ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəy̓əm (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 their culture, history, and traditions from one generation to the next on this site.

COURSE INFORMATION

Course Title	Course Code Number	Section
Calculus III	MATH 200	101 102 103

PREREQUISITES

 MATH 101

CONTACTS

Contact Details
General inquiries should be sent directly to the administrative assistant at calc-coord@math.ubc.ca. To ensure a response, please begin your subject line with MATH200", followed by your section number", then followed by your student number".   Any questions about registration into, or between, sections of the course are handled by the undergraduate chair (individual instructors do not have this authority) and must be directed through the Undergraduate Advising Contact Form.

Course Instructor	Contact Details	Office Hours
Albert Chau (Section 101)	chau@math.ubc.ca	TBA
Stephen Gustafson (Section 102)	gustaf@math.ubc.ca	TBA
Colin Macdonald (Section 103)	cbm@math.ubc.ca	TBA

OTHER INSTRUCTIONAL STAFF

Other people (such as teaching assistants) are also involved in the teaching of this course. You may meet some of them over the course of the term and/or interact with them online. However, any concerns about grading should come to your instructor via mechanisms outlined on Canvas

COURSE STRUCTURE

Section 101 (Instructor: Albert Chau), TT 8:00am-9:30am, Room (HEBB-Floor 1-Room 100)

Section 102 (Instructor: Stephen Gustafson), TT 11:00am-12:30pm, Room (SCRF-Floor 1-Room 100)

Section 103 (Instructor: Colin Macdonald), WF 2:00pm-3:30pm, Room (SCRF-Floor 1-Room 100)

Section specific office hours can be found in their respective pages, additional general office hours are available as well General Office Hours

SCHEDULE OF TOPICS

1. Functions of several variables

- Domain: Euclidean space
- Vectors: distance, length, dot product, cross product, projections

2. Differentiation: rates of change

- partial derivatives
- directional derivatives (limit of difference quotient, formula)
- classification of the directions at p (gradient, directions of max, min, zero rate of change)
- definition of differentiability (limits)

3. Differentiation: approximations

- linear approximation
- the differential

4. Differentiation: tangency

- lines and planes
- level sets and tangency
- graph of $f(x, y)$ and tangency

5. Differentiation: chain rule

- general chain rule formula
- differentiation along curves
- coordinate changes
- implicit differentiation

6. Optimization

- optimize over open sets
- optimize over curves and surfaces: Lagrange
- Local max min: 2nd derivative test

7. Double integration

- Integrals in nature, Riemann sums

University of British Columbia

- Calculating: iterated integration, Fubini
- Techniques: switching order
- Techniques: substitution (polar coordinates)

8. Triple Integration

- Integrals in nature, Riemann sums
- Calculating: iterated integration, Fubini
- Techniques: switching order
- Techniques: substitution (cylindrical coordinates, spherical coordinates)

LEARNING OUTCOMES

Upon completing MATH 200: Calculus III, students will be able to apply multivariable calculus concepts, including partial derivatives and optimization techniques, to real-world problems. They will demonstrate proficiency in performing double and triple integrations and analyzing rates of change.

LEARNING MATERIALS

TEXTBOOKS AND REFERENCES

There is no required textbook for the course. Most standard hardcopy books on multivariable Calculus, and also some free online books would serve our purposes in this course. You are free to use any these as you like. JUST PAY ATTENTION THAT EMPHASES AND ORDER OF TOPICS IN OUR LECTURES MAY DIFFER FROM ANY GIVEN TEXTBOOK. The following online text and note summary is all you need for the course. These should be viewed as a supplement (and not replacements) to your lecture notes, and the reference books listed below.

UBC Calculus Textbook series (See CLP 3 of this series. Reference to sections appear below. See also CLP-3 Multivariable Calculus problem book where you will also find solutions to some past final exam problems.)

LEARNING ACTIVITIES & ASSESSMENTS OF LEARNING

Your grade in the course will be determined by your grades in weekly webwork assignments (worth 10% of overall grade) see below for schedule/dates.

2 in class Tests (worth 30% of overall grade) see below for schedule/dates.

1 final exam (worth 60% of overall grade)

All the basic information on these can be found below. The tests will be held during regular class time. It is your own responsibility to also check your own sections page (within this site) for any section specific instructions regarding these and for other announcements in general. In particular, different

sections will have different tests and your grades in these assessments may be scaled to ensure fairness across the different sections of the course. The final exam however will be the same for all sections.

<u>WEBWORK</u>

Access your weekly webwork assignments through the Assignments" table on left.   All information on these assignments including due dates is indicated within the webwork site. Note that the intent of homework is to help you learn the material, and therefore it should be done as you are studying. The default plan will be that Assignments open on Tuesdays, and are due 9 days later on a Friday. The first assignment will be open on Tuesday Sep 3.

IN CLASS TESTS

Test 1: (Thurs oct3 (section 101, 102), Fri oct4 (section 103))

Test 2: (Thurs nov7 (section 101, 102), Fri nov8 (section 103))

UNIVERSITY POLICIES

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

ABSENSE FROM CLASS AND MISSED ASSESSMENTS: If you are unable to attend lectures in person for whatever reason (visa issues, absence due to illness, emergency travel), you will be expected to follow the course by reading lecture notes and announcements posted to your section page. No exemptions or special allowances will be made for online homework (Webwork) which you will be expected to submit on time.   You must inform your instructor in the case of a MISSED IN CLASS TEST, and follow the procedure in the General Policy link above for academic concessions.   If you are granted an exemption from a test by your instructor, then your grade for the test will appear as EX in the Canvas gradebook, and a scaled version" of your final exam grade will later be used to replace your missing grade for that test, and the scaling will be done in a way which is fair to everyone.   If you miss both in class tests for whatever reason, you will be asked to de-register from the course.

GENERAL POLICIES AND SYLLABUS INFORMATION

University of British Columbia

LEARNING ANALYTICS

This course will be using the following learning technologies: Canvas, Piazza, Wolfram and WeBWork. Many of these tools capture data about your activity and provide information that can be used to improve the quality of teaching and learning. In this course, we may use analytics data to:

- View overall class progress
- Track your progress in order to provide you with personalized feedback
- Review statistics on course content being accessed to support improvements in the course
- Track participation in discussion forums
- Assess your participation in the course]

LEARNING RESOURCES

PAST FINALS You can find solutions to many past finals at the link SOLUTIONS TO PAST FINALS

You are encouraged to learn how to use Wolfram Alpha (the syntax you need to know for this is similar to using Webwork, which you will have to use anyways) although there will not be specific reference to it in the course. You can even check some of your homework answers with Wolfram Alpha.

Math 200 resource wiki. Links to an external site.

In addition to your instructor's office hours, please take advantage of the Math Learning Centre drop-in tutoring. Do not wait till the exams -- if you feel uncomfortable with any of the material, talk to your classmates, talk to the instructor, and come ask questions at the Math Learning Centre.

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.

COPYRIGHT

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. State whether or not you permit students to record your classes