ECN 480-01/PUB 580-H1, Quantitative Methods for Public Administration (3 credits)
Winter 2022

Instructor: Dr. Chris Douglas
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Office Hours: Tuesdays and Thursdays, 4:00pm-5:00pm, or by appointment (see below).
Anticipated Response Time to Questions: Within 24 hrs, usually much sooner
Class Meeting Days/Times: Tuesday and Thursday, 5:30pm-6:45pm in 301 French Hall or
livestream the class on Zoom.
Prerequisites: At least junior standing
Support Staff: Audrey Beauchesne (abeauche@umich.edu)

Course Description (from UM-Flint Catalog):
Application of statistical techniques to problem-solving. Forecasting and time-series;
regression; correlation; variance; cost-benefit analysis. Computer methods in solving problems
of public policy and health care administration. Graded ABCDE.

Course Overview:
ECN/PUB 480/580 is an introductory course in applied econometric analysis. Econometrics is
means the measurement and testing of economic theories. In this class, we will cover regression
analysis, the technique by which econometric analysis is undertaken. Regression topics include
simple and multiple regression, hypothesis testing, goodness-of-fit measures, different functional
forms in regression, the Gauss-Markov requirements the data must satisfy for the regression to
work property, the consequences when the data doesn't, and how these violations can be fixed.
Since this is an applied course, we will make use of a professional statistical package, Stata,
when conducting the analysis.

Course Learning Outcomes:
- The student will be able to conduct research using econometric techniques as well as
  consume research that use these techniques.
- The student will be able to use regression analysis to estimate economic parameters, test
  hypotheses and make predictions using different types of data sets.
- The student will understand the basic assumptions of the regression model, know how to
  test for violations of these assumptions, such as heteroscedasticity and serial correlation,
  and what corrections may be used.
- The student will gain the experience of working with a widely used statistical program,
  Stata. Additionally, this experience is beneficial should future work involve other
  statistical programs such as SPSS, SAS, EViews, and so forth.

- The student, by understanding quantitative methods and their limitations, will become a better consumer of statistical information. He or she will be able to think critically about the methodology, assumptions, and techniques behind claims made based off of statistical analysis.

Required Textbook:
The book we will use is entitled *Introductory Econometrics: A Modern Approach* by Jeffrey Wooldridge, 7th edition. Note that this book has an extremely thorough treatment of the subject, much more thorough than our treatment in this class, as this book easily has enough material for a year-long (or more) econometrics class. Pay close attention to the reading assignments in the schedule at the end of the syllabus. Most, if not all, reading assignments only cover certain portions of the chapters in the book.

Many of the chapters contain dense mathematics. Don't worry about this. The author dives deeply into the theory behind the econometrics we will be doing in class and rigorously proves the results of the theory, rather than just presenting them. As this is an applied class, we will not be doing a deep dive into the theory behind the econometric analysis. When doing the reading assignment, don't get lost in the mathematics and instead, focus on the application and results. With that said, this book is the best book in the field and is used by the top schools. The author is also a top researcher in the field (and former professor of mine in graduate school), so it's the book we want to be using!

Office Hours:
I will hold office hours on class days before class from 4:00pm-5:00pm in my office in 220 French Hall. Since this is a hyperflex class, the office hours are also virtual. You can access my office hours on Zoom during this time by opening Zoom and entering meeting id 910 8906 8400 during office hours. Join the meeting and enter the waiting room. If I am currently with a student, I will meet with you as soon as I am finished with him/her. If I am not with a student, I will meet with you immediately. I am also available for office hours by appointment. Just email me for one and I can set-up one on Zoom.

Finally, please feel free to email me questions. You will receive a response to your email within 24 hours, usually much quicker (within an hour or two). See below with regards to Stata questions.

Required Technology and Software:
This course will require the use of Canvas (canvas.flint.umich.edu), email, as well as the video conferencing software Zoom. You can set-up a free Zoom account at zoom.umich.edu

We will utilize the statistical program Stata in completing the applied computer problems. During normal times, twenty-five Stata licenses are installed in the computer lab in 206 Murchie (https://helpdesk.umflint.edu/customer/portal/articles/1559974-hours-and-locations#). The lab is open from 7:00am-10:00pm Monday through Friday and from 10:00am-6:00pm on Saturday. The lab is closed on Sunday.

One option is that you have access to high speed internet, you can access Stata off-campus on your computer using the UM-Flint "Lab Anywhere" service. Simply go to https://labanywhere.umflint.edu/ to access this service. The other option is to buy a 6-month Stata license for your computer for $48. To do this, go to the following website and then click on the 6-month tab:
https://www.stata.com/order/new/edu/gradplans/student-pricing/

I am happy to walk down to the computer lab during my office hours to answer any Stata question you might have when working on an assignment. Also, feel free to bring your laptop to my in-person office hours or come to my virtual office hours on Zoom. I can let you share your screen during the Zoom meeting, which will make it easy for me to answer your Stata question. I can also answer questions via email. If you email me a Stata question involving an error you are getting, please copy-and-paste the Stata output into your email message, including the error, or better yet, just attach a screen shot of your screen to the email. In order to diagnose a Stata error or problem, I really need to see the computer screen. Diagnosing a Stata problem without seeing the screen is like a mechanic trying to diagnose a car problem without seeing the car.

Structure of Course:
Note: The first two weeks of this class will meet remotely in an online synchronous format using the Zoom links in the "Zoom" section on Canvas. The hyperflex format will resume on Tuesday, January 18 (see below):

Beginning on Tuesday, Jan. 18, this class will meet on Tuesdays and Thursday from 5:30pm-6:45pm. You have the option to attend in-person in 301 French Hall or to livestream the class on Zoom. Zoom links for each class can be found in the "Zoom" section of Canvas. I strongly recommend coming to class if you have questions so you can get them answered in-person and to speak with me before or after class. Please feel free to livestream the class if you do not feel comfortable attending in-person due to the pandemic or if scheduling issues make attending in-person difficult. You can ask questions via the Zoom chat during the class as well as meeting with me during office hours on Zoom. I will also record the livestreamed classes and post them on Canvas afterwards in case you were not able to attend or want to review portions of the class afterwards.

I will post a set of notes in a .pdf file on Canvas for each class that you can download and use to follow along. I encourage you to print these notes before class, so you can write your own notes in the margin. There may be an occasional graph or two to draw. I will leave spaces in the notes for you to draw them if/when that occurs.

Each set of lecture notes corresponds to a lecture number in the "Schedule of Topics" portion of the syllabus. Canvas is organized in "modules," so lectures notes can be downloaded in the "Modules" section. My goal is to make each set of notes correspond to a 75-minute class. However, some notes might take less than 75-minutes to get through and some might take more. If we finish a set of notes prior to class ending, we will simply start the next class's notes. If we do not finish a set of notes prior to class ending, we will pause there and pick-up from where we left-off in the next class. This should all average out so that we get through all 24 sets of notes during the semester 😊

Course Assignments and Grading:
This course will not have in-class midterm exams or an in-class final exam. Instead, it will have seven graded homework assignments.

Homework assignments will consist both of written and applied computer problems, both of which involve working with data sets using Stata. Assignments will be posted on the dates given later in the syllabus and due in one week. Assignments will be submitted on Canvas. You must upload one file to Canvas when submitting your assignment and the files must be either in MS Word or .pdf format.

The following scale will be used to assign grades: A: 90-100; A-: 86-89.9; B+: 82-85.9; B: 78-81.9; B-: 74-77.9; C+: 70-73.9; C: 65-69.9. Your grade will be calculated as the number of points earned divided by the number of points possible. Points on all homework assignments have equal weight.

Late Assignment Policy:
You will have at least one week, from when the homework assignment is given to when the homework assignment is due, to complete each homework assignment. In practice, you do not need that much amount of time to complete each assignment. The amount of time given to complete each assignment is simply to give you the flexibility to complete the assignment at a time that best fits your schedule. Since you have ample time to complete each assignment, the penalty for late assignments is a 10% per day deduction from your score for each day the assignment is submitted past the due date. Since I know that issues will arise, I will give each student one opportunity to submit one homework assignment one class period late without penalty. No assignments submitted more than two weeks late will be accepted.

UM-Flint Statement on Academic Integrity:
"Intellectual integrity is the most fundamental value of an academic community. Students and faculty alike are expected to uphold the highest standards of honesty and integrity in their scholarship. No departure from the highest standards of intellectual integrity, whether by cheating, plagiarism, fabrication, falsification, or aiding and abetting dishonesty by another person, can be tolerated in a community of scholars. Such transgressions may result in action ranging from reduced grade or failure of a course, to expulsion from the University or revocation of degree."
(https://www.umflint.edu/sites/default/files/imported/cas/documents/AcademicIntegrity.pdf)

UM-Flint Disability Statement:
"The University of Michigan–Flint strives to make learning experiences as accessible as possible and complies with Section 504 of the Rehabilitation Act of 1973 and the American with Disabilities Act. The university provides individuals with disabilities reasonable accommodations to participate in educational programs, activities, and services. Students with disabilities requiring accommodations to participate in class activities or meet course requirements must self-identify with Disability and Accessibility Support Services as early as possible at (810) 762-3456 or dassflint@umich.edu. The office is located in 264 University Center, inside the CAPS Office. Once your eligibility for an accommodation has been determined you will be issued an Accommodation Letter. Please present this letter to each

faculty member in each class at the beginning of the term, or at least two weeks prior to the need for the accommodation (test, project, etc.)."

Assignment Dates:

Date	Assignment	Due
Thu, Jan 20	Assignment #1	Thu, Jan 27
Thu, Feb 10	Assignment #2	Thu, Feb 17
Thu, Feb 17	Assignment #3	Thu, Feb 24
Thu, Mar 10	Assignment #4	Thu, Mar 17
Thu, Mar 24	Assignment #5	Thu, Mar 31
Tue, Apr 12	Assignment #6	Thu, Apr 21

Schedule of Topics, Readings, and Assignments:

Lecture #	Date	Topic	Reading
1	Thu, Jan 6	Introduction	Chapter 1
2	Tue, Jan 11	The quantitative approach and common statistical fallacies	No text reference
3	Thu, Jan 13	Expected value, conditional expectation, variance, and standard deviation	Appendix B-1, B-3a thru B-3f
4	Tue, Jan 18	Covariance, correlation, begin simple regression	Appendix B-4a thru B-4c, Ch. 2-1
5	Thu, Jan 20	The simple regression model: ordinary least squares (OLS) estimated coefficients, residuals, and interpretation	Ch. 2-2
6	Tue, Jan 25	Properties of OLS and goodness-of-fit	Ch. 2-3
	Thu, Jan 27	**Go over Stata together**	**Handout**
7	Tue, Feb 1	The multiple regression model, OLS estimated coefficients, residuals, and interpretation	Ch. 3-1, 3-2b thru 3-2e
	Thu, Feb 3	**No class: professor is out-of-town**	
8	Tue, Feb 8	Goodness-of-fit, hypothesis testing	Ch. 3-2h
9	Thu, Feb 10	t-tests, confidence intervals	Ch. 4-2 thru 4-3
10	Tue, Feb 15	F-tests, dummy variables	Ch. 4-5, Ch. 7-1 thru 7-3
11	Thu, Feb 17	Interaction terms, with and without dummy variables	Ch. 6-2c & Ch. 7-4a thru Ch. 7-4b
12	Tue, Feb 22	Using logarithms in regression	Ch. 2-4b & Ch. 6-2a
13	Thu, Feb 24	Finish logs in regression, quadratic terms in regression	Ch 6-2b
	Tue, Mar 1	**No class: winter break**	
	Thu, Mar 3	**No class: winter break**	
14	Tue, Mar 8	Gauss-Markov Assumptions	Ch. 3-3 until 3-a. 3-4 until 3-4a. Ch. 3-5 & 3-6

15	Thu, Mar 10	Omitted variable bias, Multicollinearity	Ch. 3-3b thru 3-4b
16	Tue, Mar 15	Heteroskedasticity: consequences for OLS and robust t- and F-tests	Ch. 8-1 & 8-2
17	Thu, Mar 17	Testing for Heteroskedasticity	Ch. 8-3
18	Tue, Mar 22	Correcting for heteroscedasticity: weighted least squares	Ch. 8-4a & 8-4b
19	Thu, Mar 24	Time series models	Ch. 10-1 & Ch. 10-2
20	Tue, Mar 29	Time series properties and Gauss-Markov	Ch. 10-3
21	Thu, Mar 31	Serial correlation: consequences for OLS and testing for it with strictly exogenous regressors	Ch 12-1a thru Ch. 12-2a
22	Tue, Apr 5	Testing for serial correlation: Durbin-Watson test and testing without strictly exogenous regressors	Ch 12-2b & 12-2c
23	Thu, Apr 7	Correcting for serial correlation	Ch. 12-3a & Ch. 12-3b
24	Tue, Apr 12	Hypothesis testing with serial correlation	Ch. 12-5
	Tue, Apr 14	Catch-up day	
	Tue, Apr 19	Catch-up day	