

UNIVERSITY OF WATERLOO

Department of Economics
ECON 322: Econometric Analysis 1

Course Outline (Winter 2017)

Instructor: Chaussé, Pierre
Office: HH-211
Phone: 519-888-4567 ext. 32422
Email: pchausse@uwaterloo.ca

Lecture Time (001): T-Th 8:30 to 9:50
Lecture Time (002): T-Th 11:30 to 12:50

Lecture Location: RCH 112
Lecture Location: MC 2035

Office Hours: Mondays, 4:00 to 5:30 or by appointment

Course description

This course covers the core topics needed to estimate linear models using ordinary least squares and to interpret estimates for cross-sectional data. Students will learn to interpret the coefficients of linear models for continuous and discrete regressors, to conduct reliable inference for different specifications of the error term, and to determine which model is the most suitable among the class of linear models. It concludes with an introduction to the method of instrumental variables.

Students will be introduced to a statistical software package and will be required to complete regular computer-based assignments throughout the course that either: (i) simulate the statistical distribution of the least squares estimator under an assumed model; or (ii) estimate the parameters of an assumed model using a sample of data from the real world.

The statistical software package used in this course is R. It runs on Windows, Mac or Linux and can be downloaded for free at <https://www.r-project.org/>. It is also available in any Arts computer labs. You will be trained to use it in class and in tutorial sessions. If you have a computer, you should go to the above link and install R before the first tutorial session. It is also recommended, but not required, to install R-Studio, which is also available for free at <https://www.rstudio.com/>. It is an IDE (Integrated Development Environment) for R. It greatly facilitates the use of R.

Textbook

The students are expected to read the chapters mentioned in the Topics section below. Ideally, the readings should be done before attending the lectures.

- Wooldridge, Jeffrey M., *Introductory Econometrics: A Modern Approach* Sixth Edition, Cengage Learning 2016 (**previous editions can also be used**)

- Heiss, Florian, *Using R for Introductory Econometrics*, CreateSpace 2016 (**It is available online for free at <http://www.urfie.net/read.html>, or it can be purchased at Amazon.ca**)

Topics

For each topic, some problems are suggested. Some of them will be solved by the TA during the tutorial sessions. It is strongly recommended that you try to answer the ones not covered by the TA.

1. Introduction: (Appendices B and C)
Overview of important concepts in statistics
 - ◇ **Problems from appendix B:** 1, 2, 4, 9, 10
 - ◇ **Problems from appendix C:** 1, 6, 7, 8, 11
2. The simple regression model (Chap. 1 and 2)
Discussion on the different types of data, estimation of models with 1 regressor, and the interpretation of a regression.
 - ◇ **Theoretical problems:** 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8, 2.9
 - ◇ **Numerical problems:** C2.1, C2.2, C2.4, C2.6, C2.7, C2.10
3. Multiple regression models (Chap. 3)
Issues regarding data and model selection.
 - ◇ **Theoretical problems:** 3.1, 3.3, 3.4, 3.6, 3.7, 3.12, 3.15, 3.16
 - ◇ **Numerical problems:** C3.1, C3.2, C3.6, C3.8, C3.10
4. Inference (Chap. 4)
Tests of single and multiple linear restrictions
 - ◇ **Theoretical problems:** 4.1, 4.2, 4.4, 4.6, 4.8, 4.10, 4.11
 - ◇ **Numerical problems:** C4.1, C4.2, C4.3, C4.6, C4.8, C4.12

5. Asymptotic properties of the OLS estimators (Chap. 5)
Analysis of the properties of the estimators when the sample size increases
 - ◇ **Theoretical problems:** 5.2, 5.3, 5.5
 - ◇ **Numerical problems:** C5.1, C5.2, C5.4, C5.6
6. Functional forms and forecasting (Chap. 6)
Discussion on how to choose the functional form, and the forecasting of the dependent variable.
 - ◇ **Theoretical problems:** 6.1, 6.3, 6.4, 6.7, 6.10
 - ◇ **Numerical problems:** C6.1, C6.2, C6.3, C6.5, C6.8, C6.11, C6.14
7. Regression with dummy variables (Chap. 7)
Including unquantifiable information in a regression: the qualitative variables
 - ◇ **Theoretical problems:** 7.1, 7.2, 7.5, 7.8, 7.9
 - ◇ **Numerical problems:** C7.2, C7.4, C7.8, C7.10, C7.12, C7.14, C7.16
8. Generalized linear models: Heteroscedasticity (Chap: 8)
The properties of OLS with heterogenous error terms, and the weighed least quares (WLS) method
 - ◇ **Theoretical problems:** 8.1, 8.2, 8.3, 8.5, 8.6, 8.8
 - ◇ **Numerical problems:** C8.1, C8.5, C8.8, C8.12, C8.14
9. Misspecification (Chap: 9)
Measurement errors, missing data, and functional form misspecification
 - ◇ **Theoretical problems:** 9.1, 9.2, 9.3
 - ◇ **Numerical problems:** C9.1, C9.3, C9.8, C9.11, C9.13, C9.14
10. An introduction to the instrumental variables method (Chap. 15, sections 1 to 5)
Solution to the problem of Measurement errors and endogenous regressors.
 - ◇ **Numerical problems:** C15.1, C15.2, C15.3, C15.6, C15.12

Evaluation

Assignments (Weekly (almost)): 25%
Midterm exam (Thursday January 26th): 20%
Midterm exam (Thursday March 2nd): 20%
Final exam (cumulative): 35%

Policy regarding the assignments

At the end of each tutorial, the TA will hand out an assignment. You must hand in it at the beginning of the next tutorial session. Failure to do so without a valid justification, to be approved by the instructor, will result in a grade of 0. You must therefore attend the session you are registered for.

In all assignments, you have to answer theoretical and computer questions. You can submit handwritten answers to the theoretical questions, but it is recommended to type your answers using your preferred word processor. However, it is mandatory to submit the answers to the computer questions using a word processor. Your answers must include the R codes, the output produced by R, any graphs if you are asked to produce them, and a discussion if required. Failure to do so, may result in a grade of 0.

The marking scheme is as follows (except for the last two assignments): You get 0 if you answer less than 50% of the questions or if you do not hand it in. You get 1 if you answer between 50% and 99% of the questions. You get 2 if you answer all questions.

The last two assignments are worth the equivalent of five assignments (2 and 3 respectively). You will be asked to answer general questions using new datasets, and to build your own model. For these assignments, you will be evaluated on your ability to apply the different concepts covered in class. For each of them, you will be given two weeks to complete it.

Policy regarding missed midterm exams

If a student provide the proper documents to the instructor within 2 business days of the exam and that the justification is considered valid by the instructor, the weight of the midterm exam is moved to the final exam.

Economics Department Deferred Final Exam Policy

Deferred Final Exam Policy found at <https://uwaterloo.ca/economics/current-undergraduates/policies-and-resources/deferred-final-exam-policy>.

Cross-listed course

Please note that a cross-listed course will count in all respective averages no matter under which rubric it has been taken. For example, a PHIL/PSCI cross-list will count in a Philosophy major average, even if the course was taken under the Political Science rubric.

Academic Integrity

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility.

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline (<https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-71>)

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances (<https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-70>), Section 4.

Appeals: A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals (<https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-72>).

Other sources of information for students:

Academic Integrity website (Arts)

<https://uwaterloo.ca/arts/current-undergraduates/student-support/ethical-behaviour>

Academic Integrity Office (UWaterloo)

<https://uwaterloo.ca/academic-integrity/>

Accommodation for Students with Disabilities

Note for students with disabilities: The AccessAbility Services office (<https://uwaterloo.ca/disability-services>), located on the first floor of the Needles Hall extension (NH 1401), collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.