University of Toronto
ECO 220Y1
Quantitative Methods in Economics
Section L0401

Professor Chuan Goh

Spring 2011

1 Basic Information

- This syllabus refers to the second semester of a two-semester course. The first semester was taught by **Rita Pivovarova**.
- Lectures will be held on Thursdays from 10:10 AM to 12 noon in SS 2118.
- Lectures will be supplemented by a one-hour tutorial led by a teaching assistant. The tutorials will be held on Fridays from 11:10 AM to 12 noon in SS 2118.
- The lectures will be further supplemented by a self-contained Excel Course Module, which has the goal of training students to use Microsoft Excel for statistical analysis. In this connection, students are required to attend six training sessions starting the week of January 24–28 in addition to the lectures and tutorials for which they have already registered. The training sessions will be coordinated by **Christy Chen**, from whom further details may be obtained (`christy.chen@utoronto.ca`).

2 Instructor Contact Information

- Professor Goh will hold office hours on Tuesday afternoons between 2 and 4 o'clock in Max Gluskin House, 150 St. George St., Room 232.
- His office telephone number is (416) 978-4964.
- He can also be reached by e-mail at goh@economics.utoronto.ca.

E-mail is welcome from students enrolled in the course, and will usually be answered on weekdays between 9 AM and 6 PM within a delay of 24 hours. Occasionally questions that cannot be answered quickly will not receive a response; in these cases students are asked to repeat their questions in person. Students should not expect quick responses during the evening hours or on weekends. Students have a responsibility to ensure that their e-mail to the instructor does not end up being categorized as "spam" by the instructor's mail server.

3 Required Textbook

The lectures in this course are based on the material covered in Gerald Keller, *Statistics for Management and Economics*, Eighth Edition (2009), South-Western Cengage Learning, ISBN 978-0-324-56949-0. The text is meant to be supplemented with a Students Solutions Manual (ISBN 978-0-324-56953-7) which contains solutions to the even-numbered exercises in the textbook. Students are welcome to use earlier editions of the textbook for the purpose of studying the material. Homework problems, however, will be assigned from the eighth edition.

4 This Course on the Web

Students are asked to take note of the URL for the course webpage:

http://www.chuangoh.org/eco220y.html.

Assignments and any announcements or class handouts will be made available directly on this site. Students are also urged to participate in the online Discussion Board related to this course. The Discussion Board is available by logging into http://portal.utoronto.ca.

5 Course Description and Intended Learning Outcomes

This course is designed to serve as an introduction to statistical methods as they are most commonly applied to problems in economics and business. To this end, students will be expected to develop the ability to define, understand and recognize important statistical concepts as they appear in various situations in the social sciences and business. Basic methods of data analysis will be taught, and students will have opportunities to apply them to datasets drawn from real-world situations.

This course aims to instil in undergraduates an enthusiasm for the modelling of random phenomena, and should be useful for further work in a wide range of different disciplines. Furthermore, many of the major decisions affecting the lives of *everyone* on this planet have some statistical justification or basis, and the way of thinking to which students are exposed in this course will be relevant to understanding those decisions.

6 Prerequisites

ECO 100Y with a minimum grade of 67% or ECO 105Y with a minimum grade of 80% is required. Students are also expected to have had an introductory undergraduate course in calculus. In particular, passing grades in both MAT 123H and MAT 124H or in any of MAT 133Y, MAT 135Y, MAT 137Y or MAT 157Y will satisfy the calculus prerequisite for this course.

7 Homework

Weekly problem sets will be given. Although **these problem sets will not be graded**, their completion will be essential for success in this course.

8 Grading Scheme

Student grades during the second half of this course will be based on three components:

1. A midterm examination based on the material covered in class up to February 17. This examination has been scheduled for **Thursday 10 March be-**

tween 10:10 and 12:00 noon and will be written in **SS 2118**. The examination will count for 26% of the final grade in the course.

2. A 45-minute computer-based test covering the topics discussed in the Excel Course Module to be held during the week of April 4–8. This test will count for 7% of the final grade in the course.

3. A three-hour final examination based on the material covered in both semesters of the course. This examination will take place during the April examination period and as such the time, date and location are yet to be determined. The examination will count for 35% of the final grade in the course.

Students are asked to bring their University of Toronto TCard to both the midterm and final examinations. In addition, students may bring their own non-programmable calculator to both exams.

The distribution of final grades may be adjusted in late April to improve the grades for all students.

9 Policies on Missed Examinations

Please read the following notices carefully:

1. **There will be no "make-ups" for missing either examination**. Students will receive a grade of zero for missing either of the examinations unless they receive an accommodation from the instructor or from the Faculty of Arts and Science that allows one or both of the following rules to be applied specifically to them:

   (a) Students who miss the midterm examination for acceptable reasons will have their score on the final examination count for 61% of their final grade in the course.

   (b) Students who miss the final examination for any reason at all should file a petition for a deferred examination with their college registrar. This is something that is taken very seriously by the University. Medical or other documentation will be required and a special fee will need to be paid.

   In any event, students who miss both the midterm and final examinations are strongly encouraged to take this course again at a later time.

2. A student who is absent from the midterm examination and wishes to be treated under the provisions of 1a above is required to supply Professor Goh with documentation. This is a requirement of the Faculty of Arts and Science and is intended for the fair treatment of all students.

3. Illness is the only generally acceptable reason for 1a to apply to a student missing the midterm examination. Students who are ill on the day of the midterm exam should observe the following rules:

(a) A completed copy of the University of Toronto Student Medical Certificate must be submitted to Professor Goh **within seven days** of the exam (i.e., by March 17).[1] Submission of the Medical Certificate, however, is not sufficient in itself to guarantee that the provisions of 1a will apply. A medical certificate from the University of Toronto Health Service will also be accepted. Any other form of medical certificate or doctor's note will not be acceptable. **In particular, a personal form supplied by a student's doctor is not acceptable**.

(b) A statement that merely confirms a report of illness made by the student and documented by the physician will not be acceptable.

(c) Students are required to supply their student number and to fill out all the required information. Both the student and the physician must sign and date the document. The physician must supply his or her full address in the form of a stamp, business card or official letterhead. In addition, the physician must supply his or her CPSO registration number, a daytime telephone number and must specifically answer, in full, all of the required questions.**Medical Certificates that are in any way incomplete will not be acceptable**.

(d) Students are required to note the Faculty regulations to the effect that "the physician's report must establish that the patient was examined and diagnosed at the time of the illness, not after the fact. The Faculty will not accept a statement that merely confirms a report of illness made by the student for documentation by the physician."

(e) In addition to observing the rules noted above, students are also required to register their medical absence on ROSI. Note that students are no longer permitted to declare that they have H1N1 or flu-like symptoms—they are required to get the required medical certificate that attests to such symptoms.

(f) Students who claim "depression", "anxiety" or an inability ot sleep, eat or otherwise write the midterm exam should take note of the following:

   i. The actual conditions and causes for an alleged case of depression are almost never specified in full or documented. **Medical Certificates alleging that the medical cause of a student's absence from the exam was "depression" or some other similarly vaguly defined condition will be rejected unless more specific evidence is supplied.** The physician who signs the document is also required to have treated the student in question from the start of the specified period of depression. The problem here is that many doctors will sign a certificate attesting to a depression that they have never or have only recently treated, i.e., they have simply taken the student's word at face value. Such a claim cannot be acceptable.

[1]The University of Toronto Student Medical Certificate may be downloaded from `http://www.artsci.utoronto.ca/current/undergraduate/course/timetable/2006-2007-fall-winter-timetable/medcert.pdf/view`. You will be instructed to click on a link that will produce the PDF file for this form.

10 Course Timetable for the Spring Semester

The schedule of problem sets and term tests is subject to change.

10.1 Scheduling of Problem Sets

- Problem Set 1: Questions from Chapters 9 and 11. Assigned January 13, "due" January 20.
- Problem Set 2: Questions from Chapter 11. Assigned January 13, "due" week of January 27.
- Problem Set 3: Questions from Chapter 12. Assigned week of January 27, "due" February 3.
- Problem Set 4: Questions from Chapters 9 and 12. Assigned February 3, "due" February 10.
- Problem Set 5: Questions from Chapter 13. Assigned February 10, "due" February 17.
- Problem Set 6: Questions from Chapter 16. Assigned February 17, "due" March 3.
- Problem Set 7: Questions from Chapter 16. Assigned March 3, "due" March 17.
- Problem Set 8: Questions from Chapter 17. Assigned March 17, "due" March 24.
- Problem Set 9: Questions from Chapter 17. Assigned March 24, "due" March 31.
- Problem Set 10: Questions from Chapter 18. Assigned March 31, "due" April 7.
- Problem Set 11: Questions from Chapter 18. Assigned April 7, "due" by the date of the Final Examination.

10.2 Scheduling of Examinations

- Midterm Examination: Based on the material covered in lectures up to an including the lecture of February 17. Friday March 10, 10:10 to 12 noon in SS 2118.
- Final Examination: Based on the entire year's work. April examination period. Date and location to be announced.

11 List of Topics for the Spring Semester

We will cover most of the material in Chapters 11, 12, 13, 16, 17 and 18. In general, only topics covered in both the lectures *and* the textbook will appear on the term tests. A detailed listing follows:

1. Review of Sampling Theory; January 13.

   (a) Role of probability in statistical inference, sampling distributions, sampling from normal populations, sampling distribution of the sample mean, law of large numbers and central limit theorem

   Review Chapters 9 and 10

2. Introduction to Hypothesis Testing (Chapter 11); January 13 and 20.

   (a) Formulation of statistical hypotheses, type-I and type-II errors, tests regarding a population mean when the population variance is known

   Read Chapter 11

3. Further Topics in Hypothesis Testing (Chapter 12); January 27 and February 3.

   (a) Tests regarding a population mean when the population variance is unknown

   (b) Tests regarding a population proportion

   Read Sections 12.1 and 12.3

4. Comparing Two Populations (Chapter 13); February 10.

   (a) Tests regarding the difference between the means of two populations

   (b) Tests regarding the difference between two population proportions

   Read Sections 13.1, 13.2 and 13.5

5. Simple Linear Regression (Chapter 16); February 17 and March 3.

   (a) Conditional means, method of least squares

   (b) Goodness of fit for simple linear regression (ANOVA, R^2), prediction using linear regression, graphical diagnostics

   Read Chapter 16

6. Multiple Linear Regression (Chapter 17); March 17 and March 24.

   (a) Conditional means, method of least squares, goodness of fit (ANOVA, R^2), t-tests and F-tests

   (b) Regression diagnostics, multicollinearity, Durbin-Watson test

   Read Chapter 17

7. Further Topics Related to Multiple Regression (Chapter 18); Weeks of March 31 and April 7.

   (a) polynomial regression, dummy variables

   (b) application to pay equity, logistic regression

   Read Sections 18.1, 18.2, 18.3 and 18.4