DALHOUSIE UNIVERSITY

FACULTY OF MANAGEMENT
Rowe School of Business

Master of Science in Business

BUSS 6203

Econometrics for Business Research

Fall 2020

RECOGNITION OF MI'KMAQ TERRITORY

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

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Course Website:	BrightSpace
Tutorials:	N/A
Teaching Assistant:	N/A

Course Description

This course covers the mathematical and statistical tools needed to undertake financial economics research. Topics include statistical inference, linear and nonlinear regressions, generalized least squares, simultaneous equations models, and time series models, with a focus on parameter estimation, hypothesis testing, statistical inference, and forecasting.

Course Pre-requisites, Co-requisites, and/or other Restrictions

The prerequisite courses include an introduction to statistics, calculus, and matrices. Students should be familiar with concepts in probability theory and statistical inference, and the course begins with a brief review of basic probability and statistics. Students who lack the required background are encouraged to undertake study before taking this course.

Course Rationale and/or Other Restrictions and Requirements

Econometrics is at the intersection of economics, mathematics, and statistics. Economic systems are typically modeled with stochastic dynamic equations and observations on operating systems provide the data used to calibrate the parameters in equations. To understand and conduct research in financial economics requires a facility with dynamic equations and the statistical techniques for fitting equations to data.

Course Learning Outcomes/Objectives

Upon completion of this course, students should be able to:

1. understand the theory and application of linear regression models.
2. estimate model parameters of the chosen econometric models.
3. test the hypotheses derived from a model.
4. use the econometric models for prediction and forecasting

Approach Taken & Ground Rules

The course material is technical and the `Socratic Method' (lectures: questions and discussion) will be used throughout. For the Fall 2020 semester the course is online, and all interaction will be virtual. The lectures will be recorded, and discussions will take place on Microsoft Teams.

Required Text(s)/Learning Materials

Required textbook: Damodar N. Gujarati | Dawn C. Porter (GP), Essentials of Econometrics, 4th Edition, 2010, McGraw-Hill/Irwin.

Additional reading: R. Carter Hill | William E. Griffiths | Guay C. Lim (HGL), Principles of Econometrics, 4th Edition, 2011, John Wiley & Sons, Inc.

Lecture notes posted on course website.

Software:

MatLab (Preferred). Dal has a site license so that you can install the MatLab software on your own computer and use it anywhere. MatLab has 56 toolboxes, and a number of toolboxes are specifically related to financial research, such as Database, Datafeed, Deep Learning, Econometrics, Financial Instruments, Financial Optimization, Parallel Computing, Simulink, Statistics and Machine Leaning.

Students can use their own software for their assignments.

Learning Management System Site Information

All course material, such as assignments, teaching notes, etc, will be uploaded to the Brightspace course website.

Drop dates

Last day to add/drop classes –

Last day to drop without a "W" –

Last day to drop with a "W" –

Other important dates

Course Schedule

Week	Topics/Assignments	Reading Material
1	**1. The Nature and Scope of Econometrics** 1.1 What is econometrics? 1.2 Why study econometrics? 1.3 The methodology of econometrics. 1.4 The road ahead. 1.5 Review of the basics of probability and statistics	Chapter 1
2	**2. The Simple Linear Regression Model** 2.1 The meaning of regression. 2.2 The population regression function. 2.3 Statistical or stochastic specification of the population regression function (PRF). 2.4 The nature of the stochastic Error Term. 2.5 The sample regression function (SRF). 2.6 The specific meaning of the term: "linear" regression. 2.7 Two-variable versus multiple linear regression. 2.8 Parameter estimation: The method of ordinary least squares.	Chapter 2

3	**3. The Two-Variable Model: Hypothesis Testing** 3.1 The classical linear regression model 3.2 Variances and standard errors of OLS estimators. 3.3 Why OLS? The properties of OLS estimators. 3.4 The sampling or probability distributions of OLS estimators. 3.5 Hypothesis testing. 3.6 Goodness of fit. 3.7 Reporting the results of regression analysis. 3.8 Normality tests. 3.9 Forecasting	Chapter 3
4	**4. Multiple Regression: Estimation and Hypothesis Testing** 4.1 The three-variable linear regression model. 4.2 Assumptions 4.3 Parameter estimation 4.4 Goodness of fit, R square. 4.5 Hypothesis testing in a multiple regression. 4.6 Testing the Joint hypothesis. 4.7 Introduction to specification bias 4.8 Adjusted R square 4.9 Restricted least squares	Chapter 4
5	**5. Functional Forms of Regression Models** 5.1 How to measure elasticity: the log-linear model. 5.2 Comparing linear and log-linear regression models. 5.3 Multiple log-linear regression models. 5.4 How to measure the growth rate: the semi-log model. 5.5 The lin-log model. 5.6 Weighted least square method. 5.7 Polynomial regression models. 5.8 Regression through the origin. 5.9 Regression on standardized variables	Chapter 5
6	**6. Dummy Variable Regression Models** 6.1 The nature of dummy variables. 6.2 ANCOVA models. 6.3 Regression on one quantitative variable and one qualitative variable. 6.4 Regression on one quantitative explanatory variable and many qualitative variables. 6.5 Dummy variables for seasonal analysis. 6.6 The linear probability model (LPM).	Chapter 6

	Summary.	
7	Reading week	
8	**7. Model Selection Criteria and Tests** 7.1 The attributes of a good model. 7.2 Model specification errors 7.3 Omission of relevant variable bias: “underfitting” 7.4 Inclusion of irrelevant variables: “overfitting”. 7.5 Incorrect Functional form. 7.6 Error of measurement. 7.7 Tests of specification errors. 7.8 Summary	Chapter 7
9	**8. Multicollinearity** 8.1 The nature of multicollinearity 8.2 Theoretical consequences of multicollinearity. 8.3 Practical consequences of multicollinearity. 8.4 Detection of multicollinearity. 8.5 Is multicollinearity necessarily bad? 8.6 What to do with multicollinearity: remedial measures. 8.7 Summary	Chapter 8
10	**9. Heteroscedasticity** 9.1 The nature of heteroscedasticity. 9.2 Consequences of heteroscedasticity. 9.3 Detection of heteroscedasticity. 9.4 Remedial measures for heteroscedasticity. 9.5 Summary.	Chapter 9
11	**10. Autocorrelations** 10.1 The nature of autocorrelation. 10.2 Consequences of autocorrelation. 10.3 Detection of autocorrelation 10.4 Remedial measures. 10.5 Estimation of autocorrelation. 10.6 The Newey-West (NW) method. 10.7 Summary.	

12	**11. Simultaneous Equations Models** 11.1 The nature. 11.2 Inconsistency of OLS estimators. 11.3 Method of indirect least squares. 11.4 The identification problem. 11.5 Rules for identification 11.6 Estimation of an overidentified equation. 11.7 Summary.	
13	**12. Course Wrap-up** 12.1 Overview of course content 12.2 Discussion of final exam: individual comprehensive projects 12.3 Project Report format 12.4 Evaluation scheme	

Course Assessments/Method of Evaluation/ Marking Scheme

Assignments: 50%

Final Exam: 50%

The method of mark given is the only allocation which can be used to establish the grade. This means that grades can only be changed if there is an error in the scores on the assignments and the final project. If you believe there is an error in an assignment or the final project, please consult the instructor immediately. Request to reassess the assignment or the final project marks after a course letter grade is posted into the Dal system will only be considered as part of a formal Request for Reassessment of a Final Grade submitted through the registrar's office.

Assignments: Given the nature of the course, each of the 5 assignments (covering 2 weeks of material) is composed from the questions in the text. These assignment questions are mostly quantitative, though some qualitative interpretation based on quantitative problem-solving will be added. Students are encouraged to use the Discussion Board in Brightspace to interact with other students and the professor when working on assignments. It is expected these assignments will help the students understand and make use of the econometric skills for business research. Each assignment is worth maximum 10% of the total course assessment, and answers to assignment questions will be graded for content.

Final Project: Each student will be assigned a separate project as the final component of the course. The nature of the final project will be both quantitative and qualitative, and it will be a test of the students' working knowledge of econometrics for business research. Specifically, students will prepare a project report, following a given template for the final project, which will be composed of the following sections:

Section	Content	Points
1. Introduction	research questions and hypotheses; brief discussion of literature	10
2. Data	definition of variables; observations/sample; relevance of data to hypotheses	20
3. Methodology	models (variable relationship equations); formal hypotheses; model fitting	20
4. Results	fitted models; tests of hypotheses; validation of models	40
5. Discussion	connection of results to research questions; limitations of methods and data; recommendations for further research.	10

The project report must be completed individually by each of the students. A selected project topic must be approved by the instructor before work commences. The project can be in the form of replication of a published paper on an application of econometrics, or an original piece of empirical research .

Grading Scale for Graduate Students

Grading Scale as per Dalhousie Faculty of Graduate Studies Calendar

Regulation 7.6.2 Grading Policy

Letter Grade	Numerical % equivalent
A+	**90 - 100**
A	**85 - 89**
A-	**80 - 84**
B+	**77 - 79**
B	**73 - 76**
B -	**70 - 72**
F	**0-69**

NOTE: As per FGS regulations students must obtain a final course grade of 70% (B-) or higher to pass the course.

Missed or Late Academic Requirements due to Student Absence

Dalhousie students are asked to take responsibility for their own short-term absences (3 days or less) by contacting their instructor by phone or email prior to the academic requirement deadline or scheduled time and by submitting a completed Student Declaration of Absence to their instructor in case of missed or late academic requirements. Only 2 separate Student Declaration of Absence forms may be submitted per course during a term.

Read more: https://cdn.dal.ca/content/dam/dalhousie/pdf/dept/university_secretariat/policy-repository/StudentAbsenceRegulation(OCT2017)v2.pdf

Accessibility

Students may request accommodation as a result of barriers experienced related to disability, religious obligation, or any characteristic protected under Canadian human rights legislation.

Students who require academic accommodation for either classroom participation or the writing of tests and exams should make their request to the Student Accessibility Centre prior to or at the outset of the regular academic year. Please visit www.dal.ca/access for more information and to obtain the Request for Accommodation form.

A note taker may be required as part of a student's accommodation. There is an honorarium of $75/course/term (with some exceptions). If you are interested, please contact the Student Accessibility Centre at 902-494-2836 for more information or send an email to notetaking@dal.ca

Please note that your classroom may contain specialized accessible furniture and equipment. It is important that these items remain in the classroom, untouched, so that students who require their usage will be able to fully participate in the class.
Read more: https://www.dal.ca/campus_life/academic-support/accessibility.html

Accreditation

As an AACSB (Association to Advance Collegiate Schools of Business) accredited university, Dalhousie University's business programs are subject to Assurance of Learning (AOL) standards. During the semester anonymous data may be collected to assess if AOL goals and objectives are being met. The data collected will be used for program improvement purposes only and will not impact nor be associated with student grades.

Academic Integrity

The commitment of the Faculty of Management is to graduate future leaders of business, government and civil society who manage with integrity and get things done. This is non-negotiable in our community and it starts with your first class at Dalhousie University. So when you submit any work for evaluation in this course or any other, please ensure that you are familiar with your obligations under

the Faculty of Management's Academic Integrity Policies and that you understand where to go for help and advice in living up to our standards. You should be familiar with the Faculty of Management Professor and Student Contract on Academic Integrity, and it is your responsibility to ask questions if there is anything you do not understand.

Dalhousie offers many ways to learn about academic writing and presentations so that all members of the University community may acknowledge the intellectual property of others. Knowing how to find, evaluate, select, synthesize and cite information for use in assignments is called being "information literate." Information literacy is taught by Dalhousie University Librarians in classes and through Dalhousie Libraries' online Citing & Writing tutorials.

Do not plagiarize any materials for this course. For further guidance on what constitutes plagiarism, how to avoid it, and proper methods for attributing sources, please consult the University Secretariat's Academic Integrity page.

Please note that Dalhousie subscribes to plagiarism detection software that checks for originality in submitted papers. Any paper submitted by a student at Dalhousie University may be checked for originality to confirm that the student has not plagiarized from other sources. Plagiarism is considered a very serious academic offence that may lead to loss of credit, suspension or expulsion from the University, or even the revocation of a degree. It is essential that there be correct attribution of authorities from which facts and opinions have been derived. At Dalhousie, there are University Regulations which deal with plagiarism and, prior to submitting any paper in a course; students should read the Policy on Intellectual Honesty contained in the Calendar.

Furthermore, the University's Senate has affirmed the right of any instructor to require that student assignments be submitted in both written and computer readable format, e.g.: a text file or as an email attachment, and to submit any paper to a check such as that performed by the plagiarism detection software. As a student in this class, you are to keep an electronic copy of any paper you submit, and the course instructor may require you to submit that electronic copy on demand. Use of third-party originality checking software does not preclude instructor use of alternate means to identify lapses in originality and attribution. The result of such assessment may be used as evidence in any disciplinary action taken by the Senate.

Finally: If you suspect cheating by colleagues or lapses in standards by a professor, you may use the confidential email: managementintegrity@dal.ca which is read only by the Assistant Academic Integrity Officer.

Faculty of Management clarification on plagiarism versus collaboration:

There are many forms of plagiarism, for instance, copying on exams and assignments. There is a clear line between group work on assignments when explicitly authorised by the professor and copying solutions from others. It is permissible to work on assignments with your friends but only when the professor gives you permission in the specific context of the assignment. University rules clearly stipulate that all assignments should be undertaken individually unless specifically authorised.

Specific examples of plagiarism include, but are not limited to, the following:

- Copying a computer file from another student, and using it as a template for your own solution
- Copying text written by another student
- Submitting the work of someone else, including that of a tutor as your own

An example of acceptable collaboration includes the following:

- When authorised by the professor, discussing the issues and underlying factors of a case with fellow students, and then each of the students writing up their submissions individually, from start to finish.

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. Read more: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/student-life-policies/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2).

Read more: http://www.dal.ca/cultureofrespect.html

Recognition of Mi'kmaq Territory

Dalhousie University acknowledges that the University is located on Traditional Mi'kmaq Territory.

The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit the office in the McCain Building (Room 3037) or contact the programs at elders@dal.ca or 902-494-6803 (leave a message).

University Policies, Statements, Guidelines

This course is governed by the academic rules and regulations set forth in the University Calendar and the Senate. https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog

Provide required links to:

- Important Dates in the Academic Year (including add/drop dates) http://www.dal.ca/academics/important_dates.html
- University Grading Practices: Statement of Principles and Procedures https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Statement on the Use of Scented Products:

Dalhousie University and the organizations which represent students, faculty and other employees support the efforts of the Dalhousie University Environmental Health and Safety Committee to create a scent-free University. In consideration of the difficulties that exposure to these products cause sensitive individuals, the University encourages faculty, staff, students and visitors to avoid the use of scented personal care products. Thank you for helping us all breathe easier!

Read more: http://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html