

McGill University  
Department of Economics  
Class Time: Mon/Wed 10.05-11.25  
Class Room: Leacock 424

Instructor: Dhanoos (Dee) Sutthiphisal  
Office: Leacock 538  
Office Hours: Mon/Wed 11.30-12 & 1.30-2.15  
E-mail: via WebCT  
Class Web: [www.deefred.net/Dee](http://www.deefred.net/Dee)

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**ECON 665B: QUANTITATIVE METHODS  
MASTERS**

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**WINTER 2008**

### **Course Objectives**

The goal of this course is to introduce you to the methods economists use to test economic theories in the real world. Particularly, we will focus on regression analysis with the emphasis on both the theory underlying such analysis and the actual application of the theory to analyze real world problems. (Note that because of time limits, we will not spend much time on two important areas in econometrics: probability theory and time series regression analysis.)

### **Course Prerequisites**

An understanding of basic probability theory and regression analysis is essential. Students should also have some knowledge of linear algebra.

### **Software and Textbooks**

You are required to use STATA for the problem sets and term project. (I will test your knowledge of the software in the exams.) The recommended textbook for this course is William H. Greene, *Econometric Analysis*, Sixth Edition (Prentice Hall, 2008) – Fifth edition (Prentice Hall, 2003) will do just fine too.

Students might also find the following textbooks useful. (All these books offer a great discussion on regression analysis but not on probability theory.)

Jack Johnston and John DiNardo, *Econometric Methods*, Fourth Edition (McGraw-Hill, 1997) – A nice classic book that efficiently discusses the concepts.

Arthur S. Goldberger, *A Course in Econometrics*, Third Edition (Harvard University Press, 1997) – Another concise classic textbook that is especially good for OLS theory. This is for those with math background.

Russell Davidson and James G. Mackinnon, *Estimation and Inference in Econometrics*, (Oxford University Press, 1993) – An advanced textbook that offer an intuitive interpretation of several topics in econometrics. (They also offer another easier textbook: *Econometric Theory and Methods*, Oxford University Press, 2004.)

Damodar N. Gujarati, *Basic Econometrics*, Fourth Edition (McGraw-Hill, 2003) – A good undergraduate introductory textbook for those who want to review the concepts.

Jeffrey M. Wooldridge, *Introductory Econometric: A Modern Approach*, Third Edition (Thomson South-Western, 2006) – An intermediate undergraduate textbook with lots of real life examples.

## **Course Requirements**

There are 2 exams in this course: midterm and final. The midterm is on Monday March 3. The final is cumulative and is on the date given by the university. These exams will consist of T/F, problem-solving (theory), empirical questions and STATA programming questions. In addition to the two exams, you are required to complete a term project (there may be questions about it in the final). Deadline for the term project and how to submit it are discussed on the following page. Instructions for the term project will be posted on the Class Web by January 30. I will be happy to provide some assistance for the project during my office hours. Also, if you hand in your project draft at least 2 weeks before the deadline, I will give you suggestions that may help increase your grade for the project.

## **Class Notes, Readings and Problem Sets**

Class notes, readings and problem sets (with solutions) will be posted on the Class Web. Use them at your own risk. I have tried to eliminate typing errors when preparing these materials. However, it is very likely that there are still (a few) errors in the notes and the solutions. You must use your own judgment when utilizing these materials. (I would appreciate it if you could let me know where the errors are so that the future generation of students can benefit from better class materials.)

Although the problem sets will not be counted towards your grade, it is in your best interest to familiarize yourself with the concepts given in class by solving the problems. Also, an understanding of the required readings will be helpful in answering questions in the exams.

## **Office Hours and Review**

Regular office hours are listed on the first page. For each exam, I will schedule extra office hours which will be announced in class a week before the exam. However, you should not let questions accumulate until the week before an exam. It is not healthy to panic at the last minute and it is difficult to work things out under pressure.

For students with a legitimate time conflict with the office hours, you can make an appointment with me by e-mail when you need help. In addition, I will give a review session for the midterm on Monday February 18 and for the final on Wednesday April 9.

## **Communication Policies**

In addition to office hours, please feel free to ask me questions via the Internet. I encourage you to use the Class Discussion function in WebCT to ask me questions since they may also benefit your classmates. Should you need to contact me via email, please use the WebCT email system. Please do not contact me via my usual McGill email. For the night before each exam, I will answer your e-mails if and only if I receive them BEFORE 10 PM.

If there is an important announcement such as extra office hours and review, I will also e-mail you. To be able to receive my announcements, you need to update your email address in Minerva.

## Exam Policies

The midterm scores and grades will be posted on the Class Web. (They will be listed by the last 3 digits of your student ID.) You are not allowed to keep your exams. If you would like to review your exams, please see me during my office hours or make an appointment.

## Grade Appeals

If you are not satisfied with how your exam/term project (or any part of it) is graded, you may submit a grade appeal in WRITING. If you choose to do so, your entire exam/term project will be reviewed. There will not be a partial re-grading, and you may receive a lower grade after the appeal.

## Grade Assignment

For Schemes 1 and 2, you will receive a letter grade for each exam and the term project. Your grade for each exam is based on a class distribution, whereas your grade for the term project is based on your own performance.

<u>Scheme 1</u>			<u>Numeric</u>	<u>Course Grade</u>
		Letter Grade	Grade	Lower Bound
Term Project	25%			
Midterm	25%	A	4.0	3.85
Final	50%	A-	3.7	3.50
		B+	3.3	3.15
		B	3.0	2.85
		B-	2.7	2.50
		C+	2.3	2.15
		C	2.0	1.85
Term Project	25%	D	1.0	0.85
Midterm	0%	F	0.0	0.00
Final	75%			

For Scheme 3, you will receive the grade for the course based on the McGill percentage scale.

<u>Scheme 3</u>		<u>Letter Grade</u>	<u>Total Score</u> <u>Lower Bound</u>
Term Project	25%		
Midterm	25%	A	85%
Final	50%	A-	80%
		B+	75%
		B	70%
		B-	65%
		C+	60%
		C	55%
		D	50%
		F	0%

The grade you receive will be from the scheme that yields the highest grade. For example, suppose you receive 50 out of 100 for the term project, 100 out of 200 for the midterm and 80 out of 100 for the final; and the curves give you a B- from the term project, a C for the midterm and an A for the final. Scheme 2 is obviously better than Scheme 1 and will give you:  $2.7 \times 0.25 + 4.0 \times 0.75 = 3.68 < 3.85 \rightarrow$  an A-. Scheme 3 gives you  $(50/100) \times 0.25 + (100/200) \times 0.25 + (80/100) \times 0.50 = 65\% \rightarrow$  a B-. Hence, your course grade would be an A-.

Note that if you receive the grade below B-, the grade reported in your transcript will be a fail grade.

### **Supplemental Exam Policy**

The supplemental exam will account for 75% of your grade and the term project will be 25%. The supplemental exam cannot makeup for the term project. Because I will not be able to curve your score, your grade for the course will be based on the McGill percentage scale as in Scheme 3 if you take the supplemental exam.

### **Academic Integrity Statement** (It is mandatory that I put this in the syllabus.)

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see <http://www.mcgill.ca/integrity> for more information).

## **Term Project Deadline and Late Penalties**

Extensions for submission of term project will only be given in cases of illness, where a medical certificate is provided. You need to submit a hard copy of the term project to me (for grading purpose) as well as an electronic version to TurnItIn.com (to verify authenticity). (Using TurnItIn.com will help me focus my grading on your ideas rather than putting an effort to check the authenticity of your work. Hence, I can give you the mark fairly and promptly.) By 10am of Monday April 7, you must submit an electronic version to TurnItIn.com. The hard copy can be submitted after 10am but must be before 5.30pm of the due date (April 7). A project submitted late (electronically) will lose 20% of the points a day (each 24-hour period from the deadline) including during the weekend. For example, suppose you earn 60 points out of 80 for the project that was 1 day late. You will lose 12 points for the project. (Your project will be first assigned points without considering whether you are late or not. Then, the mark down will be applied.) No project will be accepted after 10am of the 5th day after the due date. (Except in cases where a medical note has been supplied AND you have made arrangements with me in advance.)

## **Alternatives to Use of TurnItIn.com**

Requests for exemption from the Turnitin.com requirement will NOT be considered after Wednesday January 30, 2008. If you do not wish to use Turnitin.com, you must do the following. Submit to me, by January 30 at 5pm, a letter of intent stating that you do not wish to use TurnItIn.com. In the letter, you must also specify which of the three following alternatives you would like to use instead of submitting the term project to TurnItIn.com:

(1) Instead of using the data I will be making available to the class (for those who use TurnItIn.com), set up research question(s) that you would like to test empirically and then collect a data set that could help you answer the questions. This data set must be an original panel data set. You must collect the data yourself. The data set must have at least 25 variables and 250 observations per each cross-section. I will be available during office hours for consultation about how you intend to go about data collection. In addition, your plan for constructing the dataset must be approved by me before February 20. (To get approval, you must set up an appointment to discuss your plan. If the plan is approved, I will send an email confirmation that you can keep for your records. The approval will be based on the feasibility of the data collection tasks as well as whether the data you want to collect are likely to help answer your research questions. In other words, the approval is my confirmation that you are on the right track for the project.) Your grade for the project will not be curved. Your grade will be based both on how well the dataset you construct helps answer the questions and on how you apply concepts we learn in class to answer the questions of interest.

The term project must be double-spaced in 12pt Garamond font with justified 1.25-inch side margins. Use STATA and EXCEL to obtain the results. Include all your programming work (do files and/or log files) as an appendix. Excluding tables, figures and appendix, the project should be no longer than 25 pages. Be sure to explain your regression specifications (e.g., why you include certain control variables). Also, write about whether the results comply with your intuition. If no, discuss what could explain the unexpected findings. If yes, discuss the data condition(s) that could change the validity of your results.

All submissions must be in 2 hard copies. I will keep one copy for my file and return the other to you after it is graded. The deadline and late penalties for turning in the term project still apply.

(2) Use the same dataset as those who will submit the project via TurnItIn.com. Follow the same instructions as those who will submit the project via TurnItIn.com, except that all submissions must be in 2 hard copies. I will keep one copy for my file and return the other to you after it is graded. The deadline and late penalties for turning in the term project still apply. In addition to the project submission, you must take an oral exam on the project. The oral exam date will be at time convenient to both of us between Monday April 7 and Friday April 11. You must let me know the preferred date and time in writing by March 15. Note that the questions to be asked include, but not limited to, STATA programming procedures and commands.

(3) Take an exam at time convenient to both of us between Monday, March 31, and Wednesday, April 9. You must let me know the preferred date and time in writing by March 15. Materials covered in the exam will be of an applied nature, i.e., that I would expect students who have done an empirical project to be able to answer. You will also be asked to provide answers to some parts of the exam using STATA. (A computer with STATA installed will be provided when you take the exam.) I will provide additional information about the exam by March 24. Your grade for this exam will be based on the McGill percentage scale (see Grade Scheme 3 in the syllabus).

Failure to follow the procedures set out above (and also do not use TurnItIn.com to submit the work) will result in a mark of zero for the term project.

**Course Schedule** (Dates for topics to be covered are tentative and subject to changes.)

### **1. Introduction to Econometrics**

- Topics:           What econometrics is about  
                  Examples for questions of interests  
                  Overview of methodology  
                  Sample vs. population  
                  Properties of estimators: unbiasedness, efficiency, MSE and consistency  
                  Basic data analysis (plotting graph, tabulation, and simple hypothesis testing)  
                  Review of bivariate (two-variable) regression model  
                  Review of matrix algebra  
                  Introduction to STATA
- Dates:           Mon Jan 7, Wed Jan 9, Mon Jan 14 & Wed Jan 16  
                  (By request, I will add a class at a special time for matrix algebra review.)
- Required:       Supplementary Note 1: Basic Statistics  
                  Supplementary Note2: Matrix Algebra  
                  Supplementary Note3: Introduction to STATA  
                  Dhanoos Sutthiphisal, "Learning-by-producing and the Geographic Links between Invention and Production: Evidence from the Second Industrial Revolution," *Journal of Economic History*, Vol. 66, No. 4 (Dec. 2006).
- Optional:       *STATA Base Document Set*, STATA Press, 2003.  
                  Christopher F. Baum, *An Introduction to Modern Econometrics Using Stata*, Stata Press, 2006.

### **2. OLS Regression Model: Estimation**

- Topics:           Writing the model  
                  Causality and the interpretation for regression coefficients (beta)  
                  Estimating the model using OLS  
                  Goodness of fit test (R-squared)
- Dates:           Mon Jan 21 & Wed Jan 23

### **3. OLS Regression Model: Assumption**

- Topics:           CR assumptions  
                  Property of the OLS estimators (BLUE)
- Dates:           Mon Jan 28 & Wed Jan 30
- Required:       Supplementary Note 4: Large Sample Properties

#### 4. OLS Regression Model: Specification

Topics: The linearity of the regression function  
Some specification examples  
Time trend  
Semi-log model (constant growth rate)  
Log-log model (elasticity and increasing returns)  
Quadratic model (increasing returns)  
Standardized coefficient  
Dummy variables  
Interaction terms  
Difference-in-difference model

Dates: Mon Feb 4 & Wed Feb 6

Required: Daniel S. Hamermesh and Jeff E. Biddle, "Beauty and the Labor Market," *The American Economic Review*, Vol. 84, No. 5. (Dec., 1994), pp. 1174-1194.  
Mariko Sakakibara and Lee Branstetter, "Do Stronger Patents Induce More Innovation? Evidence from the 1998 Japanese Patent Law Reforms," *RAND Journal of Economics*, Vol. 32, No. 1 (Spring 2001), pp. 77-100.

#### 5. OLS Regression Model: Testing

Topics: Classical normal regression (CNR)  
Hypothesis testing & result interpretation (magnitude & significance)  
t-test (one coefficient)  
F-test (joint-testing)  
Chow test

Dates: Mon Feb 11, Wed Feb 13 & Mon Feb 18  
(Midterm Break during Feb 24-Mar 1.)

Optional: Gregory C. Chow. "Tests of Equality Between Sets of Coefficients in Two Linear Regressions," *Econometrica*, Vol. 28, No. 3. (Jul., 1960), pp. 591-605.

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**Review: MON FEB 18**

**Midterm: MON MAR 3** (covers materials till OLS Testing)

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## 6. OLS Regression Model: Validity

- Topics: Specification errors (omitted variables, irrelevant variables, specification tests)  
Correlated X's (multicollinearity) – consequence, detection and correction  
Non-constant variance (heteroscedasticity) → GLS, WLS  
Correlated error terms (autocorrelation/serial correlation and time series)  
Stochastic X's → neoclassical regression model  
Non-exogenous X's (measurement errors and endogeneity) → IV, 2SLS, SEM
- Dates: Wed Feb 20, Wed Mar 5, Mon Mar 10 & Wed Mar 12
- Required: Javier Escobal and Sonia Laszlo, "As Time Goes By: Measurement Error in Access to Market Data. Evidence from Peru," *Mimeo*, McGill University, 2006.  
Daron Acemoglu, Simon Johnson and James A. Robinson, "The Colonial Origins of Comparative Development: An Empirical Investigation," *The American Economic Review* Vol. 91 (Dec. 2001), pp. 1369-1401.  
Charles F. Manski, "Identification of Endogenous Social Effects: The Reflection Problem," *Review of Economic Studies*, Vol. 60, No. 3 (July 1993), pp. 531-542.  
John C. Brown and Timothy W. Guinnane, "Regions and Time in the European Fertility Transition: Problems in the Princeton Project's Statistical Methodology," *Mimeo*, Yale University, 2004.
- Optional: Arthur S. Goldberger, *A Course in Econometrics*, Harvard University Press, 1997, Chapter 25.  
William J. Collins and Robert A. Margo, "The Economic Aftermath of the 1960s Riots: Evidence from Property Values," *NBER Working Paper* No. 10493, 2004.

## 7. Panel Data

- Topics: Pooled model  
Fixed effect model  
Random effect model
- Dates: Mon Mar 17 & Wed Mar 19
- Optional: Cheng Hsiao, *Analysis of Panel Data*, Second Edition, Cambridge University Press, 2002.

## 8. Other Estimations

Topics: MLE and GMM estimations  
Binary choice models (logit and probit)  
Censored regression models (tobit and sample selection bias)  
Duration models

Dates: Thu Mar 20, Wed Mar 26, Mon Mar 31, Wed Apr 2 & Mon Apr 7  
(No class on Mon Mar 24, but a class on Thu Mar 20 instead.)

Optional: William H. Greene, *Econometric Analysis*, Fifth Edition, Prentice Hall, 2003,  
Chapters 16-18. (Or, chapters 14-16 for Sixth Edition, 2008.)

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**Review: WED APR 9**

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