

**FRE 528 Applied Econometrics (Fall, 2024)**

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**Instructor:** Michael Johnson, PhD

**Contact Info:** Email: [mjohnson@mail.ubc.ca](mailto:mjohnson@mail.ubc.ca)

**Lectures:** Tues and Thurs 11:30 to 1:00pm in MCML 154 **(with some modification – please see the weekly MFRE online schedule and the class schedule posted on page 6 and 7)**

**Office Hours:** Thurs 4:30-5:30pm **Office:** MCML 352

**Computer Lab:** Thursdays 4:30-5:30pm. Go under the assumption of NO computer lab unless announced by the instructor during lecture. Computer labs only take place when required to support student learning – more so to support learning of software. Computer Labs held in MCML 154. On days of no computer lab, Mike will attend his office hours in MCML 352.

**Course Support:**

Juan Fercovic, Educational Researcher, MFRE Program

**Email:** [juan.fercovic@ubc.ca](mailto:juan.fercovic@ubc.ca) (Please see Canvas for Office Hours)

**Course Overview**

This course will provide the necessary foundations and experience for students to conduct sound empirical research in Food and Resource Economics. The course will review the foundations of data and regression analysis and the common problems encountered by applied researchers (data constraints and econometric challenges) along with potential solutions to these problems. Students will be expected to manipulate data and apply the models presented in class on a weekly basis with assignments and lab sessions. Additionally, students will carry out a team-based project to further contribute to the understanding and application of applied econometrics.

**Learning Outcomes:**

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At the end of this course, students will be able to:

- Develop a broad understanding of regression analysis using cross-sectional data relevant for analysing economic and business data. Fully understand the underlying assumptions of OLS and mitigation strategies when assumptions are violated.
- Understand the application and use of Logistic Regression and Panel Data Analysis (specifically First Difference and Fixed Effects estimation).
- Understand the context of applied econometrics to prediction and theory driven models.
- Specify, interpret and critically evaluate regression estimates using procedures of diagnostic testing and model validation.
- Understand important theoretical properties of ordinary least squares estimators and the statistical testing of hypotheses with regards to econometric modeling.
- Perform statistical tests to investigate whether the classical assumptions in regression analysis are satisfied, and what to do when such assumptions are violated.
- Understand the context of estimation using method of moments and the maximum likelihood principle for parameter estimation.
- Demonstrate proficiency in the use and application of R for conducting econometric analysis; Excel for data manipulation and conducting classical statistical tests; Tableau Prep for data cleansing/manipulation and cleansing; and Tableau Desktop for visual analytics.
- Interpret and understand academic literature concerning empirical analysis and econometrics. Develop critical thinking skills as a reader of journal articles that make use of the concepts and methods that are introduced in the course.
- Demonstrate proficiency in the development of econometric models to your own academic work and summer internship project.

The course will be delivered in-person during scheduled class times. Some content may be provided in recorded format to support student learning. Students are expected to attend and participate as required in all class activities. Absenteeism will affect your grades for participation and in-class TBL activities.

### **Learning Management System and Communication**

- Canvas (<http://canvas.ubc.ca>) will be used for course content delivery
- Canvas Notifications and Student email addresses will be used for communicating information and disseminating class materials. **It is your responsibility to check your email and the Canvas course website frequently.**

### **Software, Textbook, Materials etc.**

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**Required Software:** Excel, Tableau Desktop, and R will be used in this course.

- **R statistical software** will be required to be used in this course for a minimum of one assignment. **Please be sure to download and install the most recent versions of R and R Studio for the course.** Download R: Visit: <https://www.r-project.org/>  
Once you have downloaded R, you can download RStudio.  
Download RStudio: Visit: <https://rstudio.com/products/rstudio/download/>
- **Microsoft 365** (Excel, Powerpoint, Word, etc) is available for free for UBC students. Mac users – please be sure to update to the Microsoft 365 because the Addins for Excel will be similar to Addins on PCs. Please sign up for your free MS software at: <https://it.ubc.ca/services/desktop-print-services/software-licensing/microsoft-365-students>
- Please sign up free your free student copy of **Tableau Desktop** using the following link: <https://www.tableau.com/academic/students>. Be sure to sign up for the software using your UBC email account. We will also be using **Tableau Prep** for data cleansing, manipulation and preparation.

### **Recommended Textbook/References:**

- R. Carter Hill, William E. Griffiths and Guay C. Lim, *Principles of Econometrics*, 2011 (4<sup>th</sup> edition), 2017 (5<sup>th</sup> edition). Available in KOERNER LIBRARY reserve collection: <http://resolve.library.ubc.ca/cgi-bin/catsearch?bid=4897188>
- *Introductory Econometrics: A Modern Approach*, 2012, 5<sup>th</sup> Edition. Jeffrey M. Wooldridge. (Chapters 13 and 14 on Panel Data Analysis)
- Several econometrics papers will be provided via Canvas for additional reading

## Required Calculator:

- Any 2-variable scientific calculator (Sharp EL 531 or 531XTWB or equivalent) is required. The following is available through the UBC bookstore:  
<https://the.bookstore.ubc.ca/Item?item=3425821> Lectures on regression analysis will be taught using the Sharp EL 531. **Programmable calculators are not allowed during exams.**

## Learning and Assessments

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### Evaluation

Assessment Type	Weighting %
Assignments	20%
Replication Project*	15%
Participation and Team-Based Learning (TBL) Activities	5%
Midterm Exam	25%
Final Exam	35%
<b>Total</b>	<b>100%</b>

\***Teams of 4 students.** Details of the Replication Project will be discussed during class.

## Course Policy: Assignments and Exams

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**Makeup Exams and Late Assignments:** There will be NO makeup exams or quizzes. If you miss an exam, you will receive zero marks. Likewise, late assignments will be heavily penalized and will be discounted by 50% per day. Exceptions may be made for documented medical reasons or extenuating circumstances. In such a case, it is the responsibility of the student to inform the instructor immediately (not after the exam or deadline has taken place). Notification after the examination date is not acceptable.

**Attendance: Required** Attendance is mandatory at ALL class. The course will be conducted using a **Team-Based Learning (TBL)** format, to develop both your leadership and team-building skills, while enhancing your learning beyond individual study. Your team will require access to a laptop computer during classes during TBL exercises. If you are unable to attend class due to illness, it is your responsibility to inform the instructor prior to class.

Academic honesty is essential to the continued functioning of The University of British Columbia as an institution of higher learning and research. All UBC students are expected to behave as honest and responsible members of an academic community. Breach of those expectations or failure to follow the appropriate policies, principles, rules, and guidelines of the University with respect to academic honesty may result in disciplinary action.

**Academic misconduct** that is subject to disciplinary measures includes, but is not limited, to the following:

- **Plagiarism**, which is intellectual theft, occurs where an individual submits or presents the oral or written work of another person as his or her own. **Plagiarism is also defined as presenting the work of another person as your own or from a gen AI tool without proper referencing as stated in this course outline.**
- In many UBC courses, you will be required to submit material in electronic form. The electronic material will be submitted to a service which UBC subscribes, called TurnItIn. This service checks textual material for originality. It is increasingly used in North American universities. For more information, review TurnItIn website online.
- **Cheating**, which may include, but is not limited to falsification of any material subject to academic evaluation, unauthorized collaborative work; or use of unauthorized means to complete an examination.
- **Submitting others work as your own**, may include but not limited to i. using, or attempting to use, another student's answers; ii. providing answers to other students; iii. failing to take reasonable measures to protect answers from use by other students; or iv. in the case of students who study together, submitting identical or virtually identical assignments for evaluation unless permitted by the course instructor.
- **Resubmission of Material**, submitting the same, or substantially the same, essay, presentation, or assignment more than once (whether the earlier submission was at this or another institution) unless prior approval has been obtained from the instructor(s) to whom the assignment is to be submitted.
- **Use of academic ghostwriting services**, including hiring of writing or research services and submitting papers or assignments as his or her own.

**Student Responsibility:** Students are responsible for informing themselves of the guidelines of acceptable and non-acceptable conduct for examinations and graded assignments as presented via FRE code of conduct guidelines; course syllabus and instructors; and UBC academic misconduct policies, Review the following web sites for details:

- UBC Academic Misconduct and Discipline (<https://vancouver.calendar.ubc.ca/campus-wide-policies-and-regulations/student-conduct-and-discipline/discipline-academic-misconduct> )
- UBC Learning Commons web-based Academic Integrity (<http://learningcommons.ubc.ca/academic-integrity/>).

**Penalties for Academic Dishonesty:** The integrity of academic work depends on the honesty of all those who work in this environment and the observance of accepted conventions. Academic misconduct is treated as a serious offence at UBC and within the MFRE program. Penalties for academic dishonesty are applied at the discretion of the course instructor. Incidences of academic misconduct may result in a reduction of grade or a mark of zero on the assignment or examination with more serious consequences being applied if the matter is referred to the Dean's office and/or President's Advisory Committee on Student Discipline.

All learning materials of this course (videos, course handouts, lecture slides, assessments, etc.) are the intellectual property of the instructor or licensed to be used in this course by the copyright owner. Redistribution of these materials by any means without permission of the copyright holder(s) constitutes a breach of copyright and may lead to academic discipline and could be subject to legal action. Audio or video recording of classes are not permitted without the prior approval of the Instructor. Any lecture video and recordings are for the sole use of the instructor and for students currently enrolled in this class. In no case may the lecture video or recording (or other learning materials), or part of the recording be used by students or any other person for any other purpose, either personal or commercial. Further, audio or video recording of classes are not permitted without the prior consent of the instructor.

## **AI Policy**

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Students are permitted to use artificial intelligence tools, including generative AI, to gather information, review concepts or to help produce assignments and the replication project. However, students are ultimately accountable for the work they submit (they can be wrong!), and **any content generated or supported by an artificial intelligence tool must be cited appropriately** (see: <https://apastyle.apa.org/blog/how-to-cite-chatgpt>). **Note: when referencing the use of gen AI tools on assignments, it is expected that you provide both your prompt and the output that was provided by the gen AI tool so your instructor can ascertain the extent of your own original content.** Please read the section on Academic Policy that discusses plagiarism.

**NOTE:** Use of AI tools is NOT permitted during quizzes, midterm exams and final exams in this course.

Course Schedule (Highlighted dates are classes that fall outside the typical Tues / Thurs schedule)

Week	Overview of lecture topics	Reference
1 Sept 2	<p><b>Tues Sept 3</b> Introduction to course and econometrics.</p> <p><b>Wed Sept 4</b> Introduction to data visualization using Tableau Desktop. <b>Assignment #1 posted.</b></p> <p><b>Thurs Sept 5</b> Tableau Desktop continued. Visual analytics; Clustering Analysis.</p>	Handouts provided; Hill Chaps 1-2.
2 Sept 9	<p><b>Tues Sept 10</b> Statistics Inquiry (t Tests reviewed!). Introduction of simple linear regression (SLR1). Assumptions, Estimation and Fit.</p> <p><b>Wed Sept 11</b> Complete Introduction to SLR1. <b>Assignment #2 posted</b></p> <p><b>Thurs Sept 12</b> Simple linear regression (SLR2). Interval estimation, prediction; interpretation and modeling issues.</p>	
3 Sept 16	<p><b>Tues Sep 17</b> Completion of last day's content (SLR2).</p> <p><b>Wed Sept 18</b> Tests of significance (SLR3). Assignment 2 discussion.</p> <p><b>Thurs Sept 19</b> Introduction to functional forms; Case Study.</p>	Handouts, Hill Chapt 3-5
4 Sept 23	<p><b>Mon Sept 23</b> Functional forms; transformations.</p> <p><b>Tues Sep 24</b> Assignment discussion.</p> <p><b>Thurs Sept 26 – No class</b></p>	
5 Sept 30	<p><b>Tues Oct 1</b> Introduction to Multiple Regression</p> <p><b>Thurs Oct 3</b> <b>Midterm Exam: Thurs Oct 3rd (11:30am – 1:30pm)*</b></p>	
6 Oct 7	<p><b>Tues Oct 8</b> Multiple Regression continued (Backwards-PI). Assumptions. Stepwise processes and model development.</p> <p><b>Thurs Oct 10</b> Multiple Regression continued (Backwards-PII). Diagnostic tests. <b>Assignment #3 posted</b></p>	

\*Please note the midterm exam will extend beyond regular class time to allow for extra time.

Week	Overview of lecture topics	Reference
7 Oct 14	<b>Tues Oct 15</b> Indicator Variables. Coding, Interpretation; prediction.  <b>Thurs Oct 17</b>  Heteroskedasticity.	Hill Chapt 6-8
Weeks 8 – 10	<i><b>During Weeks 8 to 10 there will be no scheduled classes as per the MFRE schedule!</b></i>	
11 Nov 11	<b>Midterm Break Nov. 11-13 (No class Tues Nov. 12)</b>  <b>Thurs Nov 14</b> Tests for misspecification & structural stability. <i><b>Assignment #4 posted.</b></i>	
12 Nov 18	<b>Tues Nov 19</b> Autocorrelation. Tests and remedies.  <b>Wed Nov 20</b> Introduction to Panel Data Analysis. First Differences.  <b>Thurs Nov 21</b> Fixed Effects (within estimator).	Wooldridge Chapt HO
13 Nov 25	<b>Tues Nov 26</b> Introduction to Logistic regression; probit.  <b>Thurs Nov 28</b> Logistic regression; diagnostics, prediction, model accuracy and assessment.  <b>Fri Nov. 29</b> Other models dealing with binary/nominal dependent variables. Diagnostics and applications.	Hill Chapt 16
14 Dec 2	<b>Dec. 3/5. Team Project Presentations.</b>	

**Final Exam – Scheduled by MFRE Admin**