

Business 9702 – Multivariate Analysis Fall 2026

Professor: John Wilson
Office No. 3363
Tel. Number: 519-661-2111 ext. 86722
Email: jwilson@ivey.ca

Faculty Assistant: Stephanie Baxley
Office No. 3350-7
Tel. Number: 519-661-2111 ext. 86722
Email: sbaxley@ivey.ca

Mondays, 9:00am – 12:00pm
12 Sessions
See Learn for Course Dates

Class on Monday Nov 23 is tentatively canceled. It will be tentatively replaced by a midterm test on Thursday Nov 5 from 9 a.m. to 12 a.m. The Final Exam is tentatively scheduled for Monday December 14 from 9 a.m. to 12 a.m.

COURSE DESCRIPTION

This course introduces modern statistical methods for empirical research in business and related fields balancing theoretical foundations with applied data analysis. Core topics include statistical inference, estimation, hypothesis testing, and regression modeling (including logistic Poisson, ridge and lasso). Other topics such as principal components, ANOVA, Bayesian methods, resampling methods, classification, machine learning approaches and tree-based methods will be covered as time permits.

Students will also gain exposure to unsupervised learning techniques, including clustering and principal components analysis, as well as machine learning methods. A central component of the course is the application of these methods to real-world datasets, with hands-on implementation in R.

LEARNING OUTCOMES/OBJECTIVES

By the end of this course, students will:

- have a rigorous foundation in modern statistical inference and regression modeling for empirical research;
- be able to apply advanced statistical methods (including regression extensions, resampling techniques, survival analysis and classification models) to realistic datasets;
- understand and evaluate model assumptions, diagnostics, and limitations to ensure robust and credible research findings.
- have proficiency in R for implementing statistical analyses, managing data, and producing reproducible results;
- have strengthened research skills by integrating statistical methods into their own dissertation projects and future scholarly work.

METHODS OF EVALUATION

Contribution (15 points)

Discussion forms an important part of the course. You should be ready to contribute without having to be called upon. Being unprepared or not willing to contribute will result in negative points.

Individual/Group Assignments (15 points)

There will be three individual assignments (5 points each) after classes 3, 5 and 9. They are due by 9a.m. the following Wednesday.

Student Presentations (20 points)

Each week a student will lead part of the class by presenting key statistical concepts, selecting a simple open-source dataset and demonstrating its application or presenting a research paper. Selection of the topic will be in conjunction with the instructor. The number of student presentations will depend on the number of students in the class. Evaluation will be based on clarity of the presentation and slides and lecture content. Slides must be made available the night before class.

Mid-Term Exam (15 points)

Final Project/Exam (35 points)

Upon approval from the instructor, it might be possible to substitute a project or case study for the final and/or mid-term exams. This is not guaranteed and depends on the instructor's evaluation of the potential of any project/case study.

MATERIALS/REQUIRED READING

- **Required textbook:** [James et al., "Introduction to Statistical Learning with Applications in R", 2e, Springer, 2013]. <https://www.statlearning.com/>
- Students are welcome to purchase second-hand or earlier editions of this textbook or use an online version

COURSE TIMELINE AND FORMAT

Classes are generally in-person. However, there might be some unforeseen circumstances that necessitate moving to Zoom. So always check your emails before class.

The following is the tentative outline of sessions. This may change depending on students level of difficulty with the material

Session 1: Basics

- Review of basic statistics and probability concepts
- R-Basics

Sessions 2-6: Regression Basics

- Regression Basics
- Simple Linear
- Multiple Linear
- Interactions, Non-Linearity, Multicollinearity
- Diagnostics
- Logistic regression

- Poisson regression
- Ridge and Lasso regression

Sessions 7-8

- Bayesian Methods

Sessions 9-10

- Survival Analysis

Sessions 10-12

- Machine Learning
- Supervised
- Unsupervised

USE OF GENERATIVE ARTIFICIAL INTELLIGENCE (AI)

Use of AI is permitted for assignments and preparation subject to the following:

Any use of GenAI tools in the preparation of assignments must be clearly acknowledged, including identification of the GenAI tool(s) used, an explanation of how they were used (e.g., brainstorming, outlining, drafting, editing, or summarization), and the extent to which GenAI-generated content appears in the final submission.

AI is not permitted during exams.

ENROLLMENT RESTRICTIONS

Enrollment in this course is restricted to graduate students in the Ivey PhD Program, as well as any student that has obtained special permission to enroll in this course from the course instructor as well as the Graduate Chair (or equivalent) from the student's home program.

ACADEMIC OFFENCES: PLAGIARISM AND ACADEMIC INTEGRITY

Scholastic offences are taken seriously and students are directed to read the Scholastic Offences policy, specifically, the definition of what constitutes a [Scholastic Offence](#).

All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com.

GENDER-BASED SEXUAL VIOLENCE SUPPORT

“Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who is going through or has gone through these traumatic events. If you are experiencing or have experienced GBSV (either recently or in the past), you will find information about support services for survivors, including emergency contacts on the [Wellness and Wellbeing website](#). To connect with a case manager or set up an appointment, please contact support@uwo.ca.”

HEALTH AND WELLNESS SERVICES

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. See <https://www.uwo.ca/health>.

Students who are in emotional/mental distress should refer to [Mental Health Support at Western](#) for a complete list of options about how to obtain help.

ACCESSIBLE EDUCATION

Western is committed to achieving barrier-free accessibility for all its members, including graduate students. As part of this commitment, Western provides a variety of services devoted to promoting, advocating, and accommodating persons with disabilities in their respective graduate program.

Graduate students with disabilities (for example, chronic illnesses, mental health conditions, mobility impairments) are strongly encouraged to register with [Accessible Education \(AE\)](#), a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both AE and their graduate programs (normally their Graduate Chair and/or Course instructor) to ensure that appropriate academic accommodations to program requirements are arranged. These accommodations may include individual counselling, alternative formatted literature, accessible campus transportation, learning strategy instruction, writing exams and assistive technology instruction.