

## ACKNOWLEDGEMENT

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UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the  $x^w m\theta k^w \acute{y}\acute{e}m$  (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on in their culture, history, and traditions from one generation to the next on this site.

## COURSE INFORMATION

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Course Title	Course Number	Webpage	Credit Value
Differential calculus with applications to physical sciences and engineering	MATH 100	Through Canvas	3

First day of teaching: Sep 08; Last day of teaching: Dec 07.

University closed: Sep 30, Oct 11 and Nov 11; Midterm break: Nov 10-12.

## PREREQUISITES

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High-school calculus and a score of 80% or higher in BC Principles of Mathematics 12 or Pre-calculus 12.

## SECTIONS

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Course Instructor(s)	Contact Details	Office Hours
Sven Bachmann, Instructor-in-charge & Section 103	By email: sbach@math.ubc.ca	Zoom: Monday 20:30-21:30 Friday 10:30-11:30
Boaz Elazar, Sections 101, 106	By email: boaz@math.ubc.ca	Zoom: Monday 21:15-22:15 Wednesday 11:30-12:30
Nahid Walji, Section 102	By email: nwalji@math.ubc.ca	Zoom: Monday 14:30-15:30pm Friday 13:00-14:00
Dragos Ghioca, Section 105	By email: dghioca@math.ubc.ca	Zoom: Tuesday 11:45-13:00 Thursday 14:45-16:00

Christoph Ortner, Section 107	By email: ortner@math.ubc.ca	Zoom: Tuesday 20:30-21:30 Friday 10:30-11:30
Guodong Gai, Section 108	By email: guodong.gai@math.ubc.ca	Zoom: Tuesday 16:00-17:00 Friday 16:00-17:00
Lior Silberman, Sections 109, 701	By email: lior@math.ubc.ca	Chapman Learning Commons: Monday 12:30-14:00, Zoom: Tuesday 21:30-23:00, MATX 1112: Thursday 11:00-12:00

## SPECIAL HEALTH RECOMMENDATION

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Everyone is expected to follow federal, provincial and UBC's rules and recommendations at all times.

Wearing a **mask covering nose and mouth** in classrooms, tutorial sessions, the math learning centre, and building hallways is mandatory. Students are asked not to eat or drink during classes. Anyone who cannot wear a mask should tell their instructor immediately.

Any student experiencing symptoms of Covid-19 is asked to self-isolate at home. There will be one complete set of recorded lectures available online in Canvas.

If you are sick on a midterm exam day, do not attend the exam and please email the instructor as soon as you are confident you should not come to the scheduled exam.

If you are sick on a final exam day, do not attend the exam. You must apply for deferred standing (an academic concession) through Science Advising no later than 48 hours after the missed final exam/assignment.

## COURSE STRUCTURE & LEARNING OUTCOMES

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The three, respectively two, weekly lectures guide the students through the fundamental concepts of real analysis in a non-technical fashion: limits, continuity and differentiability. Beyond the basic definitions and arithmetic rules, the course focusses on applications commonly used in the sciences: optimization and the identification of extrema, rates and exponential laws, approximations. The lectures are complemented by weekly homework exercises which are an essential part of the learning process.

Students should supplement the lectures by reading the corresponding material in the recommended textbook, which may provide a slightly different perspective on the topics and covers many more examples. Many other textbooks are freely available through the UBC library. There are excellent textbooks, lecture notes and videos online, even more terrible and potentially wrong ones. It is assumed that student will spend 2-3 hours studying at home for each hour of class

time, in other words 6-9 hours per week.

Questions and comments should be addressed to your section's instructor. Questions whose answer can be found on the present syllabus will not be answered.

## SCHEDULE OF TOPICS

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The sections below refer to the CLP textbook. The precise schedule is subject to small changes and minimal discrepancies between sections. By 'Week', we roughly mean Wednesday to Tuesday.

- Week 1: Introduction to the course; Limits, infinite limits. 1.1-1.4
- Week 2: Squeeze theorem; Limits at infinity; Continuity. 1.5-1.6
- Week 3: The intermediate value theorem and zero-finding, the derivative. 1.6, 2.1-2.4
- Week 4: Computing derivatives; Exponentials and trigonometric functions. 2.6-2.8
- Week 5: The chain rule; Inverse functions, logarithms, implicit differentiation. 2.9-2.11
- Week 6: Inverse trigonometric functions; Rates, exponential growth and decay. 2.12, 3.1, 3.3
- Week 7: Related rates; Mean value theorem; Linear approximation. 3.2, 2.13, 3.4
- Week 8: Taylor polynomials, approximations; Optimisation. 3.4, 3.5
- Week 9: Midterm exam. More on optimisation. 3.5
- Week 10: *Midterm break*. Optimization problems. 3.5
- Week 11: Increasing/decreasing functions, convex/concave functions. Sketching graphs. 3.6
- Week 12: Indeterminate forms and l'Hôpital's rule; Antiderivatives. 3.7, 4.1
- Week 13: Review

## LEARNING MATERIALS

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Depending on the section, there are three 50min or two 80min lectures per week. As emphasized by the schedule above, the course will follow closely the free online CLP textbook. It is recommended that you read the text as the course progress and work out some additional problems from it.

The weekly homework assignments will be in online format, with a link posted on Canvas.

Recordings of the online lectures of Section 107 and V01 will be available to all through Canvas.

Examinable material in this course will consist of all topics presented in the lectures or in homework problems.

Discussions forum. The Piazza discussion page, which can be reached through Canvas, is meant as a platform for students to exchange ideas. It is monitored by TAs who will occasionally answer questions when relevant.

Some instructors may provide additional material to their section.

## ASSESSMENTS OF LEARNING

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There will be

1. weekly homework assignments due at the end of the day **Tuesdays at 11:59pm**,
2. one midterm exam, taking place in class  
on **Wed Nov 03 & Th Nov 04**
3. one **comprehensive** final exam to be scheduled in the exam period

Cheating will not be tolerated.

All students must have their UBC student's ID card visible in front of them during all exams.

*Final Grade:*

The final grade is computed as such:

Precalculus preparation: 5%;    Homework: 20%;    Midterm: 25%;    Final: 50%.

In calculating your score for the homework, the lowest score will automatically be dropped. This includes missed assignment.

Missing the midterm: There is no make-up midterm. Missing the midterm for a valid reason normally results in the weight of that midterm being transferred to the final exam, resulting in Pre: 5%, HW: 20%, F: 75% . 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 test is to present to their instructor the Department of Mathematics self-declaration form for reporting a missed assessment within 72 hours of the midterm date. This form can be used at most once in the term. Should there be a request for additional accommodation, the student should contact their advising office.

A student must finish a significant amount of term work in order to pass the course.

In the case of the final exam, the students should contact the Department of Mathematics and the missed final will be handled in a formal way.

*On submitted work:*

All assertions require an argument unless the problem states otherwise. No matter the operative word ('find', 'solve', 'establish', 'calculate', 'determine',...), you must justify your answer. Written work should be presented carefully, in complete English sentences, and with sufficient detail. A correct sequence of formulae will only receive partial credit, an unstructured cloud of formulae and incoherent text will receive none.

*On special requests:*

Under no circumstances will there be a possibility for a student to provide additional work in order to make up for a disappointing grade. Similarly, the relative weight of the final grade's components is not subject to adjustments.

## UNIVERSITY POLICIES

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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 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 on the UBC Senate website.

## COPYRIGHT

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