

MATH 110 ALL Differential Calculus

MATH 110 is a two-term course in Differential Calculus. The main topics covered are Limits and Derivatives of elementary functions, Rates, Optimization, Graphing, and Approximations. The early part of the course also provides a review of some key algebra skills and precalculus concepts, such as solving equations, working with functions, basic trigonometry, properties of exponentials and logarithms.

I know that being a first year student and during a pandemic on top of that may be challenging and overwhelming at times. If you fall behind, have trouble understanding some certain topics, or just have concerns about the course (or life in general), don't hesitate to login to the office hours or to send me an email. I try to respond to my email within a day or two.

Instructors

Section 004: Seckin Demirbas (term 1 and 2)

Office hours: MWF 10:00-11:00 (i.e. right when the regular class time ends. This way, if you have questions, you can keep logged in and I can answer your questions about the topics we just covered, or about the other topics you need clarifications on).

If you cannot make it to the office hours and still have questions, please 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.

Textbook

We use two free online textbooks 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>)

Topics

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

Course components

There are 4 main component to the course.

1. **Lectures:** The lectures are going to be online, over Zoom. The information on how to login to the lectures is going to be posted on the course Canvas site. While attendance is not usually checked, it is *strongly recommended* to attend lectures regularly. I will run in-class activities (worksheets, polls, etc.) that will be highly beneficial to you all.
2. **Homework:** There are frequent homework assignments to help you learn the material effectively. Homework will be delivered on WeBWork and provides essential practice and immediate feedback on the key skills taught in the course. To access WeBWork go to Assignments on the common MATH 110 Canvas site.

I will also post some more interesting, more involved questions on Canvas every now and then for you to work on. Those are not going to be collected, but I strongly suggest you work on them. They will help you solidify your understanding of the topics at hand.

3. **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).
4. **Assessments:** Learning is assessed using online homework, at least two in-class midterms (on **October 16** and **February 24**), workshop activities, weekly quizzes (in the workshops), and two end-of-term exams (in December and April). Both end-of-term exams are cumulative.

Grading Scheme

- Final grades normally will be computed based on the following formula:
30% April Exam + 20% December Exam + 10% October exam + 10% February Exam + 15% Workshops (10% participation + 5% quizzes (or something equivalent)) + 15% WebWork Assignments.

- 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: Students 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 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 50% of a student's final grade, with the December exam accounting for 20% and the April exam for 30% of a student's grade.
2. No calculators and no formula sheets, 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 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 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 their instructor the Department of Mathematics self-declaration form for reporting a missed assessment to their instructor 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. Please note that a student who misses a midterm examination and has otherwise not completed a substantial portion of the term work normally shall not be admitted to the final examination.
 - Missing quizzes: If a student miss one quiz per term without justification, the student's grade will not be affected. Any student who misses more than one quiz in a term should send me the Department of Mathematics self-declaration form for reporting a missed assessment to their Workshop Instructor within 72 hours of the midterm date. Examples of valid reasons for missing an assessment are listed in the section above ("Missing midterms"). Failure to submit a self-declaration will result in the student receiving a grade of 0 on that quiz. There are no make-up quizzes in this course.

- 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.***

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.