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**Department of Mathematics**

 **Calculus 2402A Course Outline**

 **Fall 2025**

**Calculus with Analysis for Statistics**

**1. Course Information**

**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’s Designate (Department/Program Counsellors and Science Academic Counselling) 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**

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| **Instructor** | **Email** | **Office** | **Phone** | **Office Hours** |
| Dr. Khoa Nguyen | knguyen@uwo.ca |  |  | Wednesday, 3:00pm-4:00pm  |
| 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

* **Define a function 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 4, 2025

National Day for Truth and Reconciliation: September 30, 2025 (no classes)

Thanksgiving: October 13, 2025

Fall Reading Week: November 3–November 9, 2025

Classes end: December 9, 2025

Exam period: December 11-22, 2025

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

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.
**In the event that Test/Exam cannot be help in-person**, please see the last page of this document.

**4. Course Materials**

**Required Textbook: Multivariable Calculus, 9th Edition, by James Stewart, Daniel Clegg and**

**Saleem Watson, ISBN:** 9780357042922 which is available at UWO Bookstore. **The textbook costs $173.35.**

Or the eBook version of the textbook

**Multivariable Calculus eBook 365 Day Rental costs $80.00.**

**Students may purchase a second-hand copy, provided it is the 9th edition of the textbook.**

Both versions of the textbook are available in the UWO Bookstore:

<https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2025A&courses%5B0%5D=001_UW/CAL2402A>

Students are responsible for checking the course OWL site (<https://westernu.brightspace.com>) 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: https://westernu.brightspace.com

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 like Firefox or Chrome.

**5. Methods of Evaluation**

The overall course grade will be calculated as listed below:

Regular Assigned Problems (not graded)

5%: Marked on participation only using iClicker. The score you receive is based on the % of questions you answer:

At least 80% = 5; 70-79% = 4; 60-69% = 3; 50-59% = 2; 40-49% = 1; Less than 40% = 0

Assignments (6) 20%

Midterm Test 35%, Saturday, October 18, 2025, from 1:00pm-3:00pm (in person)

Final Exam 40% scheduled by the Registrar Office (in person)

The final exam is a comprehensive exam. It covers the entire material of the course.

In the case of midterm exam, a makeup exam will be offered during the week following the date of the term test. In the case of missed quizzes or missed makeup midterm exam with an excuse, the weight will be shifted to the final exam.

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

Assignment 1: released September 15, due September 20

Assignment 2: released September 29, due October 4

Assignment 3: released October 13, due October 18

Assignment 4: released October 27, due November 1

Assignment 5: November 10, due November 15

Assignment 6: November 24, due November 29

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| **Week** | **Dates** | **Topics by Chapters** | **Comments** |
| 1 | September 4-5 | 14.1 | Functions of several variables |
| 2 | September 8-12 | 14.2 | Limits, Continuity  |
| 3 | September 15-19 | 14.3, 14.4 | Partial derivatives,Tangent plane and linear approximation, Chain Rule |
| 4 | September 22-26 | 14.5, 14.6 | Chain Rule(cont’d), Directional derivative, gradient |
| 5 | September 29-Oct 3 | 14.7 | Hessian, extreme values, the 2nd derivative test |
| 6 | October 6-10 | Extra material, 14.8 | Taylor series of functions of two variables, Lagrange multiplier |
| 7 | October 13-17 | Catchup and review | **Midterm Exam** (Sat, Oct 18 from 1:00pm-3:00pm) |
| 8 | October 20-24 | 15.1, 15.2 | Double integrals in rectangular regions, Double integrals in general regions,  |
| 9 | October 27-31 | 10.3, 15.3 | Polar coordinates, double integrals in polar coordinates |
| 10 | November 3-9 | READING WEEK | No classes |
| 11 | November 10-14 | 15.4, 15.6 | Applications of double integrals, triple integrals |
| 12 | November 17-21 | 15.7, 15.8, 15.9 | Triple integrals in cylindrical and spherical coordinates, Change of variables in multiple integrals, Jacobian |
| 13 | November 24-28 | 11.1, Extra material | Real analysis, sequences, subsequence and Cauchy sequence, Power series, pointwise and uniform convergence |
| 14 | December 1– 5 | 11.8-11.11, extra material | Power series, pointwise and uniform convergence |
| 15 | December 8-9 | Catchup | Classes end December 9, 2025 |

**Remark:** NO calculators or other electronic devices or any other aids are allowed on exams.

**General 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://www.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](http://academicsupport.uwo.ca/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.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

* Examinations scheduled during official examination periods (Defined by policy)
* Midterm Test

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

**Evaluation Scheme for Missed Assessments**

***Missed Online Assignments***

Students are expected to submit each of the online assignments by the deadline listed. Should extenuating circumstances arise, students do not need to request Academic Consideration; instead, they must contact the instructor. Assignments will remain open for an additional 48 hours after the deadline as a No-Late- Penalty Period, during which submissions will be accepted without penalty. No submission will be accepted after that 48-hour period. In such cases, the weight of the missed quiz will be redistributed to the remaining quizzes.

**Absences from *Midterm Test***

If you miss a midterm test due to any circumstance, you must provide an academic consideration covering the date of the test. As it is noted previously, students cannot use their academic consideration without documentation for the midterm test.

Makeup examination for the midterm test will be available to those who are granted academic consideration. A makeup test is expected to be scheduled for the week after the original test date.

In cases where a student misses a midterm test and the makeup test and can provide an academic consideration for both absences, the weight of the test will be transferred to the final exam.

***Absences from Final Examinations***

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under [Special Examinations](https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_70)), especially for those who miss multiple final exams within one examination period.

**6. Additional Statements**

**6.1 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.

**6.2 Academic 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,

**6.3 General Academic Policies**

The website for Registrar Services is http://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 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.

**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>

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

<https://uwo.ca/univsec//pdf/academic_policies/appeals/graduate_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:

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

**Use of Electronic Devices During Assessments**

*Remarks:* NO calculators or other electronic devices or any other aids are allowed on midterm and final exams.

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, and wireless earbuds or headphones.

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

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is your 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 your responsibility to seek clarification before using any AI tools in academic work.

**6.5 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%20Accommodation_disabilities.pdf)

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