

MATH 200 COURSE SYLLABUS

W2020-2021, Term 2

LAND ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the $x^w m \theta k^w \acute{o} y \acute{o} m$ (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. For more information see Indigenous Foundations UBC: <https://indigenousfoundations.arts.ubc.ca/home/>

BASIC COURSE INFORMATION

| Course Title | Course Code | Credit Value |
|-------------------------------|-----------------|------------------|
| Multivariable Calculus | Math 200 | 3 Credits |

There are two sections:

Section 202: MW 11:00-11:50

Section 203: TuTh 12:30-1:20

COURSE STRUCTURE

Lectures (by Zoom): There will be two 50-minute synchronous lectures per week for each section and one common asynchronous lecture that will be posted on each Friday morning. All lectures will be recorded

Section 202:

| Monday | Wednesday | Friday |
|---|---|-------------------------------|
| 11:00-11:50, Synchronous, Recorded | 11:00-11:50, Synchronous, Recorded | Asynchronous, Recorded |

Section 203:

| Tuesday | Thursday | Friday |
|--|--|-------------------------------|
| 12:30-1:20, Synchronous, Recorded | 12:30-1:20, Synchronous, Recorded | Asynchronous, Recorded |

You are strongly encouraged to attend the lectures for your section. You may attend lectures in either section.

CONTACT

| Course Instructor | Email | Office Hours by Zoom |
|---------------------|---------------------------|--|
| Brian Marcus | marcus@math.ubc.ca | Tu&Th 1:30-2:00, F11:00-12:00, + by appointment |

Students from both sections can attend any of the office hours.

TEXTBOOK

The textbook is free and online:

CLP-3 Multivariable Calculus (<https://www.math.ubc.ca/~CLP/CLP3/>) by J. Feldman, A. Reznitser, and E. Yeager

PREREQUISITES

One of MATH 101, MATH 103, MATH 105, MATH 121, SCIE 001.

APPROXIMATE SCHEDULE OF TOPICS

| Week | Topics CLP-3 | Sections |
|------|---|------------------------|
| 1 | Three-dimensional coordinate systems, vectors, dot product | 1.1, 1.2.1, 1.2.2 |
| 2 | Dot product (cont.), cross product, equations of lines and planes | 1.2.2, 1.2.5, 1.4, 1.5 |
| 3 | Equations of lines and planes (cont.), cylinders and quadric surfaces, functions of several variables: domain, range, graphs, level curves/surfaces | 1.7, 1.8, 1.9 |
| 4 | Limits and continuity, partial derivatives | 2.1, 2.2, 2.3 |
| 5 | Tangent planes and linear approximations, chain rule | 2.4, 2.5, 2.6 |
| 6 | Directional derivatives and the gradient vector | 2.7 |
| 7 | Maximum and minimum values, Lagrange multipliers | 2.7, 2.9, 2.10 |
| 8 | Lagrange multipliers (cont.), double integrals over rectangles | 2.10, 3.1 |
| 9 | Double integrals over general regions, double integrals in polar coordinates | 3.1, 3.2 |
| 10 | Double integrals in polar coordinates (cont.), applications of double integrals | 3.2, 3.3 |
| 11 | Applications of double integrals (cont.), triple integrals | 3.3, 3.5 |
| 12 | Triple integrals (cont.), triple integrals in cylindrical coordinates | 3.5, 3.6 |
| 13 | Triple integrals in spherical coordinates | 3.7 |

LEARNING OUTCOMES

Multivariable calculus provides the language and tools to analyze the outcomes that depend on more than one parameter (which means, most situations in our world). Multivariable calculus is used in many fields of natural science, social science, computer science, and engineering.

This course builds on single variable calculus, and its natural follow-up courses are Math 317 (Calculus IV), various courses on differential equations, courses in probability/statistics, etc. For some students, this may be their last mathematics course, as it teaches sufficient mathematics background for many applications. The main goal of the course is to develop an understanding of the fundamental concepts of multivariable calculus and the skills necessary for its applications. Upon completion of this course, students should be able to:

1. Manipulate vectors to perform geometric calculations in three dimensions.
2. Calculate and interpret derivatives of functions of several variables.
3. Integrate functions of several variables.
4. Apply multivariable calculus to a range of applications including optimization, rates of ascent and descent and computing volumes and centers of mass.

EVALUATION

Course mark will be based on weekly Webwork (10%), two midterms (25% each), and the final exam (40%); the weights are approximate.

Webwork

There will be weekly WeBWork Homework assignments which must be accessed from the Assignments section of the course Canvas page. The WebWork will be due each Friday by 11:59PM, with the first Webwork assignment due on Friday, January 22.

The main goal of WeBWork is to help you learn the material. You are encouraged to work in groups on the more difficult problems, but you must complete the problems yourself.

Your lowest Webwork score will be dropped.

Midterms

The midterms will be held during regular class time. Your midterms are scheduled for the following dates and times:

Section 202:

Midterm 1: Wed, Feb 10, 11:00-11:50

Midterm 2: Wed, March 31, 11:00-11:50

Section 203:

Midterm 1: Thursday, Feb 11, 12:30-1:20

Midterm 2: Tuesday, March 30, 12:30-1:20

You can access the midterms from the Assignments section of the Canvas page and then upload your answers.

More information will be given closer to the dates of the midterms.

If for some reason you cannot write a midterm during the scheduled time (such as you are in a sufficiently different time zone), you must contact the instructor Brian Marcus (marcus@math.ubc.ca) to request an exception by Tuesday, January 12 at the latest.

Final Exam

The final exam will be comprehensive, i.e., will cover the entire course material. It will be scheduled during the final exam period.

You can access the final exam from the Assignments section of the canvas page and then upload your answers.

More information will be given closer to the date of the final exam.

Concessions

No late WebWork will be accepted and there will be no make-up midterms. Students with valid concessions (e.g. for documented medical emergencies) for a missed Webwork assignment will have the weight of that assignment transferred to the other Webwork assignments. Students with valid concessions (e.g. for documented medical emergencies) for a missed Midterm will have the weight of that Midterm transferred to the final exam.

You can receive one concession during the term by submitting the Student Declaration of Academic Concession for Math Courses form to your instructor. Further concessions or missed final exams need to be discussed with the Academic Advisors of your Faculty. There cannot be any exception to this university-wide policy.

Regulations:

For a full description of midterm and final exam regulations, see the UBC Calendar page on Student Conduct during Examinations. Specific details and requirements for the midterms and final exam will be posted on Canvas. The midterms and final exam may be invigilated via Zoom and it is essential that every student have a webcam. **Without a webcam, it will not be possible to complete the course.**

Scaling Grades may be scaled.

PIAZZA

Do post questions and answers about WebWork (and other parts of the course) on Piazza, but when posting the answers, refrain from solving the problem completely, instead, point out relevant ideas from the course. Asking questions and providing answers (and generally discussing mathematics with your friends) is an excellent way to learn!

ACADEMIC INTEGRITY

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. Be sure you understand UBC's expectations: see the UBC Calendar entries on Academic Honesty, Academic Misconduct, and Disciplinary Measures, and the Student Declaration and Responsibility.

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 <https://senate.ubc.ca/policies-resources-support-student-success> UBC Senate website.

BICYCLE HELMETS

British Columbia law requires the use of a helmet while riding a bicycle.

VOTING

Please register to vote if you are eligible. Information about BC voter registration is available here (this covers municipal voter registration): <https://elections.bc.ca/voting/register-to-vote/> Information about federal voter registration is available here: <https://www.elections.ca/>

CLIMATE EMERGENCY

In December 2019, UBC declared a climate emergency, recognizing the scale and severity of the global climate crisis and the University's responsibility to take urgent action by reducing emissions in line with 1.5 °C climate targets and infusing climate justice across all aspects of the University. You can read the full declaration here: <https://president.ubc.ca/homepage-feature/2019/12/05/climate-emergency-declaration/>. To get involved in climate action and climate justice at UBC, you can join the student-led UBC Climate Hub: <https://ubccclimatehub.ca/>.