

Course Outline for Introduction to Econometrics 321

Department of Economics

University of Waterloo

Spring 2011

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Office Hours: Tuesdays 4.30pm-8pm and Thursdays 12-1.30pm at HH205
and by appointment (send an email through UW - ACE).

Class Hours: Tuesdays and Thursdays 10-11.20am at MC 2082.

Course Description: Introduction to formal statistical analysis of choice-based behavior.

Main Learning Objective: To gain the **ability to identify** threats to the validity of regression analyses.

Prerequisites: Good command of Probability Theory, Statistics and Calculus. Familiarity with Regression Analysis.

Recommended Textbooks:

- Stock, J. H. and M. W. Watson, *Introduction to Econometrics*.
- The textbook on probability theory student used in the prerequisite class on probability.
- The textbook on statistics student used in the prerequisite class on statistics.
- The textbook on calculus student used in the prerequisite class on calculus.

Course Website: UW - Angel Course Environment [<https://uwangel.uwaterloo.ca>].

Expectations: The class meetings are only an introduction to each topic covered in this course. For this reason class attendance should represent less than 30% of the student's weekly effort in studying for this class. The course progresses fast and the **course material is cumulative both in terms of what is studied during the semester and what is studied in the prerequisite classes**; success in the course thus generally requires a **weekly effort** from the student outside of class and a **good understanding of the probability theory, statistics, and calculus** covered in the prerequisite classes. Without the weekly effort outside of class a student should not expect to either learn the material or receive a passing grade for the class. Similarly, students without a good understanding of probability theory, statistics, and calculus covered in the prerequisite courses should not expect to either learn the material in this course or receive a passing grade for the class.

Homeworks: Homeworks are distributed **weekly** via the UW - Angel Course Environment [<https://uwangel.uwaterloo.ca>]. The weekly homeworks are the key learning tool used in this course.

Class Topics (The numbers in parentheses refer to sections in the 3rd edition of the textbook. Previous editions have similar sections but may be labeled/numbered slightly differently. A careful studying of these sections is recommended):

1. The Linear Regression Model (4.1)
2. The OLS Estimator (4.2, Appendix 4.2)
3. Consistency of the Least Squares Estimator (4.4, Appendix 4.3)
4. The Sampling Distribution of the LS Estimator (4.5, Appendix 4.3)
5. Hypothesis Testing (5.1-5.3)
6. Omitted Variable Bias (6.1, Appendix 6.1)
7. Linear Regression with Multiple Regressors (6.2-6.3, 6.5-6.7; 4.3, 6.4, 7.5; 5.4)
8. Tests of Joint Hypotheses in Multiple Regression (7.1-7.2, 7.4)
9. Measurement Error and Simultaneous Causality (9.1-9.2)
10. Panel Data Analysis (10.1-10.2)
11. The IV Estimator (12.1)
12. The Sampling Distribution of the IV Estimator (Appendix 12.2 - Appendix 12.4)
13. Tests for Instrument Validity (12.3)
14. Examples of IV Analyses (12.4-12.5)
15. Estimation of Treatment Effects in Experiments (13.1-13.3)
16. Quasi-Experiments (13.5-13.6)
17. Non-Constant Marginal Effects (8.1-8.3)
18. Probit Regression (11.1-11.2)
19. Censored and Truncated Data, Sample Selection (Appendix 11.3)

Exams:

- Midterm Exam 1: **Thursday May 19th (in Class)**
- Midterm Exam 2: **Thursday June 2nd (in Class)**
- Midterm Exam 3: **Tuesday June 21st (in Class)**
- Midterm Exam 4: **Thursday July 21st (in Class)**
- Final Exam: **TBA**

Each exam covers topics discussed in **all previous classes** and **in the associated homeworks** as well as in **the associated sections of the textbook** (see above) and **the prerequisite classes**.

Missed Exams: Only a properly and timely documented illness or death of an immediate family member is a valid reason for missing an exam. The weight of a missed Midterm Exam is shifted on the Final Exam if the student submits proper documentation in a timely manner. Student who misses an exam and does not submit proper documentation in a timely manner receives the grade 0 for the exam. A student who misses the Final Exam for a valid and properly documented reason can attend the Joint Make-Up Final Exam Session arranged by the economics department simultaneously for all economics classes for the Spring 2011 term. **There are no other Make-Up Final Exams and there are no Make-Up Midterm Exams.**

Final Grade: The final grade is calculated as a weighted average of exam performance with the following weights:

- 20% Grade for Midterm Exam 1
- 20% Grade for Midterm Exam 2
- 20% Grade for Midterm Exam 3
- 40% Combined Grade for Midterm Exam 4 & Final Exam

Midterm Exam 4 and the Final Exam each have 5 parts. The intended coverage of these 5 parts is approximately as follows:

- Part I: Classes 1-4
- Part II: Classes 5-8
- Part III: Classes 9-13
- Part IV: Classes 14-16

- Part V: Classes 17-21

Each of the 5 parts in the Midterm Exam 4 and in the Final Exam is graded separately. Each part therefore receives two grades, one in Midterm Exam 4 and one in the Final Exam. For each part the better of these two grades is then selected and the combined grade that determines 60% of the course grade is the average of these 5 selected grades.

Example: A student receives grade 100 in Midterm Exam 1, grade 90 in Midterm Exam 2, and grade 90 in Midterm Exam 3. In Midterm Exam 4 the student receives grades 20, 80, 100, 100 and 90 for the parts I,II,III,IV, and V, respectively. In the Final Exam the student receives grades 100, 100, 0, 90 and 20 for the parts I,II,III,IV, and V, respectively. For each part the better of the student's grades in Midterm Exam 4 and in the Final Exam is then selected and the student's grades become 100, 100, 100, 100 and 90 for the parts I,II,III,IV and V, respectively. The combined grade for Midterm Exam 4 and Final Exam is calculated as the average of these 5 grades: $(100+100+100+100+90)/5 = 98$. The student's final grade is $0.2 \times 100 + 0.2 \times 90 + 0.2 \times 90 + 0.6 \times 98 = 95$.

Institutional Required Statements.

Academic Integrity, Grievance, Discipline, Appeals and Note for Students with Disabilities: see www.uwaterloo.ca/accountability/documents/courseoutlinestmts.pdf The text for this web site is listed below:

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check www.uwaterloo.ca/academicintegrity/ for more information.]

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, Section 4, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity [check www.uwaterloo.ca/academicintegrity/] to avoid committing an academic offence, 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 instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

Appeals: A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is

a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Note for Students with Disabilities: The Office for persons with Disabilities (OPD), located in Needles Hall, Room 1132, 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 OPD at the beginning of each academic term.