

MATH\*2200 Advanced Calculus (Fall 2020)  
Department of Mathematics and Statistics  
University of Guelph

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**Course Description**

The topics covered in this course include infinite sequences and series, power series, tests for convergence, Taylors theorem and Taylor series for functions of one variable, planes and quadratic surfaces, limits, and continuity, differentiability of functions of two or more variables, partial differentiation, directional derivatives and gradients, tangent planes, linear approximation, Taylors theorem for functions of two variables, critical points, extreme value problems, implicit function theorem, Jacobians, multiple integrals, and change of variables.

**Credit Weight**

0.50 credits

**Prerequisites**

One (1) course from IPS\*1510, MATH\*1090, MATH\*1210, MATH\*2080.

**Lectures**

Asynchronous, but will be broadcast live Monday, Wednesday, Friday 1:30-2:20 on CourseLink Virtual Classroom

**Instructor**

Jeremy Levick

**Email**

[levickje@uoguelph.ca](mailto:levickje@uoguelph.ca)

**Office Hours**

Online over CourseLink Virtual Classroom

Tuesday 12:30 - 1:30

Thursday 10:30 - 11:30 \*\* Or by appointment

## Teaching Assistants

Jack Hughes  
Zixuan Luo

## Textbooks

**Required:** None.

**Recommended:** Multivariable Calculus, 7th/8th Edition, by James Stewart, Brooks/Cole.  
Apex Calculus, Version 4.0, <http://www.apexcalculus.com/>

## Course Website

All course announcements, assignments, solutions, practice questions, and grades will be posted on the course website <https://courselink.uoguelph.ca>

## Email Communication

As per university regulations, all students are required to check their [juoguelph.ca](mailto:juoguelph.ca) e-mail account regularly: e-mail is the official route of communication between the University and its students.

## Evaluations

Evaluations for the course are as follows:

40%	Assignments	Due Oct 2, Oct 23, Nov 13, Nov 27
20%	Midterm	
40%	Final	Dec 7, 2:30 - 4:20 pm

\*\* You must receive at least 50% of the marks available, in total, on the midterm and final exam that are used to calculate your final grade. That is,  $(\text{Total marks earned on midterms and exam}) / (\text{Total marks available on midterm and exam}) = 50\%$ . If you do not achieve this, your maximum possible final grade will be 48, no matter what grade you receive on the Assignment component.

## Marks

Assignments and term tests will be marked as quickly as possible and returned. All marks will be posted on CourseLink. It is your responsibility to check that the posted marks are accurate.

## Assignments

Assignments will be distributed online via the course web page and are due online to <https://crowdmark.com/> no later than 11:59 pm on the dates listed above. Late assignments will NOT be accepted. Of course, you can talk about assignment questions with me and with each other, but

please make sure that the bulk of the work you submit is truly your own work. There will be low tolerance for plagiarism or what I deem to be excessive collaboration.

### **Midterm and Final Exam**

An announcement will be made in class regarding the scope of material for the midterm. The final exam will cover all material taught in the course.

### **Lecture Schedule**

Tentative Schedule and List of Topics

Week	Lecture Topics
1	Sequences, Series
2	Series, Convergence Tests
3	Absolute Convergence, Power Series, Functions as Power Series
4	Taylor Series, Applications of Taylor Series
5	Multivariate Introduction, Quadratic Surfaces
6	Limits and Continuity in 2D
7	Partial Derivatives, Tangent Planes
8	Chain Rule
9	Directional Derivatives, Gradients
10	Maxima/Minima, Lagrange Multipliers
11	Lagrange Multipliers, Implicit Function Theorem
12	Multiple Integration, Change of Variables

### **Course Objectives**

This course is an advanced course in Calculus. The objective of the course is to continue to develop strong mathematical background and skills that you will require as you progress through your degree. The main goals of the course are (1) to develop qualitative skills, critical thinking, and application of these skills to physical problems and (2) develop strong mathematical communication skills, which will serve you well when working on interdisciplinary teams.

### **Learning Outcomes**

Upon successful completion of this course, the student will have demonstrated the ability to:

1. Determine convergence behaviour of sequences.
2. Identify different types of series and determine convergence properties using a variety of techniques.
3. Represent functions as power series and determine the interval and radius of convergence using techniques discussed in the class.

4. Represent functions using Taylor series approximations and apply these approximations to physical systems.
5. Work with multivariate functions, including identifying and sketching common quadratic surfaces, calculating limits of two-dimensional functions, determining partial derivatives, directional derivatives, tangent planes, and their ability to apply the chain rule.
6. Extend their knowledge from single variable calculus to develop new skills for finding critical points and solving extreme value problems, including Lagrange multipliers, in higher dimensions.
7. Extend anti-derivative techniques from single variable calculus to multivariable calculus and demonstrate the use of change of variables.
8. Solve word problems by applying formulas and techniques learned in class.
9. Think critically about complicated mathematical problems. Question the potential subtleties of such problems and give a complete and correct answer.

### **Disclaimer**

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website <https://news.uoguelph.ca/2019-novel-coronavirus-information/> and circulated by email.

### **Missed Evaluation due to Illness or Compassionate Reasons**

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, student ID, and e-mail contact. See the academic calendar for information on regulations and procedures for Academic Consideration: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

The University will not normally require verification of illness (doctor's notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.

### **Recording of Materials**

By enrolling in a course, unless explicitly stated and brought forward to their instructor, it is assumed that students agree to the possibility of being recorded during lecture, seminar or other live course activities, whether delivery is in-class or online/remote.

If a student prefers not to be distinguishable during a recording, they may:

turn off their camera mute their microphone edit their name (e.g., initials only) upon entry to each session use the chat function to pose questions. Students who express to their instructor that they, or a reference to their name or person, do not wish to be recorded may discuss possible alternatives or accommodations with their instructor.

## **Academic Misconduct**

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

## **Accessibility**

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student. When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway. Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day. More information: [www.uoguelph.ca/sas](http://www.uoguelph.ca/sas)

## **Drop Date**

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>