Advanced Econometrics
Fall 2024
0.5 Credits

General Course Information

Instructor: Alex Maynard

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Office Location   MACK 720 and/or on Zoom
Office Hours   Fridays 1-3pm
Department/School   Department of Economics and Finance/Lang School of Business and Economics

Class Schedule: T/Th 1:00 PM - 2:20 PM (ROZH, 108 and/or Zoom)

Pre-requisites: ECON 3740

Restrictions:

Course Description

This is a course in both the application and theoretical foundation of econometrics and involves the application of econometric methods to empirically analyse important issues in economics. The course emphasizes the importance of data analytics in understanding economic model predictions by applying advanced regression techniques. These techniques may include instrumental variables, regression discontinuity, difference-in-differences, other panel data methods, big data analysis, and more. Students will learn to code and to estimate econometric models by completing an empirical research project using current statistical programming software.

Course Learning Outcomes

Upon successfully completing this course, you will:

Knowledge and Understanding:

1) Gain an understanding of empirical economics. Students will learn to apply standard microeconomic analysis to finance, labour and other public policy questions.

2) Improve their understanding of coding by using R or PYTHON to complete an empirical project.

3) Gain knowledge of the historical and global context. The empirical project will require students to understand the context in which their data were collected to interpret their results.

4) Gain an understanding of how to measure causal impacts.

Discipline/Professional and Transferable Skills:

5) Written communication: The empirical projects will give the students the opportunity to practise the skill of developing arguments, employing citations and ordering bibliographic references. Students will be expected to learn how to format an empirical paper in economics.

6) Numerical problem solving: Textbook homework assignments and two take home quizzes will give students the opportunity to solve problems using numerical and analytic skills, while the empirical project will give them the opportunity to demonstrate basic software and computation skills.

7) Problem solving in a real-world context: Students will apply the content of the course to current policy questions in when they work on their empirical project. The marking of this work will reward normative arguments with empirical substantiation from hypothesis testing.

8) Students will develop their comprehension and discussion skills through the oral assessment of the individual research projects during the presentation and Q&A components.

Attitudes and Values

9) Students will complete each of the assignments themselves. Students will submit their code and data sets for all individual research projects. Students will practise using proper citation of works and incorporation of bibliographical references into their own work.

10) Students will gain appreciation of evidence-based research and knowledge, as well the distinction between correlation and causation. More generally, you will learn to consider both the evidence and plausible alternative explanations carefully before forming conclusions.

Summary of Course Content and Materials

Please note that some topics discussed in lecture may not be included in the textbook and some topics in the readings may not be discussed in lecture. To do well on this course, it is strongly suggested that you both complete the readings and attend the lectures. It could be a costly mistake to assume that you can use the book as a substitute for the lectures or vice-versa. The following schedule is only approximate. Below is a preliminary list of topics covered. These may be updated as the course progresses. We will set our pace according to the comfort level of the class and may cover either more or less than what is listed below.

Approximate Week	Textbook Chapters	Topic
Self-Study for Project	19	Carrying Out an Empirical Project

Week	Chapter	Topic
1-2	3, Advanced Treatments D,E	Review of Multivariate Regression (including matrix formulations)
3	10	Basic Regression Analysis with Time Series Data
4	11	Further Issues in Using OLS with Time Series Data
5	12	Serial Correlation and Heteroskedasticity in Time Series Regression
6	13	Pooling Cross-Sections across Time: Simple Panel Data Methods
7	14	Advanced Panel Data Methods
9	15	Instrumental Variable Estimation and Two-Stage Least Squares
10	16	Simultaneous Equations Models
11	17	Limited Dependent Variable Models and Sample Selection Corrections
12	18	Advanced Time Series Topics (if time permits)
13	TBA	Additional Topics if Time Permits

Course Assessment

			Associated Learning Outcomes	Due Date/ location
Assessment 1:	10%(*)	Research Project: Live Presentation/Q&A session (Group of 1-2)	LO 1 – 3	*Last Week of Class (Tue Nov 26 or Thu Nov 28)*
Assessment 2:	20%	Research Project: Short paper, data, and code files and 5 minute video. (Group of 1-2)	LO 1 – 3	*Rough Draft and 5 minute video, Friday Nov 1, Near Final Draft Fri Nov 22, Final Draft, data, code file, & video, Fri, Nov 29*

Assessment 3:	10%	Research Proposal and Summary Statistics: (Group of 1-2)	LO 2, 3	*Saturday, Oct 5*
Assessment 4:	5%(*)	Lecture Participation	LO 1-3	*During Lecture*
Assessment 5:	15%	Regular Homework Assignments (MindTap and Instructor Provided)		*Weekly*
Assessment 6:	40%(*)	e.g. Final exam	LO 1-3	*See exam schedule*
Total	**100%**			

Obtaining a Passing Grade

(*)NOTE: To pass this course you must **both** obtain a course mark of 50% or higher **and** obtain an In-Person Average of 40% or higher. If your In-Person Average is below 40%, then your course mark will be set equal to your In-Person Average. Your In-Person Exam Average, uses a weight of 9.09% on Lecture Participation, a weight of 18.18% on your live presentation/Q&A for the research project, and a weight of 72.73% on the final exam and is therefore defined by the following formula (denoting multiplication by *):

In Person Average = (0.0909)*(Lecture Participation)+(0.1818)*(Live Presentation/Q&A)+0.7273*(Final Exam)

This requirement is to encourage students to work on all aspects of the course and to approach out of class work as learning opportunities.

Teaching and Learning Practices

Lectures	Please use this space to provide information regarding lecture style instruction as appropriate. This may be entered as formatted text (bullets, lists) or as a table.

Course Resources

Required Text: Jeffrey M. Wooldridge, "Introductory Econometrics: A Modern Approach" edition 7. Please purchase the latest edition that comes with access to the publisher's online resources, as you will be completing on-line problems associated with each chapter. The early chapters of this text cover the material from ECON 3740. Apart from a brief review, we will start roughly half-way into the book.

Other Resources: You will need a personal GMAIL Google account to use an instructor provided Google Collab notebook in which to do your coding and empirical work. You will have the choice of using either Python or R for your coding. All coding and data work, including rough work, must be completed in the Google Collab notebook assigned to you. You should have already learned either Python or R in ECON

3740. However, the TA will provide limited support for Python and R during office hours. Replication files must be handed in with your project.

Respondus will be employed. Only the Lock Down Browser will be employed when an in-person invigilator is present.

Group Work Policies

All group members are expected to contribute substantively to the project and are expected to work collaboratively and to be responsive to each other's e-mails/communications. If a team is not functioning well, it is expected that all group members will meet within three days to make a good faith effort to resolve the issues. If the issues cannot be resolved, any group member may request to disband the group by sending an e-mail from their own university e-mail address to both their fellow group member's University e-mail address and to my University e-mail address, including the following information: full name of each group member including yourself, group number, issues that could not be resolved and efforts made to date to resolve them (including dates). The request may or may not be approved at the instructor's discretion, depending on the circumstances. If the request to disband is approved, both team members must promptly share all work done to date. Thereafter, they may be required to work on the remaining assignments individually or the instructor may assign them to a new team. No academic consideration will be given to any student due to the malfunction and/or disbandment of a team. When deemed necessary, the course instructor may also make changes to team composition even in the absence of a request to disband. Although the same mark would often apply to all team-members, in some cases the instructor may give different marks to different team members.

All group members are responsible for ensuring the quality and academic integrity of the material submitted on behalf of the group. No academic consideration can be provided on the basis that a mistake was made by another group member, as all group members are responsible for verifying the final assignment before submission.

Information on the Proposal

Students will be required to carefully and thoughtfully fill out a proposal form, using Word-Online in Courselink, which may then be complemented by a short, scheduled discussion with the TA and/or instructor. Students should have both a concrete plan and a data set in hand by the time of the proposal. Looking over the proposal form well ahead of time will give students a better sense of what is expected. It is also strongly recommended to stop by office hours to discuss your developing plans well ahead of the proposal deadline. You do and should not wait until you have a fully formed plan to stop by.

The proposal will be written using Word-Online in Courselink. The full writing process must take place within Courselink. Otherwise, mark deductions may apply. The instructor and TA will have

access to the full history. Students should print their final proposal to PDF and submit the PDF under groups.

Information on the Presentation and Q&A Session

These will be held during the last week of class, either in class or at a time of mutual convenience after you have handed in a near final version of your paper. You will be allowed to present with certain limited factual information, such as a tables, equations, and references, but are expected to speak naturally rather than read your presentation. You may be asked questions both during and/or after your presentation. These questions are not meant as a test or quiz, but rather as a discussion and you are encouraged to ask for clarification if the question is not clear. Your presentation may be recorded.

Information on the 5-minute Recorded Video

This is to be handed in together with the rough draft only. Since there is a live presentation near the time of your near final and final drafts, there is no need to include a pre-recorded video with those. Please limit yourself to no more than 3 uncluttered slides.

Information on the written project

The paper will be written using Word-Online in Courselink. The full writing process, including preliminary and rough drafts must take place within Courselink. Otherwise, mark deductions may apply. The instructor and TA will have access to the full history. The submitted version of each required draft (rough, near final and final) should be printed to PDF and submitted in Groups under Courselink. Submitted versions of code should be changed to a text (.txt) file and submitted in Groups under Courselink.

You will hand in three drafts: A rough draft, a near final draft, and a final draft. You will receive one single mark for the project based on all three drafts, as well as the history of Word-Online. Most attention will normally be given to (a) the quality of the final draft (b) and the natural progression of the work within Word-Online and from draft-to-draft. At the time of submitting your rough draft it is suggested that you stop by office hours for discussion and feedback. After submitting your near final draft, you will make a class presentation. Then you will submit your final draft accompanied by a minute recorded video summary. Your data and replication files must be submitted with each draft.

The main paper will normally be 5-10 pages excluding tables, code, appendices, and references. Only tables and references discussed in the main paper should be included. Look at a few published papers in economics to get an idea of how papers are organized. Commonly papers are broken into sections, such as Introduction, Brief Literature Review, Data, Methods, Empirical Results, Conclusion. Usually, 2-3 clear tables of results will often be sufficient, but this will depend on the topic. An acknowledgement section should clearly provide credit for any advice or support your received other than from the instructor and TA. Along with your paper you should upload your data and a replication code file that will reproduce all your results.

Clear writing, clearly labelled tables and figures, well-defined symbols and clear equations (often on their own line) will make a big difference in terms of the quality of the communication. Please do not simply copy and paste your R or python output into a table and do please replace variable names used in coding with human readable names. Please be clear about what question you attempt to answer, how you answer, and how you interpret your findings. Your interpretations and conclusions should clearly follow from the results presented in your tables. Often, you may want to discuss both the sign of your coefficients, their economic significance, and their statistical significance. In some cases, there are specific hypotheses that you are testing and these should be stated clearly.

The methods you employ should be appropriate to both your data and question and they should the econometric issues from class to the extent that they apply to your situation. If there are problems that you recognize but do not have the tools to address, it is better that you discuss than ignore them. Often this is stated in a conclusion as a "direction for future research." Sensitivity or robustness can add credibility to your research, particularly when several reasonable specifications or choices are possible. Stopping by office hours to discuss these issues as they pertain to your particular project is strongly recommended, preferably well-ahead of the due-date.

Your data, replication code, and five-minute summary video will also be evaluated. The replication code must easily and clearly replicate the results of the paper. You may be required to share or submit a code history, so that the history of the project can be evaluated.

Information on the Final Exam

The final exam covers all aspects of the course: lecture, readings, problem sets, and research project. Questions on the research project may be individual to your groups project or generic to empirical research projects in general.

Office Hours

Since you are writing a paper, you are expected to stop by office hours to consult with me and/or the TA. Doing so, from time-to-time, may be considered as a component of participation and is one factor that helps to demonstrate your effort on the project. If you cannot make the office hours, please contact me to arrange another time to meet. Unfortunately, I cannot field detailed questions by e-mail due to the technical nature of the material in this course.

Policy on Participation

Students will be expected to have completed the assigned readings ahead of lecture and to engage in meaningful discussion of the class material from time to time or when called on. Students are also expected to drop by office hours from time to time to discuss their progress on their project.

Students must be physically and mentally present in lecture to obtain participation marks, although attendance by itself does not constitute participation. Participation marks will not be

provided for a student who remotely attends an-in person lecture with their camera off. Please use your real name or first name and last initial as your zoom logon when attending virtually. It is understood that for various legitimate reasons, students will not be able to attend every single lecture. Please e-mail your instructor at your earliest convenience if you cannot or could not attend lecture. If you miss more than three lectures throughout the semester for valid reasons, then at the end of the semester please e-mail the instructor a list of missed classes together with explanation and corroboration where possible. If convinced by the explanation and corroboration, the instructor may exercise discretion to either reweight the student's participation marks or move the weight of the missed participation marks to the final exam.

Policy on Remote Attendance of in-Person Lectures

When lectures are held in-person, remote attendance may occasionally be permitted <u>with camera on</u> as a privilege when circumstances and technology allow. Remote attendance of an in-person class is never a right and even when permitted no quality assurances can be provided. A remotely participating student who keeps their camera may be removed from the meeting and will not receive participation marks. Even for a student who attends remotely with their camera on, we cannot guarantee that their participation will be counted towards their mark, despite our best efforts to do so.

Policy on Remote Attendance of Remote Lectures

Students who attend a remote lecture are encouraged, but not required, to keep their camera on. When there is no in-person alternative available, students have the right to maintain their privacy by turning their camera off and will not lose participation marks for doing so.

Policy on Independent Work and Proper Attribution

Assignments:

Assignments must be completed independently by each group without the aid of AI, such as ChatGPT, or on-line services that provide solutions, as Course Hero. Students who are stuck or have questions are strongly encouraged to consult the instructor or TA during office hours.

Project:

Discussion and advice is encouraged as an important part of research. However: (1) discussion should never involve someone else doing the work for you, (2) you must seek prior written approval from the instructor to discuss your project with a paid tutor or with anyone outside the University of Guelph community (3) All discussions and advice obtained must be clearly acknowledged in an "acknowledgements" section of the paper. Failure to provide proper attribution for advice and discussion obtained other than from the instructor or TA may be treated as academic offense. However, students should be assured that no properly acknowledged (unpaid) advice or discussions within the University of Guelph community will be subject to academic penalty.

ChatGPT may only be used for an initial exploration of your topic and review of literature and the full text of any and every discussion with ChatGPT about your paper must be included in a clearly labelled appendix. You may **not** use ChatGPT (or any AI, tutor, or paid service) to write drafts of either your paper or your code, nor may you use it to conduct your empirical analysis. Students are also cautioned in the strongest terms against handing in papers that have been copied, published, or plagiarized.

It is not possible to pass the course on assignment marks alone, due to the required mark on the In-Person-Average. The final exam may include one or more detailed questions about your project that will be compared to your previously submitted paper. In your presentation and Q&A, it will also become quite apparent if you have not done your own work.

Grading Policies

Unless you have discussed an extension well ahead of the due date with the instructor, late penalties of 5% of the total grade earned per day (including weekends) will be assigned to any assessment (i.e. deducted from the total mark). Extensions will only be granted on the basis of valid medical or personal reasons, and need to be requested via email to the instructor as soon as possible. Late assignments will not be accepted once graded assignments have been returned officially to the class at large, unless circumstances permit and alternative arrangements have been made.

Students who find themselves unable to meet course requirements by the deadlines or the criteria expected because of medical or personal reasons, should review the regulations on academic consideration in the Academic Calendar and discuss their situation with the instructor, program counselor or other academic counselor as appropriate.

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-grds.shtml

Missed Assignments:

A grade of zero will be assigned if you fail to submit an assignment, unless you are ill or have other compassionate reasons. Please read your Undergraduate Calendar for the regulations regarding illness and compassionate grounds. Please note, vacation travel, moving house, or outside work commitments will not be accepted as valid reasons for missing deadlines.

If you have religious observances which conflict with the course schedule or if you are registered with Student Accessibility Services, please contact the course instructor to make arrangements for your assessment if appropriate.

Originality Check:

Please note that software will be used to verify the originality of your assignments and final project paper.

Re-grade Requests:

Any request to remark of a student's work must be addressed to your instructors in writing (PDF of a scanned, signed, hard copy) within three weeks and must include the following (i) your name, contact information (telephone and email), and signature, (ii) a clear description of where and why you feel that you were graded in error, and (iii) the following statement exactly as it appears here "In requesting a re-grade I confirm that I have not written on, erased, or in any way changed my copy of the exam/assignment since it was handed back to me. I understand that to do so would constitute a serious academic offense. I also understand that my entire exam/assignment will be re-graded (with particular attention paid to the points that I have brought up) and understand that as a result my score on the exam/assignment could fall as well as rise."

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or

accommodation, whether due to an identified, ongoing disability or a short-term disability should contact Student Accessibility Services as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email sas@uoguelph.ca or see the website: https://wellness.uoguelph.ca/accessibility/

Course Evaluation Information

Please refer to the Blue by Explorance system.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Drop date

The last date to drop one-semester courses, without academic penalty, is **Friday November 29, 2024.** For regulations and procedures for Dropping Courses, see the Academic Calendar:

https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml