Western Science

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'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

Instructor	Email	Office	Phone	Office Hours
Dr. Khoa Nguyen	knguyen@uwo.ca	MC 282	519-661-2111 x88799	Friday, 2:30pm-3:30pm
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 7, 2023
National Day for Truth and Reconciliation: September 29, 2023 (no classes)
Thanksgiving: October 9, 2023
Fall Reading Week: October 30–November 5, 2023
Classes end: December 8, 2023

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. Here is the link:

https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2023A&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 like 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 21, 2023 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.
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.

Assignments: Students do their assignments in **WeBWorK**. There are 6 assignments, and the best five of six are chosen.
Assignment 1: released September 11, due September 17
Assignment 2: released September 25, due October 1
Assignment 3: released October 10, due October 15
Assignment 4: released October 23, due October 29
Assignment 5: November 6, due November 12
Assignment 6: November 20, due November 26

Week	Dates	Topics by Chapters	Comments
1	September 7-8	14.1	Functions of several variables
2	September 11-15	14.2, 14.3	Limits, Continuity, partial derivatives,
3	September 18-22	14.4, 14.5	Tangent plane and linear approximation, Chain Rule
4	September 25-28	14.6, 14.7	Directional derivative, gradient, Hessian, extreme values. **No class on Sept 29**

5	October 2-6	14.8	Lagrange multiplier, Taylor series of two variables
6	October 9-13	Catchup	**Thanksgiving day**
7	October 16-20	15.1, 15.2, review	**Midterm Exam** (Sat, Oct 21 from 1:00pm-3:00pm)
8	October 23-27	15.3, 15.4	Polar coordinates, applications
9	October 30-November 5	**Fall Reading Week**	**No classes**
10	November 6-10	15.4 (cont'd), 15.5	Applications of double integrals, triple integral
11	November 13-17	15.6, 15.7	Triple integrals in cylindrical and spherical coordinates
12	November 20-24	15.8	Change of variables in multiple integrals, Jacobian
13	November 27-Dec 1	11.8, 11.9, 11.10,11.11	Power series, pointwise and uniform convergence
14	December 4– 8	catchup	Class ends on Dec 8

Calculators Only scientific calculators are allowed. Graphing or programmable calculators or other devices such as cell phones (used as a calculator) cannot be used in the exams.

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 (for details, please see Student Absences). 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

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments worth less than 10% of the overall course grade:

For work worth less than 10% of the total course grade, a student may follow the procedures below.
1) For medical reasons, please contact the Academic Counseling Office of the Faculty of Registration immediately and request accommodation. If academic consideration is granted, then the weight of the assignment will be transferred to the remaining assignments.

2) For non-medical reasons, there is no guarantee that accommodation for a missed assignment to be granted because the lowest mark assignment will be dropped.
Note that in all cases where documentation (medical or otherwise) is required, it can *only* be collected by the student's Dean's Office Academic Counselling unit.

Assessments worth 10% or more of the overall course grade:

By policy, academic considerations for work totalling 10% or more of the final course grade can be granted only by the student's Faculty of Registration (typically by their academic counsellors). In such cases, students should be directed as follows.

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

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

The Student Medical Certificate is available at

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

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

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.

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,

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,

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.

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.

In the event that Test/Exam cannot be help 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

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