The Department of Sociology and Anthropology
Sociology 5102F, Fall Term 2026
Multiple Regression Analysis

Instructor: Dr. Zhiqiu Lin

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Class and Lab Meeting Time:
weekly classes: 9:35 am - 11:25am, Mondays
computer labs: 11:35 am -12:25 pm, Mondays
(The first class is on September 14th; no class on October 26th and the last class on December 11th, Friday)

Office Hours: 8:30 -9:20 am, Mondays in classroom; or by appointment.

Method of Delivery: in person at Carleton University Campus

Course Description:
This course is designed to familiarize the students with the basic properties of the general linear models, and to give students the detailed working knowledge of multiple regression analysis including both OLS and logistic regression analysis, as they are the very foundations for studying any other multivariate statistical methods. The course will concentrate on many practical issues concerning the applications of multiple regression analysis, such as regression assumptions, diagnostic procedures, modeling categorical independent and dependent variables (i.e., dummy/binary variables) and statistical interactions.

This is a graduate course in applied quantitative research methods. Therefore, the course materials will be presented based on the assumption that the students who enroll in this course have already completed an undergraduate course in social statistics, such as SOCI 3002, or have good working knowledge of basic statistics. This implies that the students have a thorough understanding of basic statistical concepts such as variance, standard deviation, correlation, and statistical inferences, hypothesis testing, and good working knowledge of simple linear regression analysis. Students who are weak on descriptive or inferential statistics should independently review the related materials in an introductory social statistics textbook before and during the first two weeks of the term. Elifson's Fundamentals of Social Statistics (3rd edition) provides useful discussions of these topics.

Students are expected to learn the course materials through lectures, readings, problem solving and participation in computer laboratory sessions. Computer labs are an important component of this course; they are designed to familiarize students with basic SAS programming and to give each student "hands-on" experience with SAS programming in

retrieving, managing, and analyzing social science data using various statistical methods including the general linear models and related statistical techniques.

Please note that as this is a graduate course with a limited class meeting time, the past students have characterized the course works heavy including readings, computer lab works, assignments, and a final research project. Therefore, *students are expected and should prepare to spend a considerable amount of time in studying course materials and SAS, and in completing course assignments and a final research project independently. The instructor will be happy to answer any questions in their studies but will not provide the answers to the assignments. In addition, all the teaching contents described in the course outline are necessary components of the course and any requests to cut course components will not be considered.*

The Chicago author-date citation style (17th edition) is to be used in the assignments and papers of this course. For more information, please see:
https://www.chicagomanualofstyle.org/tools_citationguide/citation-guide-2.html

Course Requirements & Methods of Evaluation:

In accordance with the Carleton University Undergraduate Calendar Regulations, the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85-89	B = 73-76	C = 63-66	D = 53-56
A - = 80-84	B - = 70-72	C - = 60-62	D - = 50-52
F= Below 50	WDN = Withdrawn from the course		DEF = Deferred

1) Assignments

(a) There will be three assignments (worth 15% each). Each assignment is worth 15% of the final grade, which will involve some calculations either by hand (in the first assignment only) or by the computer; and interpretations of the results of statistical analysis are also major components of each assignment. ***The assignments in hardcopy should be submitted in class.***

(b) Value: 45% in total.
Due date for assignment #1: *October 5th*
Due date for assignment #2: *November 9th*
Due date for assignment #3: *December 10th*

2) Presentation of the final research project proposal (5%)
Presentation Date: December 7th

During the class on December 1, each student will have 5-10 minutes to present her/his research proposals to the class; the instructor and students will have opportunities to provide comments and suggestions regarding the proposals respectively and the presenters may be required to answer some questions about their proposals.

This assignment is designed to encourage students to have a head-start on their final research projects. A research proposal should meet the following requirements:

(1) The length of the proposal should be no more than 800 words.
(2) The proposal should contain the following components (which will also be used as the evaluation criteria):

(a) A tentative title of your research project, which indicates clearly the substantive content and the focus of the projects.

(b) Thesis statements. In this section, a clear definition of research topic should be clearly articulated.

(c) Discussions of the significance of your proposed research in terms of theoretical and practical policy implications. In other words, the proposal should discuss how the research issues are related to some major themes and debates in your research areas.

(d) Preliminary literature reviews. Through the literature reviews, you can answer the questions of what has been done in the existing research literature regarding the topic. Usually this is the place where one also talks about different arguments/theories regarding your research questions or the pros and cons of various theoretical positions and how your research would relate to the exiting research and debates.

(e) Discussions of the questions such as what contributions your research could make in the context of the existing literature and research.

(f) An indication of sources of data that will be used in your research.

(g) the proposal presentations will be evaluated based on both the written proposal and its in-class presentation.

3) Independent take-home practice research project

(a) the guideline for the project is posted on the Carleton Course webpage.
(*b) Due day: December 23, submitted in the course webpage drop box*
(c) Value: 50%.
(Please note that if anyone needs an extension after the due date, please contact the course instructor as early as possible before the holiday season so that we can

contact the departmental graduate studies office to arrange for a final paper deferral).

Required Textbooks

Please note that textbooks #1-5 listed below are available online on Carleton Library Reserves – ARES system. And there are no restrictions for students using a second-hand copy of course material.

1) Melissa A. Hardy, *Regression With Dummy Variables,* A Sage University Paper #93, Newbury Park: Sage Publications, Inc. 1993. The price of the text: $57.

2) Paul D. Allison, *Multiple Regression: A primer,* California: Pine Forge Press, 1999. The price of the text: $114.

3) J. Jaccard, R. Turrisi, and C. Wan, *Interaction Effects in Multiple Regression,* A Sage University Paper #72, second edition, Newbury Park: Sage Publications, Inc. 2003. The price of the text: $57.

4) Scott Menard, *Applied Logistic Regression Analysis, A* Sage University Paper #106, Newbury Park: Sage Publications, Inc. Second edition, 2001. The price of the text: $57.

5) William D. Berry, *Understanding Regression Assumptions,* A Sage University Paper, #2, Newbury Park: Sage Publications, Inc. 1993. The price of the text: $57.

6) R. Freund and R. Littell, *SAS System for regression* (Third edition), SAS Institute, 2000. The price of the text: $30.

All these textbooks have also been ordered through Carleton bookstore and some of the e-copies of the texts may be available in library reserves for this course on Ares.

Recommended textbooks:

Sandra Schlotzhaue, *Elementary Statistics Using SAS*, SAS institute, 2009. (E-copy of this book is available online through Carleton University Library).

Ronald Cody and Jeffrey Smith, *Applied Statistics and the SAS Programming Language*, Prentice Hall, 1997. (E-copy of this book is available online through Carleton University Library).

Pedhazur, E.J. 1998, *Multiple Regression in Behavioral Research* (Third Edition),

Toronto: Holt, Rinehart and Winston. (Referred to as Ped in the schedule of required readings, which are available on Ares). (also E-copy of this book is available online through Carleton University Library).

Elifson, Fundamentals of Social Statistics, 1997 (third edition).

Important Policies and Conventions in This Course

1. To ensure a productive and pleasant learning environment, we must conduct our seminar discussions in a respectful manner. Disparaging language, interruptions and sarcasm will not be tolerated. At the same time, all students are required to think and act with care and be open to the different thinking and approaches on how we could make contributions to end the ways in which people are marginalized, excluded, and/or exploited.

2. Except in the cases of illness or extenuating circumstances brought to instructor's attention at least one day before the due date of an assignment including the final research project, there will be a penalty for a late assignment of 10% of the assigned grade per day.

3. All the assignments and the final research project report should be submitted in hardcopy in class (or in our course webpage drop box on Brightspace if there are difficulties in attending the classes); and students should always retain a hard copy of all the assignments that are submitted.
4. All final grades are subject to the Dean's approval.

Course Schedule

Note: The following schedule may be revised, and some topics may be dropped or added; readings, class contents and lab activities will be posted on the course website on Brightspace weekly at least one day before each class. The students are expected to check the website regularly and be prepared before coming to each class.

Topics and Readings
(For specific dates for each topic, please see Brightspace course webpage)

(1) Description of the course and Introduction to the general linear model
Required readings: Ped. 3-11.

Note: the students are expected to review bivariate correlation and regression analysis before this lecture. You can read a chapter on regression analysis and correlation

coefficient in Elifson's *Fundamentals of Social Statistics* or similar materials in an introductory statistical textbook. The discussion contents for each class are available on our course website on Brightspace.

(2) Quick review of basic statistical concepts and methods

Required readings: chapters 1-5, Allison.

(3) The notion of statistical control and multiple regression analysis

Required readings: Ped. 95-99, 156-170.

Computer Lab: Introduction to SAS programing and
Basic regression analysis with SAS.

(4) Regression assumptions

Required readings: chapter 6-8, Allison; Berry, *Understanding Regression Assumptions.*

(5) Regression analysis with categorical independent variables

Required readings: Hardy, *Regression with dummy variables*; and chapter 8.5, Allison;

Computer Lab: diagnostic tests and modeling dummy variables with SAS.

(6) Regression analysis with statistical interaction

Required readings: Jacard, Turrisi, and Wan; and Chapter 8 (8.6 and 8.7) Allison, and Baron and Kenny, "moderator versus mediator variable distinction".

Computer Lab: using SAS to model categorical independent variables and statistical interaction.

Required readings: Scott Menard, *Applied Logistic Regression Analysis*
Computer Lab: Logistic regression with SAS.

(7) Presentations of final research proposal

(8) Introduction to some advanced data analysis methods (optional pending upon the availability of time)

Academic Regulations, Accommodations, Plagiarism, Etc.

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University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, here: https://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website (https://students.carleton.ca/course-outline/). For an accommodation request, the processes are as follows:

Academic Accommodations for Students with Disabilities
The Paul Menton Centre for Students with Disabilities (PMC: https://carleton.ca/pmc/) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at **613-520-6608 or pmc@carleton.ca** for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send your ***Letter of Accommodation*** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*).

*The deadline for contacting the Paul Menton Centre regarding accommodation for October/November examinations is **October 1, 2026** and **November 15, 2026** for December examinations.

For Religious Obligations:

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: www.carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

For Pregnancy:

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: www.carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

For Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual

Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: www.carleton.ca/sexual-violence-support

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf

Plagiarism

Plagiarism is the passing off of someone else's work as your own and is a serious academic offence. For the details of what constitutes plagiarism, the potential penalties and the procedures refer to the section on Instructional Offences in the Undergraduate Calendar. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy (See https://carleton.ca/registrar/academic-integrity/). The Policy is strictly enforced and is binding on all students. Academic dishonesty in any form will not be tolerated. Students who infringe the Policy may be subject to one of several penalties.

Generative Artificial Intelligence Tools (e.g. ChatGPT)

Unless explicitly permitted, either generally or for a specific assignment, any use of generative AI tools to produce assessed content is considered a violation of academic integrity standards.
As our understanding of the uses of AI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of AI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.
Note: Students can also access resources related to citing Generative AI on the MacOdrum Library website.

What are the Penalties for Plagiarism?

A student found to have plagiarized an assignment may be subject to one of several penalties including but not limited to: a grade of zero, a failure or a reduced grade for the piece of academic work; reduction of final grade in the course; completion of a remediation process; resubmission of academic work; withdrawal from course(s); suspension from a program of study; a letter of reprimand.

What are the Procedures?

All allegations of plagiarism are reported to the faculty of Dean of FASS and Management. Documentation is prepared by instructors and departmental chairs. The Dean writes to the student and the University Ombudsperson about the alleged plagiarism. The Dean reviews the allegation. If it is not resolved at this level then it is referred to a tribunal appointed by the Senate.

Statement on Student Mental Health:

> "As a student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. If you need help, please speak to someone. There are numerous resources available both on- and off-campus to support you. For more information, please consult https://wellness.carleton.ca/"

Emergency Resources (on and off campus)

- Crisis/Urgent Counselling Support: 613-520-6674 (Mon-Fri, 8:30-4:30)
- Suicide Crisis Helpline: call or text 9-8-8, 24 hours a day, 7 days a week.
- For immediate danger or urgent medical support: call 9-1-1

Carleton Resources

- Mental Health and Wellbeing: https://carleton.ca/wellness/
- Health & Counselling Services: https://carleton.ca/health/
- Paul Menton Centre: https://carleton.ca/pmc/
- Academic Advising Centre (AAC): https://carleton.ca/academicadvising/
- Centre for Student Academic Support (CSAS): https://carleton.ca/csas/
- Equity & Inclusivity Communities: https://carleton.ca/equity/

Off Campus Resources

- Distress Centre of Ottawa and Region: call 613-238-3311, text 343-306-5550, or connect online at https://www.dcottawa.on.ca/
- Mental Health Crisis Service: call 613-722-6914 or toll-free 1-866-996-0991, or connect online at http://www.crisisline.ca/
- Good2Talk: call 1-866-925-5454 or connect online at https://good2talk.ca/
- The Walk-In Counselling Clinic: for online or on-site service https://walkincounselling.com

Important Information:

- Student or professor materials created for this course (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the author(s). They are intended for

personal use and may not be reproduced or redistributed without prior written consent of the author(s).

- Students must always retain a hard copy of all work that is submitted.
- Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.
- Carleton University is committed to protecting the privacy of those who study or work here (currently and formerly). To that end, Carleton's Privacy Office seeks to encourage the implementation of the privacy provisions of Ontario's *Freedom of Information and Protection of Privacy Act* (FIPPA) within the university.
- In accordance with FIPPA, please ensure all communication with staff/faculty is via your Carleton email account. To get your Carleton Email you will need to activate your MyCarletonOne account through Carleton Central. Once you have activated your MyCarletonOne account, log into the MyCarleton Portal.
- Please note that you will be able to link your MyCarletonOne account to other non-MyCarletonOne accounts and receive emails from us. However, for us to respond to your emails, we need to see your full name, CU ID, and the email must be written from your valid MyCarletonOne address. Therefore, it would be easier to respond to your inquiries if you would send all email from your connect account. If you do not have or have yet to activate this account, you may wish to do so by visiting https://students.carleton.ca/.

Date	Activity
FALL TERM 2026	
August 31, 2026	Last day for receipt of applications from potential fall (November) graduates.
September 2, 2026	Deadline for course outlines to be made available to students registere in full fall, early fall, and fall/winter courses.
September 7, 2026	Statutory holiday. University closed.
September 8, 2026	Academic orientation (undergraduate and graduate students).

Date	Activity
	Orientation for new Teaching Assistants.
	All new students are expected to be on campus. Class and laboratory preparations, departmental introductions for students, and other academic preparation activities will be held.
September 9, 2026	Fall term begins. Full fall, early fall, and fall/winter classes begin.
September 15, 2026	Last day for registration and course changes (including auditing) in ear fall courses.
September 18-20, 2026	Full summer and late summer term deferred final examinations will be held.
September 22, 2026	Last day for registration and course changes (including auditing) in full fall, late fall, and fall/winter courses.
	Last day to withdraw from early fall courses with a full fee adjustment.
	Graduate students who have not electronically submitted their final the copy to Graduate Studies will not be eligible to graduate in fall 2026 ar must register for the fall 2026 term.
September 30, 2026	Last day to withdraw from full fall and fall/winter courses with a full fee adjustment.
October 1, 2026	Last day for academic withdrawal from early fall courses.
	Last day to request Formal Examination Accommodations for Oct/Nov final examinations from the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.

Date	Activity
October 9, 2026	December examination schedule (fall term final and fall/winter mid-terms) available online.
October 12, 2026	Statutory holiday. University closed.
October 15, 2026	Last day for receipt of applications for admission to an undergraduate degree program for the winter term from applicants whose documents originate from outside Canada or the United States.
October 16, 2026	Last day for summative tests or examinations, or formative tests or examinations totaling more than 15% of the final grade, in early fall te undergraduate courses, before the official Oct/Nov final examination period (see examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations the Graduate Calendar).
October 23, 2026	Last day of early fall classes.
	Last day for final take-home examinations to be assigned in early fall courses, with the exception of those conforming to the examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar
	Last day that can be specified by a course instructor as a due date for term work for early fall courses.
October 26, 2026	Deadline for course outlines to be made available to students registere in late fall courses.
October 26-30, 2026	Fall break, no classes.
October 31- November 1, November 7-8, 2026	Final examinations in early fall undergraduate courses will be held.

Date	Activity
November 2, 2026	Late fall classes begin.
November 13, 2026	Last day to withdraw from late fall term courses with a full fee adjustment.
November 15, 2026	Last day for academic withdrawal from full fall and late fall courses.
	Last day to request Formal Examination Accommodations for Decembe full fall and late fall examinations and fall/winter midterm examinations from the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.
	Last day for receipt of applications for admission to an undergraduate degree program for the winter term.
November 20-22, 2026	Early fall undergraduate deferred final examinations will be held.
November 27, 2026	Last day for summative tests or examinations, or formative tests or examinations totaling more than 15% of the final grade, in full fall term or fall/winter undergraduate courses, before the official December final examination period (see examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar).
November 30, 2026	Last day for receipt of applications from potential winter (February) graduates.
December 4, 2026	Last day for graduate students to submit their supervisor-approved thesis, in examinable form to the department.
	Last day for summative tests or examinations, or formative tests or examinations totaling more than 15% of the final grade, in late fall term undergraduate courses, before the official final examination period (see

Date	Activity
	examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar).
December 11, 2026	Fall term ends.
	Last day of full fall and late fall classes.
	Classes follow a Monday schedule.
	Last day for final take-home examinations to be assigned, with the exception of those conforming to the examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar.
	Last day that can be specified by an instructor as a due date for term work for full and late fall courses.
	Last day for receipt of applications for undergraduate degree program transfers for winter term.
December 12-23, 2026	Final examinations in full fall and late fall courses and mid-term examinations in fall/winter courses will be held. Examinations are normally held all seven days of the week.
December 23, 2026	All final take-home examinations are due on this day, with the exceptio of those conforming to the examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar.
December 24, 2026 at noon through January 1, 2027 inclusive	University closed.