

Calculus 2402A Course Outline

1. Course Information

Course Information

Course Number: Calculus 2402A
Course Name: Calculus with analysis for statistics
Academic Term: Fall 2026
Lecture Location:
Lecture Times:

Antirequisite(s): Calculus 2302A/B, Calculus 2502A/B.

Prerequisite(s): Calculus 1301A/B or Calculus 1501A/B or Numerical and Mathematical Methods 1414A/B or the former Applied Mathematics 1414A/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 1301A/B.

Unless students have either the prerequisites for this course or written special permission from the Department of Mathematics to enroll in it, they may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on their academic record. This decision may not be appealed.

2. Instructor Information

Instructors	Email	Office	Office Hours
Dr. Kelvin Chan	kchan773+calc2402f26@uwo.ca		MWThF 2:30 to 4 pm in Math Help Centre

You are always welcome to chat with your instructor after class.

The email listed above includes a tagging feature to ensure your email is not accidentally lost in your instructor's inbox. Please include "*Calc 2402A*" and a descriptive title in the subject line. If your email includes the +calc2402f26 tag, your instructor will respond within two business days.

Students must use their Western (@uwo.ca) email addresses when contacting their instructor.

Office hours are hosted in the Math Help Centre located in the PAB lower atrium. The Monday office hours are dedicated to Calculus 2402A, but the other office hours are shared with Calculus 1000A.

3. Course Syllabus, Schedule, Delivery Mode

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

Learning outcomes: Upon successful completion of Calculus 2402A, students will be able to:

- Define and visualize real-valued multivariate functions.
- Describe vectors, lines, planes and surfaces in dimensions two and above.
- Understand the geometric interpretation of and calculations involving limits, partial derivatives, directional derivatives, gradient and integrals of multivariate functions.
- Apply the chain rule for multivariate functions to calculate partial derivatives.
- Find the equation of a tangent plane and normal line to a surface at a given point.
- Find the Taylor expansion of multivariate functions.
- Understand extrema and their characterizations and apply the associated tests and techniques to unconstrained and constrained optimization problems.
- Understand the limit definition of double and triple integrals.
- Evaluate double integrals in rectangular and polar coordinate systems.
- Evaluate triple integrals in rectangular, cylindrical and spherical coordinate systems.
- Apply the Jacobian to perform a change of coordinates for double and triple integrals.
- Choose an efficient coordinate system to evaluate double and triple integrals.
- Evaluate delta-epsilon arguments for limits of sequences.
- Distinguish between pointwise and uniform convergence and understand their consequences.
- Provide examples of concepts taught in this course.

Course Content Schedule

In-person lectures are the primary source of content delivery. Students are expected to attend all lectures. The topics are roughly organized as follows. Your instructor may vary the pace as necessary.

Week	Mondays	Topics
1	Sep 7	Course introduction. Geometry in higher dimensions.
2	Sep 14	Fundamentals of partial derivatives.
3	Sep 21	Directional derivatives, gradient, tangent planes and approximations.
4	Sep 28	Extrema and their characterizations and optimization.
5	Oct 5	Constrained optimization and Lagrange multipliers.
6	Oct 12	Reading week, no class.
7	Oct 19	Buffer. Double integrals. Note: Test 1 is on Saturday, Oct 24 th at 10 am.
8	Oct 26	Integration techniques for double integrals.
9	Nov 2	Application of double integrals and triple integrals.
10	Nov 9	Triple integrals.
11	Nov 16	Triple integrals continued. Note: Test 2 is on Saturday, Nov 21 st at 10 am.
12	Nov 23	Limits in higher dimension. Delta-epsilon arguments.
13	Nov 30	Convergence.
14	Dec 7	Buffer and review.

Key Sessional Dates:

Classes begin: September 9, 2026; January 4, 2027

Fall Reading Week: October 10 – 18, 2026

Winter Reading Week: February 13 – 21, 2027

Classes end: December 9, 2026; April 9, 2027

Exam period: December 11 – 22, 2026; April 12 – 30, 2027

4. Course Materials

Textbook and Other Learning Materials

Required textbook: CLP Calculus 3 by Joel Feldman, Andrew Rechnitzer and Elysa Yaeger (UBC 2018). The PDF version of CLP 3 is freely available on OWL BrightSpace (<https://westernu.brightspace.com/>).

Students will need to create a free iClicker account using your @uwo.ca email address. Please refer to the instructions at <https://presswestern.uwo.ca/>. If you already have an iClicker account, please go into the settings and verify that it uses your uwo.ca email address. This software will be used during class lectures to gauge participation, solicit feedback, and for other Q and A.

All course material will be posted to OWL Brightspace: <https://westernu.brightspace.com/>

- Fillable lecture notes include a lecture skeleton and are available weekly. They include additional exposition for delta-epsilon arguments and convergence.

Students are responsible for checking the course OWL Brightspace site regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL Brightspace site, they can seek support on the OWL Brightspace 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

Additionally, students will need

- a laptop or a computer to access Skill Development workshops on webwork (<https://webwork.math.uwo.ca/webwork2/Calc2402a-Fall2026>), and
- a smartphone or a laptop to participate in in-class participation activities using iClicker.

5. Methods of Evaluation

Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

Participation (iClicker)	5%
Skill Development (webwork)	15%
Midterm Tests (non-cumulative)	$35\% = 17.5\% \times 2$
Final Exam (cumulative)	45%

The participation component is graded only on completion using the following scheme. You can expect one, sometimes two, iClicker activities per class.

Participation	Participation grade (out of 5%)
$80\% \leq \text{percentage of activities completed}$	5%
$70\% \leq \text{percentage of activities completed} < 80\%$	4%
$60\% \leq \text{percentage of activities completed} < 70\%$	3%
$50\% \leq \text{percentage of activities completed} < 60\%$	2%
$40\% \leq \text{percentage of activities completed} < 50\%$	1%
$\text{percentage of activities completed} < 40\%$	0%

Your iClicker account must be associated with your @uwo.ca email address. If your iClicker account is not associated with your @uwo.ca email address by the end of day on December 10, 2026, your participation grade will be recorded as 0%.

The skill development component consists of 144 problems with optional guidance, organized into workshops. All workshops have a recommended completion date but are officially due on the last day of class, December 9th at 11:59:00 pm, with a 48-hour no-late-penalty period.

The two midterm tests are *non-cumulative*. However, the final exam is *cumulative*. **Per the Faculty of Science guideline (effective Fall 2026), there will be no make-up tests.** See *Information about Missed Coursework* on the next page for information on schedule conflicts and religious accommodations.

Test 1 (Oct 24 at 10 am) is an in-person closed-book test and assesses all topics taught in weeks 1 to 5. See OWL BrightSpace for the location. The topics include:

- Geometry in higher dimensions.
- Partial derivatives and the chain rule for multivariate functions.
- Directional vectors and the gradient.
- Tangent planes and approximation techniques.
- Extrema and their characterizations.
- Unconstrained optimization.
- (Tentative) Constrained optimization using Lagrange multiplier.

Test 2 (Nov 21 at 10 am) is an in-person closed-book test and assesses all topics taught in weeks 7 to 10. See OWL BrightSpace for the location. The topics include:

- (Tentative) Constrained optimization using Lagrange multiplier.
- Double integrals in rectangular and polar coordinates.
- Integration techniques for double integrals.
- Applications of double integrals.
- Triple integrals in rectangular coordinates.
- (Tentative) The Jacobian and change of coordinates.

The final exam (to be scheduled by the Registrar's Office) is cumulative. The topics are weighed as follows.

- Partial derivatives and their applications (roughly 45%)
- Multiple integrals and their applications (roughly 40%)
- Limits, delta-epsilon arguments and convergence (roughly 15%)

Use of Generative AI Tools

Students should exercise caution when using GenAI to create practice problems. The course provides an abundance of practice problems. If you feel the need to generate new problems using GenAI, you are encouraged to seek advice from your instructor.

All skill development problems come with optional guidance. If you use GenAI to further assist problem-solving, you should make sure you understand the relevant ideas and fundamental concepts sufficiently so that you can complete the task independently without GenAI (e.g., in in-person, closed-book midterm tests and the final exam, when the use of GenAI is strictly prohibited).

Information about Missed Coursework

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs*, posted on the Academic Calendar: https://uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person. The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage: https://registrar.uwo.ca/academics/academic_considerations/ All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

Participation

If your final exam grade is higher than your participation grade, then your final exam grade will replace your participation grade. You do not need to submit a request for academic consideration.

For example, suppose you received 3% (out of 5%) for participation.

- If your final exam grade is 80%, then your participation grade will be 4% out of 5%.
- If your final exam grade is 50%, then your participation grade will remain at 3% out of 5%.

Midterms and Tests

This course has two midterm tests and a **cumulative** final exam. There is no makeup test for a missed midterm. If a student misses a midterm, its weight will shift automatically to their final exam grade. If their final exam grade is higher than their midterm grade, their final exam grade will replace the midterm's weight in their overall grade. They do not need to request Academic Consideration for a missed midterm; the reweighing will be done automatically.

The only exception is an early sitting, offered solely for a university-sanctioned schedule conflict (e.g., conflict of two midterms, Varsity competitions) or a religious accommodation that prevents a student from writing the midterm at its scheduled time. If a student requires this accommodation, they must notify their instructor in writing no later than one week before the test. No other circumstance, including illness, qualifies for an early sitting or makeup; these are addressed through the automatic reweighting described above.

Labs, Assignments, and Quizzes

This course has 144 skill development problems, organized as workshops, administered through WebWork (<https://webwork.math.uwo.ca/webwork2/Calc2402a-Fall2026>).

Students are expected to complete 100 problems to receive full credit for this component. Please note that to complete a skill development problem in this course means to achieve a grade of 100% from that problem. Problems are organized into workshops on WebWork, but are counted individually towards the skill development component.

Students are strongly advised to complete all skill development problems because they provide essential practice and guidance.

The following applies to all students. You do not need to submit requests for academic considerations.

- If you complete 100 or more problems, you will receive the full 15% for this component.
- If you complete 99 or fewer problems, then you will receive

$$15\% * (\text{number of completed problems}) / 100$$

towards this component. If your final exam grade is higher than your grade in this component, then your final exam grade will replace it.

For example, suppose you complete 80 skill development problems. You have completed 80% of the 100 required problems. Therefore, you will receive $15\% * 80 / 100 = 12\%$ for the skill development component.

- If your final exam grade is 90%, then you will receive $90\% * 15\% = 13.5\%$ for the skill development component.
- If your final exam grade is 70%, then your skill development component grade will remain at 12%.

Deadlines: The 48-Hour No-Late-Penalty Period

All skill development workshops are due on the last day of class, December 9th at 11:59:00 pm. All workshops include an automatic 48-hour period after the deadline during which students may still submit without a late penalty. After this 48-hour period, no further submissions will be accepted, and students do not need to request Academic Consideration for a missed deadline; their grade for this component will be calculated as described above. The latest you can submit skill development problems is December 11th at 11:59:00 pm.

Special Examination

Per university policy, Academic Consideration requests with supporting documentation are required for the final examinations scheduled during official examination periods by the Registrar's Office.

If the student has been approved by the Academic Advising Office to write a Special Examination (SPC) and the final exam is their only outstanding course component, an SPC will be assigned to them and scheduled by the instructor per university policy.

If the student misses their SPC exam and is approved for Academic Consideration, they will be withdrawn from the course without academic penalty. If they experienced extenuating circumstances such as prolonged illness, they may appeal to the Associate Dean (Academic), on a case-by-case basis, for the opportunity to write the final exam the next time the course is offered. An outstanding SPC will reduce their course load for the term in which the exam is deferred, as outlined in the Definitions of Types of Examinations policy.

If the student misses their SPC exam and Academic Consideration is not approved, or was not requested, they will receive a grade of zero on the exam.

6. Additional Statements

6.1 Religious Accommodation

When a recognized religious holiday either requires a student to be absent from the University, or requires or prohibits an activity that makes it impossible for them to complete an academic requirement scheduled that day, they are entitled to accommodation. No student will be penalized for an absence for religious reasons, and an alternative means of satisfying the requirement will be arranged. This accommodation is provided in accordance with the University's policy on Accommodation for Religious Holidays:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

The student should submit their requests through the Student Absence Portal (SAP), identifying the conflict and the specific course component(s) affected (e.g., test, midterm, exam).

Midterms and Tests: If a religious observance conflicts with a midterm test, they must submit their request no later than **one week** before the test. Their instructor will arrange an early sitting of the test. As set out above, no makeup test is offered for any other reason; this early sitting is available specifically for this accommodation.

Final Examinations: If a religious observance conflicts with the final exam, the student must submit their request no later than **two weeks** before the exam. Their instructor will arrange a Special Examination to take place no later than one month after the end of the examination period.

Students are responsible for finding out what was covered in any class they miss due to a religious observance, and for taking the appropriate steps to keep up with the course.

If a suitable arrangement cannot be reached between a student and their instructor, they should consult the Undergraduate Chair of the department offering the course, and if necessary, the Associate Dean (Academic) of the Faculty of Science.

For a list of recognized religious observances, please visit the calendars posted on the Equity, Diversity & Inclusion website - <https://www.edi.uwo.ca> (About Us – Resources – Additional Resources – Calendars).

6.2 Academic Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, 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.

6.3 General Academic Policies

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

Use of @uwo.ca email: In accordance with policy, 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 email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

Requests for Relief (formally known as “appeals”)

Policy on Request for Relief from Academic Decision:

https://uwo.ca/univsec/pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf

Procedures on Request for Relief from Academic Decision (Undergraduate):

https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf

6.4 Scholastic Offences

Policy on Scholastic Offences:

https://uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_offences.pdf

Procedures on Scholastic Offences (Undergraduate):

https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf

Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the **possession** of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, hidden cameras and wireless earbuds.

Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at a student's desk, on their person, or within reach during an assessment will be treated as a scholastic offence, **even if the device is not in use**.

Effective September 2026, the typical penalty for this offence is a failing grade in the course AND a 12-month prohibition on retaking the course.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is their responsibility to review and comply with these expectations.

Use of Generative AI Tools

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is **not permitted** in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations.

Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a **scholastic offence**.

If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is prohibited. It is the student's responsibility to seek clarification before using any AI tools in academic work.

Use of Software for Assessments

In-class participation activities are administered using the iClicker software (student.iclicker.com). Access to a smartphone or a laptop is required during lectures. You are recommended to use the iClicker mobile app rather than its web interface.

6.5 Support Services

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

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

Gender-Based and Sexual Violence. Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who has gone through these traumatic events. If a student has experienced GBSV (either recently or in the past), they can find information about support services for survivors, including emergency contacts, at:

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Accessibility for Coursework. A student may contact the course instructor if they require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to them. If they have any questions regarding accommodations, they may also contact Accessible Education at http://academicsupport.uwo.ca/accessible_education/index.html

Learning Development and Success. Learning-skills counsellors at Learning Development and Success (<https://learning.uwo.ca>) are ready to help students improve their learning skills. The facility offers 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.

Student Councils.

Student-run support services are offered by the University Students' Council (<https://westernusc.ca>) and the Science Students' Council (<https://www.westernssc.ca>).