Math 100: Differential Calculus with Applications
Section V02, Spring Term, 2024

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Course Website	`http://www.math.ubc.ca/~lior/teaching/2324/100_W24/`
Contact me at	`lior@math.ubc.ca` or at MATX 1112
My Website	`http://www.math.ubc.ca/~lior/`
Class	TTh 8:00-9:30 at ORCH 3004
Office Hours	TBA
Textbook	None required; see below for recommendations
Prerequisites	A score of 80% or higher in BC Pre-calculus 12. High school calculus is strongly recommended.

About the course

> [Physics] is written in this grand book—I mean the universe—which stands continually open to our gaze, but it cannot be understood unless one first learns to comprehend the language and interpret the characters in which it is written. It is written in the language of mathematics,
>
> Galileo Galilei, *The Assayer*

The goal of this course is to learn some of the language by which scientists describe the world around us. Topics will include:

- Asymptotics, limits, and continuity;
- Linear approximation and the derivative, differentiation rules;
- Taylor expansion;
- Application of the derivative; graphing and optimization;
- Numerical methods.

You will be expected to *master* the basic ideas taught in the course.

Textbook

We will primarily follow the CLP Notes [2], supplemented by readings from [3, 1]. That said any differential calculus textbook is likely to work.

Teaching and learning

What you can expect from me

- To come prepared for class: knowing what we want to achieve, and how we will achieve it.
- Various approaches to the material including lecturing, and in-class work.
- Responses to your questions and concerns: continuously in class and during my office hours, within reasonable time by e-mail outside class.
- Timely and clear explanations of what is correct in your work and what is not, and how you can improve.

What's expected from you

- Come prepared to class, having read the relevant material in the textbook or notes and having done homework exercises and problem sets.
- To actively participate in the course: doing the reading, thinking about the material, and **asking questions**.
- Written work that is readable and communicates your ideas.
- **Asking questions** when you don't understand, or want to learn more: most importantly in class; but also during office hours. Also, ask your colleagues questions outside of class – you will both benefit from the discussion!
- Working on the practice homework and =problem sets is *absolutely essential* for learning the material. **It is extremely rare for students who skip practice to succeed on exams.**

Official Policies

Learning

- For every lecture, there will be assigned pre-class reading from one of the textbooks. The discussions in class will assume that you have read these chapters beforehand. Your main goals are to
  - ***Learn the vocabulary*** (and notation) for the upcoming lecture.
  - Work throug some examples
  - Get a preview of the *ideas* that will be discussed.
- Every week there will be a *tutorial* with practice problems.
- Every week there will be further suggested homework exercizes.
  - These are intended to for technical practice of the material you have learned, and also to explore new ideas that will be covered in class later.
  - This homework is not to be handed in.
- There will be four *written homework assignments.*
  - These will help you learn to express your thoughts.
  - Problems might be vauge or open-ended.

Assessment

- Written work should be presented carefully, in complete English sentences, and with sufficient detail. A "correct sequence of formulas" might only merit partial credit.
- Missed work will be scored zero. Requests for academic concession should be made to the instructor using the department's academic concession form.
- There will be four written group homework assignments, to be submitted on Canvas by the indicated due date.
  - Problems will be posted online, on the section website.
  - Solutions must be typeset, prferably using LaTeX (e.g. on Overleaf).
  - Each group shall consist of three students.
  - Both the writing and the ideas will be evaluated.
- There will be a two 50-minute midterm exams.
  - If a midterm exam conflicts with a religious observance, please contact me *at least two weeks ahead of time* so we can make appropriate arrangements.
- Midterm I: mastery
  - Midterm I, as well as section I of the final exam, will consist of ~15 short problems employing the basic ideas of the course.
  - Problems will only be marked for correctness of the final answer.
  - There will be two additional retakes offered.
  - Passing the course is ***conditioned*** on scoring 12/15 on one of the four opportunities listed here.
- Midterm II: problem-solving
  - Midterm II, as well as section II of the final exam, will consist of a small number of more difficult problems.
  - There will be part marks, and marking will mostly evaluate your *reasoning*.
- There will be a 150-minute final exam in the usual exam period.
- Your course grade will be calculated as follows:

Written homework: 10%
Midterm I: 20%
Midterm II: 20%
Final Exam: 50%

Other policies

- If you need special accommodations in this course, please contact the Centre for Accessibility.
- In case of inclement weather classes will be held online if possible and cancelled otherwise.

Resources and Support

- There will be a Piazza discussion board (access through Canvas).
- The Math Learning Centre is open every day, in-person and on-line.
- Vantage College Academic Advising is also available to help.
- We will also follow the standard policies of the mathematics department.

University boilerplace

The following is a statement by UBC; is it not due to your instructor.

> 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.

References

[1] Belevan, Hamidi, Malhotra, and Yaeger, *Optimal, Integral, Likely.*

[2] Feldman, Rechnitzer, and Yaeger, *CLP-1 Differential Calculus textbook*

[3] Keshet, *Differential Calculus for the Life Sciences.*