be delivered on WeBWork and provides essential practice and immediate feedback on the key skills taught in the course.

I will drop the lowest 2 of your homework grades at the end of the course to compensate the times you miss, couldn't finish a homework assignment due to any reason. Because of that, there will be no extension for homeworks. If you are going to miss more than 2 homework sets, please get in touch with me and let me know.

To access WeBWork go to Assignments on the MATH 110 Canvas site.

4. **Workshops:** Each student in MATH 110 must be registered in a weekly workshop. These are problem-solving sessions where students work in groups on challenging problems. Workshops are an integral part of the course, and ***attendance is mandatory***; more information on the Workshops page (link on the common MATH 110 Canvas site).

5. **Exams:** All exams will be in-person. There will be two in-class midterms (on **October 20** and **March 1**), two end-of-term exams (in December and April). Both end-of-term exams are cumulative and their time and place are determined by the university.

## **Covid Safety**

For our in-person meetings in this class, it is important that all of us feel as comfortable as possible engaging in class activities while sharing an indoor space. Non-medical masks that cover our noses and mouths are a primary tool to make it harder for Covid-19 to find a new host. Though not mandatory, please wear a mask during our class meetings, for your own protection, and the safety and comfort of everyone else in the class. If you have not yet had a chance to get vaccinated against Covid-19, vaccines are available to you, free. The higher the rate of vaccination in our community overall, the lower the chance of spreading this virus. You are an important part of the UBC community. Please arrange to get vaccinated if you have not already done so.

## **Attendance in case of sickness**

If you feel ill, you should *not* attend class in person. Stay home and use the self-assessment tool at <https://bc.thrive.health/>

for guidance. This includes exams as well.

There will be class recordings that you can watch and I will also be available to answer your follow up questions during office hours.

If you do not feel ill, you are expected to attend class in person. Math is challenging; and active, in-person participation is important to your academic success.

If I feel ill, as long as I don't feel too ill, I will move that day's lecture online. I will try to let you know as soon as I can through Canvas announcements, and you should be notified via email or Canvas apps notification immediately, so please check your emails and Canvas regularly. If you end up being in class and I won't be able to make it to the class, you can just take a seat in the classroom and login to the lecture. Using a pair of headphones may be considerate in such situation. If I get sick enough that I cannot teach, I will try to find a replacement for the lecture(s), or provide recordings and lecture notes.

### Grading Scheme

- Final grades normally will be computed based on the following formula:

**30% April Exam + 20% December Exam + 10% October exam (October 20) + 10% March Exam (March 1) + 15% Workshops (10% participation + 5% self-assessment (or something equivalent)) + 10% WebWork Assignments + 5% Pre-week quizzes (very very short, multiple choice).**

Note: some of the grades *may be scaled*, but that decision is not going to be made per exam, before I have all the grades.

- Requirements for passing the course: You need to achieve a minimum of 30% on the April exam and a minimum overall score of 50% to pass MATH 110. Students who fail the course solely because they have failed to achieve the 30% minimum on the April exam will receive a grade of 47% in the course.

Passing the April exam may not be sufficient to ensure a student passes MATH 110 if they have failed the term work.

### Course Policies

1. Final exams: The final exams are going to be in-person. The December and April exams follow UBC exam guidelines for final exams (that is, the December exam follows the same policies as a "final exam"). These examinations account for a total of 50% of a your final course grade, with the December exam accounting for 20% and the April exam for 30% of your grade.

2. No calculators and no internet search and other memory aids are allowed at quizzes and examinations. All examinations are closed-books tests.
3. Midterms: There are two in-class in-person midterm examinations in MATH 110. **The dates, which are subject to change, are posted above.**
4. Missing examinations:
  - Missing midterms: **There are no make-up midterms in this course.** Missing a midterm examination for a valid reason normally results in the weight of that midterm being transferred to the end-of-term examination for that term. Examples of valid reasons include illness, arriving campus late due to visa issues, travel restrictions, etc., and travel to play a scheduled game for a varsity team. Examples of reasons that are not valid include conflicts with personal travel schedules or conflicts with work schedules. Any student who misses a midterm is to present to me their self-declaration form for reporting a missed assessment to within 72 hours of the midterm date. This policy conforms with the UBC Vancouver Senate's [Academic Concession Policy V-135](#) and students are advised to read this policy carefully.
  - Missing the End-of-term examinations: A student will need to present their situation to the Dean's Office of their Faculty to be considered for a deferred exam. See the Calendar for [detailed regulations](#). The student's performance in a course up to the examination is taken into consideration in granting a deferred exam status (e.g. failing badly generally means you will not be granted a deferred exam). In MATH 110, generally if a student misses the December exam, the weight of that exam is transferred to the April exam. If a student misses the April exam, they sit the next available exam for the course, which could be several months after the original exam was schedule. ***Note that personal travel schedule is NOT a valid reason for missing an end-of-term examination and students who miss either one of the end-of-term exams for this reason will receive a grade of 0 on that exam and fail the course.***

### Topics Covered in Class

Here is our expected progress through the course laid out in weeks. A week is roughly 3 lecture hours. Note the order of topics may change.

### Term 1

**Week 1 How do we measure velocity? An introduction to modelling with functions. AC:** Section 1.1 and 1.1.1. **APC:** 1.1, 1.2, and 1.4. **Additional topics:** Formula for distance between points, properties of perpendicular and parallel lines.

**Week 2 Review of functions–Part I.** APC 1.5 (except 1.5.3), 1.6, 1.8.1, 1.9

**Week 3 Notion of limit and the derivative.** APC: 1.3 (except 1.3.2). AC: 1.1.2, 1.2, 1.3

**Week 4 A closer look at limits.** AC: 1.7 (except 1.7.3). **Additional Topics:** Infinite limits and vertical asymptotes (parts of 2.8.2)

**Week 5 The derivative function.** AC: 1.4, 1.7.3

**Week 6 Computing derivatives of simple functions.** AC 2.1 (except exponential functions)

**Week 7 Review of functions–Part II.** APC: 3.1 (except 3.1.3), 3.3. AC: 2.1.2

**Week 8 Review of functions–Part III.** APC: 2.1, 2.2, 2.3 (except 2.3.4), 4.1.

**Week 9 More derivative formulas.** AC: 2.2, 2.3, 2.4

**Week 10 The Chain Rule.** AC: 2.5

**Week 11 Review of Functions–Part IV.** APC: 1.7, 3.4, 3.5

**Week 12 Growth models**

**Week 13 Acceleration and higher derivatives**

## **Term 2**

**Week 1 Limits at infinity** APC: 5.1, 5.2.1, 5.4.1

**Week 2 The Mean Value Theorem and increasing and decreasing functions** Extra notes, AC: 1.6.1

**Week 3 The second derivative and concavity** AC: 1.6.2, 1.6.3

**Week 4 Application 1: Approximations** AC: 1.8, Pre-activities 8.3.1, 8.4.1, 8.5.1, extra notes.

**Week 5 Application 2: Local extreme values of a function** AC: 3.1

**Week 6 Application 3: Global extreme values of a function** AC: 3.3, 3.4

**Week 7 Application 3: (cont'd)** AC: 3.3, 3.4

**Week 8 Application 4: Curve sketching** Extra notes

**Week 9 Application 5: Using derivatives to evaluate limits (L'Hopital's rule)** AC: 2.8

**Week 10 Application 6: Tangents to functions given implicitly** AC: 2.7

**Week 11 Application 7: Related Rates** AC: 3.5

**Week 12 Application 7: (cont'ed)** AC: 3.5

**Week 13 Antiderivatives** Extra notes

**Academic Misconduct:**

1. UBC takes cheating incidents very seriously. After due investigation, students found guilty of cheating on tests and examinations are usually given a final grade of 0 in the course and suspended from UBC for one year. [More information.](#)
2. While students are encouraged to study together, they should be aware that blatant copying of another student's work is a serious breach of academic integrity. Please discuss with your instructors their expectations for acceptable collaboration on any assigned coursework. Cases of suspected cheating will be investigated thoroughly.
3. Note that academic misconduct includes misrepresenting a medical excuse or other personal situation for the purposes of postponing an examination or quiz or otherwise obtaining an academic concession.