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.

Instructors

The instructor-in-charge for MATH 110 is Dr. Costanza Piccolo.

The instructors of the individual sections are:
1. Section 001: Mr. Amin Soofiani (term1), TBA (term 2)
2. Section 003: Ms Charlotte Trainor (term1), TBA (term 2)
3. Section 004: Dr. Costanza Piccolo (term 1 and 2)

Office hours are posted on the section-specific Canvas site.

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.

Midterm on Tuesday, October 22 for Section 3 and Wednesday, October 23 for Section 1 & 4

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

List of topics: Implicit differentiation, Rates problems, Approximations, Graphing and Asymptotic behaviour, Optimization, Antiderivatives.

A detailed schedule will be posted in January.

Course components

There are 4 main components to the course.

1. **Lectures:** All sections cover similar material at roughly the same pace. While attendance is not usually checked, it is *strongly recommended* to attend lectures regularly. Your instructor may run in-class activities (clicker questions, worksheets, etc.) that may or may not count for marks.
2. **Homework**: There are frequent homework assignments to help you learn the material effectively. Homework consists of an online component and a written component.
    o   Online homework is delivered on WeBWorK and provides essential practice and immediate feedback on the key skills taught in the course. WeBWorK assignments are common to all sections. To access WeBWorK go to Assignments on the common MATH 110 Canvas site.

- o Written homework provides further practice and feedback on communicating mathematics and problem-solving. Written assignments are specific to each section, refer to your section Canvas site for more information.
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, two in-class midterms (in October and February), workshop activities, weekly quizzes (in the workshops), section-specific assignments, and two end-of-term exams (in December and April). Most assessments are common to all sections. 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) + 10% WebWork Assignments + 5% section-specific assignments.
- Note: grades *may be scaled* to ensure fairness across sections and consistency with departmental expectations; this does not mean the distribution will be the same for all sections. The end-of-term exams are common to all sections and may be used to normalize grades across sections.
- 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 are common to all sections of MATH 110 and 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. Generally the final examinations are not weighted higher for students who perform better on the final examinations than they did during the term. In particular, the April exam will not be weighted more than 30% of a student's grade for students who perform better on that exam than they did on the December exam, although some allowance *may* be made for students who performed *much* better during the second semester and the April exam. (In practice, this rarely happens and the

criterion will be set by the Instructor-in-charge and applied uniformly across sections.) All examinations, including midterms, are board marked to ensure consistency and fairness across sections.

2. <u>Scaling of mark distributions</u>: The final mark distribution of the term work of each section may be scaled based on the final exam mark distribution of that section. These adjusted term marks would then be used to compute a student's final grade. Any scaling is performed to ensure fairness in the final grades across sections.

3. <u>No unauthorized devices</u> are allowed at the examinations, including quizzes. This includes cell phones, smart phones, music players, and all other devices.

4. <u>No calculators</u> and <u>no formula sheets</u> and other memory aids are allowed at quizzes and examinations. All examinations are closed-books tests.

5. <u>Midterms</u>: There are two in-class midterm examinations in MATH 110. The dates, which are subject to change, are posted above (Important Dates).

6. Missing examinations:
   - <u>Missing midterms</u>: 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.
   - <u>Missing quizzes</u>: 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 is to present to their instructor 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.
   - <u>Missing the End-of-term examinations</u>: 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.

First year can be an overwhelming experience for many students. If you find yourself having serious academic difficulties in this course, it is best to talk to your instructor as soon as you can.

Extra Help

- Each instructor will hold office hours each week for students in his/her section of MATH 110. These office hours may be by appointment.
- **Math Learning Centre:** There is a [Math Learning Centre] in LSK 301. Graduate student TAs are there to help you during the posted hours.