

## COURSE INFORMATION

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| Course Title   | Course Code Number     | Credit Value |
|--|------------------------|--------------|
| Differential Calculus with Applications to Physical Sciences and Engineering | MATH 100:701 (Vantage) | 3            |

## CONTACTS

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| Course Instructor(s)   | Contact Details   | Office Location | Office Hours                |
|------------------------|---|-----------------|-----------------------------|
| Sven Bachmann          | sbach@math.ubc.ca<br>(Inquiries through Canvas will be ignored) | Mathematics 228 | Wednesdays<br>1:30pm–2:30pm |
| Lydia Chen             | lydiachen021@gmail.com  |                 | LSK 300,<br>Mondays 5pm–6pm |
| Sarai Hernandez Torres | saraiht@math.ubc.ca   |                 | LSK 300,<br>Mondays 5pm–6pm |
| Mingfeng Qiu           | mqiu@math.ubc.ca  |                 | LSK 300,<br>Mondays 5pm–6pm |

## COURSE STRUCTURE

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Course website:

<http://www.math.ubc.ca/~sbach/teaching/2019W/100/index.html>

This is the central information platform for this course. Check regularly for news and updates.

Times and rooms:

- V01. Lecture: W 11-12 in AERL 120
- Recitations, also referred to as Discussions or Tutorials:
  - V1A. MF 9-10 in ORCH 4018
  - V1B. MF 9-10 in GEOG 214
  - V1C. MF 2-3 in MATH 104
  - V1D. MF 2-3 in MATH 202

Students are required to attend both the main lecture and the recitations, and encouraged to take careful notes. A short summary of the topics covered each week will be posted online.

The lecture will cover the bulk of the theoretical aspects of the course. Most examples will be discussed and worked out during the recitations, where concrete problem-solving techniques will be introduced. The recitations will also present applications and variations, which are crucial aspects of the learning objectives.

## SCHEDULE OF TOPICS

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The first week is of introductory nature. The remaining 12 weeks will cover the following topics

1. Limits and infinite limits
2. Sequences
3. Series
4. Tests of divergence and convergence
5. Continuity
6. Differentiability
7. Rules of differentiation
8. The chain rule, implicit differentiation and related rates
9. Special functions: trigonometric functions, exponential and logarithm
10. The mean value theorem
11. Extrema and critical points, curve sketching
12. Optimization

## LEARNING OUTCOMES

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The course will cover elementary aspects of differential calculus. We will discuss: real functions, limits, continuity, sequences and series, the derivative and its properties, the mean value theorem, minima and maxima.

Beyond these 'technical' goals, the course also aims at developing basics of mathematical literacy in English. This implies both the construction of a mathematically sound argument and its translation in a concise, coherent and efficient text.

## LEARNING ACTIVITIES

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*On participation:*

Attendance is expected at both the course on Wednesdays and the recitation sessions on Mondays & Fridays. Participation through questions and answers is encouraged during the lecture, and it is mandatory during the recitations. There will be time devoted to problem-solving in groups in each recitation session.

*Office hours:*

Office hours are times where you can meet with the instructors to discuss the course material. There are two hours during the week with your graduate Teaching Assistants and one with your Professor.

*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 formulas will only receive partial credit, an unstructured cloud of formulas and incoherent text will receive none.

When writing your solution to the problems, keep the following in mind: 'What is conceived well is expressed clearly, And the words to say it arrive without difficulty.' (N. Boileau, 1674) This in turns means that if you find yourself unable to express what you have in mind, then your ideas are most probably not clear yet.

## LEARNING MATERIALS

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Weekly lecture notes will be provided through the website as the course progresses. A very complete textbook is available online at

[http://www.math.ubc.ca/~CLP/CLP1/clp\\_1\\_dc.pdf](http://www.math.ubc.ca/~CLP/CLP1/clp_1_dc.pdf)

as well as

[http://www.math.ubc.ca/~CLP/CLP2/clp\\_2\\_ic.pdf](http://www.math.ubc.ca/~CLP/CLP2/clp_2_ic.pdf)

for the chapters on sequences and series.

For further reading, the library always welcomes you.

The weekly assignments accessible online on the Canvas platform are an essential part of the learning materials, see below.

## ASSESSMENTS OF LEARNING

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Each week, there will be a set of WebWorK questions posted through Canvas at <https://www.canvas.ubc.ca>, as well as two problems posted on the website. While the WebWorK assignment is mostly about solving simple questions immediately related to the content of the course that week, the problems require a little more creativity and a fully composed solution. These solutions, to be handed in at the beginning of the Recitation on Fridays, will be evaluated on both the mathematical accuracy and the language correctness.

Learning mathematics from lectures or a textbook only is hopeless: it is absolutely essential for your understanding to work with new concepts and try to solve problems related to the course material. Independently of the points towards the final grade you may receive on your homework solutions, it is crucial to work on the problem sets in order to understand the material and to do well in the exams.

Although you are encouraged to discuss the problems with your peers, each of you must submit an independent written solution. Do not mix sharing ideas with sharing submitted work. You will receive your weekly grades through Canvas.

There will be

1. two quizzes taking place during the recitations on September 30 and **November 15**, lasting 20 minutes,
2. one midterm exam taking place in class on **October 23**, lasting 50 minutes,
3. one final exam to be scheduled in the exam period.

All electronic devices must be turned off and put away. That includes smart phones, tablets, computers, smart watches and calculators.

### *Final Grade*

The final grade is computed as such:

Homework: 15%;    Quizzes: 10%;    Midterm: 20%;    Final: 55%.

In calculating your score for the homework, I will drop your lowest score. These include missed assignment.

Missing a midterm or a quiz: There are no make-up tests in this course. Missing a test for a valid reason normally results in the weight of that midterm being transferred to the final exam. 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 to their instructor within 72 hours of the midterm date.

You must finish a significant amount of term work in order to pass.

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

Cheating will not be tolerated.

## UNIVERSITY POLICIES

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You are expected to follow the UBC rules during examinations <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,41,90,0#199>.

Please read carefully UBC's policies on academic honesty <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,286,0,0#15620> as well as on academic misconduct <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,959>.

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.

## OTHER COURSE POLICIES

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You are not allowed to use any of {cellphones, tablets and computers} in the lecture and recitation rooms. Recording of the lectures and taking photos during or after the lectures is prohibited. If you have special needs requiring a technological assistance, please briefly notice the instructors.

## COPYRIGHT

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All materials of this course (course handouts, lecture slides, assessments, course readings, etc.) are the intellectual property of the Course Instructor or licensed to be used in this course by the copyright owner. Redistribution of these materials by any means without permission of the copyright holder(s) constitutes a breach of copyright and may lead to academic discipline.

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