

Multivariate Analysis

Statistical Sciences 9848A

Fall 2021 Course Outline

1. Course Information



Official Schedule: Wed 2:30-3:30 PM; Fri 2:30-4:00 PM.
Location: Western Science Center, Room 248

2. Instructor Information

Instructor: Serge Provost, *Ph.D.*



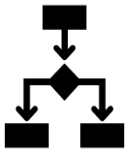
Office: WSC 223

Email: sp@uwo.ca

Phone: 519-661-3624

Office hours: After Wednesday's lectures, by appointment
or as announced on OWL

3. Course Syllabus, Schedule, Delivery Mode



The following topics will be covered after reviewing some basic definitions and results in linear algebra: multivariate distributions including the multivariate normal distribution and its properties; linear transformations; characteristic functions; estimation of mean vectors and covariance matrices; likelihood ratio tests; principal components; quadratic forms and their properties; the Wishart distribution; Hotelling's T squared distribution; multivariate analysis of variance; regression: multiple correlation; multivariate data visualization. Other topics may be added as time permits.

A proper background in Statistics (at least third-year level) is recommended.

Learning Outcomes



To become familiar with the theory and applications of multivariate statistical inference, and to acquire the necessary background to solve a variety of problems involving several variables and possibly large data sets.

Classes will begin on Friday September 10, 2021

Reading Week: November 1–7, 2021

Classes will end on Wednesday 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 such an eventuality, you will need a stable internet connection and a computer with a working microphone and webcam.

4. Course Materials

All the necessary course materials will be posted online. The course is mainly based on my own notes which will be posted on OWL:

An Introduction to Multivariate Statistical Inference

Electronic copies of the following textbooks will be available:



* *Applied Multivariate Statistical Analysis*, 6th Edition,

by R. A. Johnson and D. W. Wichern

* *Applied Multivariate Statistical Analysis*, 3rd Edition,

by W. K. Härdle and L. Simar

Links to supplementary materials will be provided.

Students should check OWL (<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. Students are responsible for checking OWL on a regular basis.

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

If students need assistance, they can seek support on the [OWL Help page](#). Alternatively, they can contact the [Western Technology Services Helpdesk](#). They can be reached by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

The overall course grade will be calculated as follows:

*Four assignments: 20%

*Two in-class midterm exams (scheduled for October 15th and November 19^h): 60%
(One crib sheet allowed)

*A final project due December 10th: 20%

If a student legitimately misses a midterm exam and provides the required supporting documentation, the evaluation components will be reweighted as follows: the other test: 50%; the assignments: 25%; the final project: 25%.

Click [here](#)

(https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_73) for a detailed and comprehensive set of policies and regulations concerning examinations and grading.

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) 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.
- (ii) 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.

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 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

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

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,

For those students who could not physically on campus during the first month of classes (before Oct 1), accommodation will be provided for any minor amount of missed work.

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.

Only non-programmable calculators will be allowed during tests.

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.

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.

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.

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