

## Department of Mathematics

### Calculus 2402A Course Outline

### Calculus with Analysis for Statistics

#### 1. Course Information

**Lectures:** M W F 1:30 pm-2:30pm in TC-141

**Prerequisites:** Calculus 1301 A/B or 1501 A/B or Numerical and Mathematical Methods 1414 A/B or the former Applied Mathematics 1413, in each case with a minimum mark of 55%. Integrated Science 1001X with a minimum mark of 60% can be used in place of Calculus 1301 A/B.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

**Anti-requisite:** Calculus 2302 A/B, Calculus 2502 A/B.

#### 2. Instructor Information

Instructor	Email	Office	Phone	Office Hours
Dr. Khoa Nguyen	<a href="mailto:knguyen@uwo.ca">knguyen@uwo.ca</a>	MC 282	519-661-2111 x88799	Tuesday, 1:00pm- 2:00pm (Zoom)
TA	TBA			

Students must use their Western (@uwo.ca) email addresses when contacting their instructors and must say **Calculus 2402A** in the subject line.

#### 3. Course Syllabus, Schedule, Delivery Mode

**Description:** Functions of multiple variables and their differential calculus. The gradient and the Hessian. Constrained and unconstrained optimization of scalar-valued functions of many variables: Lagrange multipliers. Multidimensional Taylor series. Integrating scalar-valued functions of several variables: Jacobian transformations. Pointwise and uniform convergence. Power series

**Objectives:** At the end of the course, a student should be able to

- Investigate functions of two or more variables
- Write an equation of a tangent plane and normal line to a surface at a given point
- Use the Chain Rule for functions of several variables
- Obtain the gradient and directional derivative of a function of several variables
- Write a Taylor expansion and Hessian of a function of two variables
- Find extreme values of a function of several variables by using Lagrange multiplier
- Evaluate double integrals, triple integrals in several coordinate systems
- Apply the methods of functions of several variables to physics, probability, and geometry
- Compute Jacobian of a transformation in a double or triple integral
- Distinguish the concepts of Pointwise and Uniform Convergence

**Important Dates:**

Classes begin: September 8, 2021

Reading Week: November 1–7, 2021

Classes end: December 8, 2021

**Contingency plan for an in-person class pivoting to 100% online learning**

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor. **In the event that Test/Exam cannot be held in-person**, please see the last page of this document.

## 4. Course Materials

**Required Textbook: Multivariable Calculus, 9<sup>th</sup> Edition, by James Stewart, Daniel Clegg and Saleem Watson, ISBN: 9780357042922** which is available at UWO bookstore. Here is the link:

[https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2021A&courses%5B0%5D=001\\_UW/CAL2402A](https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2021A&courses%5B0%5D=001_UW/CAL2402A)

Students are responsible for checking the course OWL site (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

All course material will be posted to OWL: <http://owl.uwo.ca>.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

### Technical Requirements

To use **WeBWork**, students will need stable internet connection, a laptop or computer and recent browsers as Firefox or Chrome.

## 5. Methods of Evaluation

The overall course grade will be calculated as listed below:

Assignments (6)	25 %
Midterm Test	35%, Saturday, October 23, 2021 from 1:00pm-3:00pm (in person)
Final Exam	40 % scheduled by the Registrar Office (in person)

**Assignments:** Students do their assignments in **WeBWork**. There are 6 assignments, and the best five of six are chosen.

Assignment 1: released September 13, due September 19

Assignment 2: released September 27, due October 3

Assignment 3: released October 12, due October 17

Assignment 4: released October 25, due October 31

Assignment 5: November 8, due November 14

Assignment 6: November 22, due November 28

**Midterm Test:** There is **NO** makeup for the midterm test. If a student missed his/her midterm test with an excuse, his/her midterm weight would be transferred to the final exam.

Week	Dates	Topics by Chapters	Comments
1	September 8-10	14.1, 14.2	Functions of several variables, limits
2	September 13-17	14.2(cont'd), 14.3, 14.4	Continuity, partial derivatives, tangent plane and linear approximation
3	September 20-24	14.5	The Chain Rule
4	September 27-Oct 1	14.6, 14.7	Directional derivative, gradient, Hessian, extreme values
5	October 4-8	14.8	Lagrange multiplier, Taylor series of two variables
6	October 11-15	Catchup	<b>Thanksgiving day</b>

7	October 18-22	15.1, 15.2, review	<b>Midterm Exam</b> (Sat, Oct 23 from 1:00pm-3:00pm)
8	October 25-29	15.3, 15.4	Polar coordinates, applications
9	November 1-5	<b>Reading Week</b>	<b>No classes</b>
10	November 8-12	15.4 (cont'd), 15.5	Applications of double integrals, triple integral
11	November 15-19	15.6, 15.7	Triple integrals in cylindrical and spherical coordinates
12	November 22-26	15.8	Change of variables in multiple integrals, Jacobian
13	November 29-Dec 3	11.8, 11.9, 11.10,11.11	Power series, pointwise and uniform convergence
14	December 6 – 8	catchup	

### Accommodated Evaluations

Missing a midterm exam, the final exam, or the due date of a submitted homework assessment will result in a grade of zero unless appropriate permission is sought and granted. For the case of missing homework assignments your mark will be re-weighted. If a student misses the midterm test and has appropriate permission, then the final exam will be re-weighted to include the weight of the missed term test.

## 6. Student Absences

### Academic Consideration for Student Absences

Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

- (i) Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met. To be eligible for a Self-Reported Absence:
  - an absence must be no more than 48 hours
  - the assessments must be worth no more than 30% of the student's final grade
  - no more than two SRAs may be submitted during the Fall/Winter term
- (ii) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.
- (iii) Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the period covered, unless otherwise instructed in the course outline.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For the policy on Academic Consideration for Student Absences – Undergraduate Students in First Entry Programs, see:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_illness.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf)

and for the Student Medical Certificate (SMC), see:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

### **Religious Accommodation**

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

### **Absences from Final Examinations**

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

## **6. Accommodation and Accessibility**

### **Accommodation Policies**

Students with disabilities work with Accessible Education (formerly SSD), which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf),

## 7. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy,

[https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf),

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

**Calculators** Only scientific calculators are allowed. For example, Sharp EL 510RB.

**Scholastic offences** are taken seriously, and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

### **In the event that Test/Exam cannot be held in-person**

Tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

## 8. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time

management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (<http://www.health.uwo.ca/mentalhealth>) for a complete list of options about how to obtain help.

Students with disabilities work with Accessible Education (formerly SSD), which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic  
Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf)

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.