

APPLIED ECONOMETRICS I ECONOMICS EC3388A-001

Department of Economics
Western University

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Registration

You are responsible for ensuring you are registered in the correct courses. If you are not registered in this course, the Department will not release any of your marks until your registration is corrected. You may check your timetable by using the Login on the Student Services website at <https://student.uwo.ca>. If you notice a problem, please contact your home Faculty Academic Counsellor immediately.

Prerequisite Note

The prerequisite(s) for this course is (are) **Economics 2223A/B**.

You are responsible for ensuring that you have successfully completed all course prerequisites, and that you have not taken an anti-requisite course. Lack of pre-requisites may not be used as a basis for appeal. If you are found to be ineligible for a course, you may be removed from it at any time and you will receive no adjustment to your fees. This decision cannot be appealed.

If you find that you do not have the course prerequisites, it is in your best interest to drop the course well before the end of the add/drop period. Your prompt attention to this matter will not only help protect your academic record, but will ensure that spaces become available for students who require the course in question for graduation.

Recommended (optional) prerequisites/corequisite: Most students should have completed at least Economics 2220A/B and 2260A/B before enrolling. Matrix algebra at the level of Mathematics 1229A/B, 1600A/B and/or Applied Mathematics 1201A/B, 1411A/B, or similar will be extremely useful. This class is highly recommended for students currently writing or who plan to write an honors thesis in economics.

Learning Outcomes:

During this course, students will learn to...

- i) ...conduct empirical analysis of economic models using real world economic data and modern econometric techniques, interpret the results, and explain and present them to a diverse audience.

- ii) ...perform model diagnostics including goodness-of-fit, residual diagnostics, and specification tests to assess whether a given model and data are appropriate to answer a specific economic question.
- iii) ...use Monte Carlo techniques and the bootstrap to assess the accuracy and effectiveness of econometric tools in a wide variety of practical situations.
- iv) ...employ different data types including time series and panel data, and understand how specialized techniques together with these data can solve inference and prediction problems.
- v) ...construct point and interval predictions for various economic observables, including but not limited to time series, and assess these predictions both in- and out-of-sample.
- vi) ...attack ‘causal inference’ problems using a variety of techniques including conditioning on observables, data transformation such as differences-in-differences, and instrumental variables.

Textbook and Materials:

Wooldridge, [*Introductory Econometrics: A Modern Approach*](#) (5th ed)

Note that this is an introductory-level text- there will naturally be a lot of overlap with previous courses. We will supplement it with notes and outside readings. This is really by far the best undergraduate econometrics text book out there in my opinion and I highly recommend you purchase a copy. I may assign problems and data sets from the book as homework.

Lecture Notes and other references are on the [course website](#).

Software:

You are highly encouraged to use STATA. It is the preferred software of most of the applied faculty in this department particularly in applied micro; most of our faculty who routinely supervise undergraduate theses either use STATA in their own work or at least are very familiar with it.

That said, you may use whatever software you like to complete the assignments. I am not a STATA expert myself so some of the in-class examples we’ll look at will be in MATLAB or Excel. While Excel is not ideal for many econometric applications it is still almost universally available and can be useful for manipulating data (such as combining data sources which we’ll cover in lecture #1).

Please note that the computer component of this class is *mandatory*. You should ideally know how to use at least one software package capable of regression analysis *before* enrolling in this course.

Grading and Exams:

Grades are based on the following weighting:

Homework (4-6 assignments)	10%
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2 Quizzes (take home)	20%
Midterm (in class, pencil & paper exam)	20%
Project	25%
Final Exam	25%

Homework assignments are given approximately biweekly. You are allowed (in fact, encouraged) to do and submit homework in groups of up to four students. I can't emphasize this enough: You will not get a good job without excellent communication skills. I don't care if you're really smart, I don't even care if you've got good social skills. You need to be able to discuss and tackle technical problems in a group situation. Use the homework assignments in this and other classes as practice. You are sitting in a room with your future colleagues – start building that professional network now!

Take-home Quizzes will focus on computer applications we discuss in class and on the homeworks. The first quiz (roughly the first week of October) will test your understanding of regression and ability to conduct a Monte Carlo study. The second Quiz (roughly the second week of November) will ask you to conduct an empirical analysis and explain the results. You will need to be familiar with at least one quantitative software package beyond Excel (e.g., STATA, MATLAB, R, Eviews, SAS). *I cannot guarantee support for packages other than STATA or MATLAB.* I will always try to help you if you run into trouble, but if you're using something I'm not familiar with and get a weird error and/or totally stuck I can't promise I'll be able to fix it.

Absolutely no collaboration between students is allowed on quizzes or exams. So while you work as a team on homework, make sure that each person knows how to do each problem (including the computer work) individually. By far the most common thing I hear from a student after s/he bombs the midterm is “but I understood this when we did it in our homework group”. *Understanding* a problem conceptually is not the same thing as being able to actually *solve* it.

Exams: The midterm exam will be held on Monday, October 24th during our regular class time. For the final exam date please see [Western's exam schedule](#).

The Midterm and Final are in-class, closed-book, closed-notes (and closed-neighbor!) exams. You are allowed one 8.5 by 11 inch sheet of notes for the midterm, two for the final. You should bring a writing instrument (I *highly* suggest pencil & eraser) and a hand calculator. Note sheets and calculators may *not* be shared between students. You may use fancy engineering calculators but graphing or user-defined functions are not allowed (i.e., no programming your calculator to run a regression or compute standard errors for you). Devices capable of sending or receiving wireless signals must be turned off or stored with other personal belongings in the back of the room (or other designated area) prior to the exam start. Such devices may NOT be used as calculators.

How to prepare: I will publish sample exams (ordinarily previous years' exams, including solutions) before the actual midterm and final. Find a quiet, isolated spot and work the exam *yourself* in a 'simulated test' situation (use only your cheat sheet and calculator, and time yourself). Do this *before* discussing the exam with your homework group!

Learning quantitative material is a lot like running. I can talk to you all day about training, diet, and how to prepare yourself for a race. At the end of the day, though, the only way to get faster is to get out there and run. A lot of students try to study by carefully reading through class notes and/or a textbook. That's ok, but it's a lot like if I were to read every issue of *Runner's World* ever published and then immediately go run a marathon and expect to break a world record (or even to finish). *Study for this class by working problems!*

The **course project** is ideally a sort of 'pre-thesis'. For students writing an undergraduate thesis, I will ask you to go put together a data set, run some preliminary empirical analysis using the techniques you've learned in this and your previous econometrics classes, and write up your results. Ideally you get some substantive results that act as a step along the way to completing a good thesis! If you don't, that's fine too, you can simply write up what you found and explain why the data, model, or technique you employed wasn't suitable for the problem. This happens in research and while it's discouraging to pour a lot of work into something that nobody will end up reading (hey, in this case at least *I* will read it!) we really do often learn more from failures than successes.

The project may be completed in groups of up to four students (smaller groups are preferred and you may work alone if you plan to write your thesis on your own). Every group/student *must* schedule and attend a preliminary project meeting with me *on or before October 14th* to discuss your plans for the project. *You must submit a copy of your data to me electronically on or before that date.* You should prepare a short (typed) description of the data including source, variable definitions, a table of basic summary statistics for each variable, and a few illustrative histogram(s), scatterplot(s), etc, and hand it in at least one week prior to the meeting. If your data set is extremely large and/or contains sensitive information I will accept this description in lieu of the data itself.

Expectations and grading for the project will be discussed at the project meeting. Because each group's project will be different I can't give uniform guidelines. Rather, once I've seen your data we will lay out a set of expectations for what would make this an 'A project' or a 'B project', et cetera. As a general rule I will, first, expect you to do at least one thing beyond the regression analysis tools you should have learned in previous classes – for example employ a panel approach with Fixed Effects and/or Diff-in-Diff, estimate an ARCH or GARCH model and use it for interval forecasting, construct an Instrumental Variables estimator. Second, you should then study the properties of your estimator and compare it to OLS, ideally via Monte Carlo.

Topics Covered (tentative; this may and probably will change)

Week 1: Regression, Conditional Means, Summary Stats, Data Manipulation, Omitted Variables [Wooldridge, Chapters 1-7*]

Week 2: Visualizing Data, Outliers, Differences in Differences, Grouping Estimator, Intro to Panel Data [W, 13]

Week 3: Heteroskedasticity and Serial Correlation, Intro to Robust Standard Errors, Measurement Errors, Monte Carlo Studies [W, 8-9]

Week 4: Linear Regression with Panel Data- Pooled OLS, Fixed Effects, 'Random Effects', Time Dummies, Clustered Standard Errors [W, 14]

Week 5-6: Instrumental Variables, "Causal Inference", Weak Instruments and other issues with IV, Simultaneous Equations [W, 15-16]

Week 7: **Midterm Exam** (lab time TBD)

Week 8: Basic Time Series, Spurious Regression, ARMA and ARIMA Models [W, 10-11]

Week 9: Serial Correlation, Intro to Forecasting, Robust Standard Errors, Unit Roots [W, 12]

Week 10: Vector Autoregression, Dynamic Forecasting [W, 18]

Week 11: Putting things together- Time Series applications with Panel Data, IV, etc.

Week 12: Maximum Likelihood, Limited Dependent Variables (Logit, Probit, Tobit Regression), Sample Selection [W, 17]

Week 13: Nonlinear Models, ARCH and GARCH

Week 14 (time permitting): Generalized Method of Moments (GMM) Estimation and Inference

*You should be familiar with most or all of the material from Chapters 1-7 of the Wooldridge text from previous classes.

Please Note
Department Policies for 2016 – 2017

Remember that the University expects all students to take responsibility for their own academic Programs. Also remember to check your registration to make sure you are enrolled in the correct courses.

1. Guidelines and policies for the Faculty of Social Science and the Department of Economics are posted online in the current Western Academic Calendar at <http://westerncalendar.uwo.ca>.
2. Students must familiarize themselves with the “Rules of Conduct for Examinations” <http://westerncalendar.uwo.ca/2016/pg136.html>.
3. **Cheating as an academic offence:** Students are responsible for understanding what it means to “cheat”. The Department of Economics treats cheating incidents very seriously and will investigate any suspect behavior. Students found guilty will incur penalties that could include a failing grade or being barred from future registration in other economics courses or programs. The University may impose further penalties such as a notation on your official academic transcript, suspension or expulsion.
4. **Plagiarism:** Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge it by using quotation marks where appropriate and referencing with footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the current UWO Academic Calendar at <http://westerncalendar.uwo.ca/2016/pg113.html>).

The University of Western Ontario uses software to check for plagiarism and students may be required to submit their written work in electronic form. Those found guilty will have penalties imposed as noted in point 3.

5. It is Department of Economics policy that **NO** assignments be dated, stamped or accepted by staff. Students are responsible for submitting assignments in class or to the instructor during office hours.
6. When appealing a mark, students should refer to the University’s Procedures in the current UWO Academic Calendar (<http://westerncalendar.uwo.ca/2016/pg112.html>). Please note the relevant deadlines.

The Department will not consider any appeal unless an attempt has been made to settle the matter first with your instructor. If after this discussion you remain dissatisfied with a grade or other decision, you may proceed with a written appeal (e-mails are not acceptable) to the Undergraduate Director in Economics, stating the reasons for your appeal. A useful form and checklist is provided at (http://economics.uwo.ca/undergraduate/program_counselling/responsibilities_policies.html#appeals).

7. Systematic adjustments of a class grade distribution (either up or down) can occur in Economics courses. The fact that grades have been adjusted is **not** grounds for an appeal.
8. Note the following add and drop deadlines:

Last day to **add** a first term half course:
Friday, September 16th, 2016

Last day to **drop** first term half course without academic penalty:
Monday, November 7th, 2016
9. Faculty of Social Science policy states that oversleeping or misreading an exam schedule is not an excuse for a make-up. This rule applies to all mid-term tests and final exams in the Department of Economics.

Policy Regarding Makeup Tests and Final Examinations

*Academic accommodation will **not** be granted automatically on request. You **must** demonstrate by documentation that there are **compelling** medical or compassionate grounds before academic accommodation will be considered.*

If you decide to write a test or an examination, you must be prepared to accept the mark you earn. Rewriting tests or examinations, or having the value of the test or examination reweighted on a retroactive basis, is **not** permitted. Book airline flights after you know the dates of your final examinations. Airline flights must not conflict with test or final exams.

If you are requesting a makeup test for a midterm or a final examination, unless medically incapable, notify your instructor by email or phone, preferably prior to the scheduled date of the test, but definitely within **24 hours** of the date of the test or exam. Failure to follow this procedure may result in denial of a request for academic accommodation or result in a grade of zero. Set up an appointment as soon as possible to meet personally with your instructor. If the instructor is not available, you may send an email message, copying the Undergraduate Coordinator at econugrd@uwo.ca (Social Science Room 4075). **Notifying your instructor of a missed test or exam does not automatically entitle you to a makeup test.**

Students who seek a makeup test or examination must provide medical or other relevant verification that their absence from a regularly scheduled test or examination is beyond their control. Documentation must support your reasons. Medical documentation should be given to the Academic Counselling Office of your *home* Faculty **as soon as possible (preferably within 24 hours of the test)** if you know you may not be able to write your final examination on the scheduled day and time. Failure to follow this procedure, or to provide supporting documentation, may result in denial of a request for academic accommodation or result in a grade of zero. If your documentation is not acceptable, you will be given a zero for the missed test.

For personal illness, if you consult Student Health Services regarding your illness or personal problem, you should request a Student Medical Certificate from the physician. If you were seen by an off-campus doctor, obtain a certificate from his/her office at the time of your visit. The off-campus medical certificate form must be used and can be found at: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf. Notes stating "For Medical Reasons" are not considered sufficient.

For any other circumstances, if you are not sure what documentation to provide, ask your Academic Counsellor. If your documentation is judged sufficient, the Academic Counsellor will issue a Recommendation for a Special Examination (a single form for midterms or a triple color form for final examinations). Once you have this form, contact your instructor as soon as possible to make arrangements. Even if approved from your home faculty Academic Counsellor, there is no guarantee that you will be allowed to write the makeup test and exam.

For final examinations, you need permission from your *home* Faculty Counsellor, your instructor, and the Department Undergraduate Director. Failure to follow this procedure may result in an examination grade of zero. You must ensure that the Special Examination form has been signed by the instructor and Department Undergraduate Director and that the form is returned to the Academic Counselling Office for approval without delay. Make-up final examinations, if permitted, will be written within one month of the end of the exam period.

Policies Regarding Academic Accommodation

Information about the Faculty of Social Science's policies regarding academic accommodation is found on its website at <http://counselling.ssc.uwo.ca/procedures/havingproblems.asp> or in Social Science Room 2105. Your "Academic Rights and Responsibilities" are also outlined in the current UWO Calendar at <http://westerncalendar.uwo.ca/2016/pg111.html>. Claiming that "you didn't know what to do" is not an acceptable excuse for not following the stated procedures.

Policy Regarding Class Attendance

If your instructor views your class attendance as unsatisfactory, you can be prohibited from writing the final examination. If there is intent to make use of this University policy, you will be notified in writing.

Statement on Mental Health and Support Services

If you or someone you know is experiencing emotional/mental distress, there are several resources here at Western to assist you. Please visit <http://www.uwo.ca/uwocom/mentalhealth/> for more information and a complete list of resources, as well as how to obtain help.