

**ECO307: Introduction to Econometrics, Forecasting, and Time Series**  
**Fall 2015**

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**Instructor Information**

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**Meeting Time / Location**

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12:40 PM - 2:05 TH - Room 305

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**Course Description**

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An introduction to regression analysis and its application to economic and business research. Topics include using secondary data sources, simple and multiple regression, forecasting, time series analysis, and interpretation and communication of results. The course develops various empirical techniques and culminates with a final research report.

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**Learning Objectives**

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For successful learning, it is important that you understand why we do the reading, lectures, assignments, etc, we do. Everything we do in this class is meant to achieve the learning objectives below. It would be useful for you to pay careful attention to what learning objectives the lectures and assignments are meant to achieve.

1. Estimate and interpret confidence intervals and hypotheses tests using univariate and bivariate statistical methods to describe characteristics of one or two populations.
  2. Construct, estimate, and interpret regression models to identify relationships between explanatory and outcome variables.
  3. Construct, estimate, and interpret various functional forms for regression models, including the use of binary variables, log and quadratic functions, and interaction effects.
  4. Identify assumptions and possible shortcomings to estimated regression models.
  5. Identify patterns and relationships among macroeconomic and financial variables by estimating and interpreting elementary time series regression models.
  6. Apply econometric models to data using the statistical package *R*.
  7. Apply econometric models to economic data as part of a significant research project culminating in a formal paper and presentation.
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**Course Resources**

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Textbook: Wooldridge, Jeffrey M. (2016). *Introductory Econometrics*. Sixth Edition.

*R* and *RStudio*: Open source (free to download and install) statistical software to be used in class and for homework assignments and projects.

Laptop: Throughout the semester, we will spend class time conducting statistical analyses using *R*. Please bring your laptop to class to participate.

Class websites: <http://www.murraylax.org/eco307/fall2015/>. All material handed out in class will also be posted on the class website.

Desire2Learn (D2L): Grades will be posted on D2L, and some quizzes may be administered on D2L. Most of the class material will be posted on the class website.

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## Office Hours

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I am available for office hours with a minimum of a *one hour* notice. You may schedule 15 minute blocks for office hours by visiting <https://murraylax.youcanbook.me>. The blocks of time that I am available each week vary and are kept up to the minute on the YouCanBook.Me online scheduler. Additional walk-in office hours will be added as necessary, especially during exam weeks and weeks with significant homework deadlines. My typical weekly availability is given below.

8:30 AM - 2:00 PM	Mondays	Scan code or visit
8:30 AM - 11:30 AM	Wednesdays and Fridays	<a href="https://murraylax.youcanbook.me">https://murraylax.youcanbook.me</a>
1:00 PM - 3:00 PM	Wednesdays	to make an office hours appointment.
2:15 PM - 4:15 PM	Tuesdays and Thursdays	



Office hours are not a substitute for attending class. Except when missing class for very extreme circumstances that were promptly discussed with me, it is not acceptable to use office hours to ask questions about material you missed while not in attendance.

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## OFFICE HOURS SATISFACTION GUARANTEED!

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I guarantee that coming to office hours to ask questions on material you do not completely understand will increase your grade in the class. If you come to office hours and still get questions wrong on the exam about the topic we discussed, I will refund those points! This guarantee is subject to the following conditions:

1. Refund points are good for up to two topics on each exam, and up to a total of 10 percentage points per exam.
2. You and I must agree in writing using the form at the end on the syllabus that the topic that is guaranteed. On this form we both agree that I have explained the topic sufficiently and that you have acquired a good understanding from our discussion.
3. You must have attended class when the topic was initially taught.
4. Only three guarantee forms may be filed before each exam.
5. Only one guarantee form may be filed on a single day. Therefore, filing two or three guarantee forms before an exam will require at least two or three separate office hours visits, respectively.
6. After the exam, if you get questions wrong that were guaranteed, it is your responsibility to recognize this and present your copy of the guarantee form to notify me you should get the points refunded.

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## Assessment

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Learning will be assessed through weekly quizzes, in-class exercises, and exams. The grading breakdown will be the following:

- Homework assignments: 20%
- Quizzes and in-class exercises: 10%
- Midterm Exam: 25%
- Final Exam: 25%
- Final project: 20%

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## Grade Breakdown

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94-100	A	77-81	BC
89-93	AB	70-76	C
82-88	B	0-69	F

I reserve the right to scale every person's grade up by the same amount on any graded item in the event that much of the class falls short of the scale above. However, even if the grades are significantly low, there is no guarantee that I will ever do this.

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## Homework Assignments

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There will be some homework graded assignments assigned throughout the semester, usually involving applying the tools learned in class to problem sets involving real data. Some homework assignments will involve a written component asking you to read and critique econometric studies.

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## In-class Exercises and Quizzes

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There will be many announced and unannounced in-class exercises and quizzes given throughout the semester. These are based on class lecture, prerequisite knowledge, assigned reading, or other suggested work, and are designed to communicate learning expectations and give you quick feedback on how well you are achieving these. Classes will begin with your questions so that you can resolve any problems with assigned work before the quiz begins.

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## Exams

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There will be one midterm exam and one final exam. The final exam will predominantly cover material since the first exam, but will likely include some material since the beginning of the semester. Also, the material in this course is by nature cumulative. The early content serves as the foundation for later content, so mastery of all material is necessary for the final exam. Unless otherwise enforced by university policy, you must take the final exam at the scheduled time given below. The exam dates are as follows:

- Midterm Exam: Thursday, October 29.
- Final Exam: Friday, December 18, 2:30 PM - 4:30 PM  
The UW-L final exam schedule can be found here:  
<http://www.uwlax.edu/Records/Final-Exam-Schedule/>

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## Research Paper

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A major goal of this class is to be able to apply econometric tools to current data to answer an original research question in economics. The course will involve a semester-long research project. Early in the semester we will work on identifying a topic and dataset. You will apply new econometric tools that we learn in the class to your dataset as we cover them. As the semester proceeds, you will be expected to focus your research question and closely tie to it your decisions for what type of analysis to conduct. By the end of the semester, your work will culminate in a formal research paper and an oral presentation given in a public form. Below are some additional guidelines and expectations for the project:

1. Your project results in an *empirical* economics paper, which means it answers a question of interest in economics based on applying statistical methods to data, and letting the results from the data support your conclusion.
2. Your project should involve publicly available data available from one of the sources below. These datasets are exhaustive enough to include variables relevant to research questions in nearly all fields in economics. You may retrieve samples from the sources below or you can use samples that I will make available to assist you in your data collection process.
  - IPUMS International: Collection of census data from around the world, measured at the household and individual level. <https://international.ipums.org/international/>
  - IPUMS USA: Collection of household and individual data from the U.S. Census and American Community Survey. It includes data on educational attainment, income, language proficiency, migration, disability, employment, and housing. <https://usa.ipums.org/usa/>
  - IPUMS CPS: Collection of household and individual data from the U.S. Current Population Survey. It includes but is not limited to data on educational attainment, income, health insurance, migration, disability, employment, housing, poverty, and welfare. <https://cps.ipums.org/cps/>
  - Integrated Health Interview Series: Collection of household and individual data on health outcomes, health behaviors, and personal and socio-economic demographics. <https://www.ihis.us/ihis/>
  - Federal Reserve Economic Database (FRED): Collection of U.S. national, state, and international macroeconomic and finance data from multiple sources. <https://research.stlouisfed.org/fred2/>
3. A good paper should be interesting to read. To make your paper interesting, introduce the question quickly and motivate it. Why is your question interesting? Why do we not have an adequate answer to it yet? What will the reader learn that is not already known if he or she decides to continue reading it?

4. Your paper should include a short literature review (either as part of the introduction or a separate section) that describes sufficient background for the audience to understand the purpose and context of your work and be used to help motivate your research question. You should cite primarily peer-reviewed academic articles from economics journals.
5. Usually, research papers make *marginal* contributions. Your paper will not solve a big problem, but will instead make an incremental step toward better a understanding of some specific aspect of the literature you are citing.
6. Make your literature review, methodology, and results interesting to read. These sections should tell a story and proceed with a clear purpose. Avoid making these sound like a letter to your parents from summer camp, "Then we did this... then we did this... then we did this..."
7. A good paper should be easy to read. Make the organization of the paper clear and your text concise. Avoid repeating the same ideas in multiple sentences when a single sentence will do. Avoid repeating ideas in multiple areas of your paper unless it is necessary; this hurts both organization and conciseness.
8. The paper should be approximately 10-12 pages in length; double spaced (not 2.2 spaced, 1.5 spaced...), excluding tables, figures, and references; twelve point Times New Roman font; and have exactly one inch margins. The page length requirement will not be strictly enforced, but serves as a guide to you for how long a paper you should expect to write to adequately meet all other expectations for the paper. The formatting on spacing, font, and margins will be strictly enforced.
9. Plagiarism will not be tolerated. This constitutes academic misconduct and will be handled accordingly.
10. Below are tentative research paper deadlines. I may need to change the dates depending on the timing of course content coverage.
  - (a) **Tuesday, October 13: One page research proposal** that includes the following: (1) A one-sentence thesis statement or research question; (2) A short description of relevant background information including at least two citations of peer-reviewed articles from economics journals; (3) A description of your dataset including the source and some of the variables that you are likely to use; and (4) A very brief and broad explanation for the relationships you expect to look for among the variables.
  - (b) **Tuesday, November 3: Annotated bibliography** that includes bibliographic information, summary, and purpose for six sources that you are likely to cite in your paper. At least four of these must be published papers in academic, peer-reviewed journals.
  - (c) **Tuesday, November 10: Rough draft of introduction and literature review.** There is no requirement on the exact organization of these sections. You may have these as two separate sections, as a combined section, or another organization that you find appropriate for your project.
  - (d) **Tuesday, December 8: Rough draft of your methodology and results.** There is no requirement on the exact organization of these sections. You may have these as two separate sections, as a combined section, or as multiple sections organized by the type of question you answer or the type analysis you conduct.
  - (e) **Friday, December 11, 2:00 PM: Poster presentation at the Fall 2015 Celebration of Student Inquiry in Economics.** This is combined public forum with other upper level undergraduate economics classes where students present their final class projects in a poster/oral presentation format to other economics and business students and faculty.
  - (f) **Tuesday, December 22, 7:45 AM (final exam day): Final paper is due**

The final project grade will be broken down into its component assignments according to the following:

- One-page research proposal: 5%
- Annotated bibliography: 5%
- Rough draft of introduction and literature review: 10%
- Rough draft of methodology and results: 10%
- Poster and participation in the Celebration of Student Inquiry conference: 10%
- Final paper: 60%

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## Eagle Alert System

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This class will be participating in the UW-L Eagle Alert system through WINGS. The Early Alert system is designed to promote student success. If I notice that you are experiencing difficulties early in the semester (e.g., low assignment scores, poor attendance, minimal engagement in the classroom), I may enter feedback into the program and you will receive an email indicating that feedback has been left. I may also enter positive feedback encouraging you to think about additional opportunities. You will be able to access the feedback through your student center in WINGS. I encourage you to meet with me and use one or more of several helpful campus resources listed here <http://www.uwlax.edu/studentssuccess/>.

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## E-mail Guidelines

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I insist on the following e-mail etiquette rules (many of these are also recommended by the College of Business Administration). Failure to adhere to these guidelines will result in a reply with a friendly reminder to follow these e-mail guidelines.

- Allow one business day to elapse before expecting a reply.
  - Questions sent by e-mail should be able to be answered with only a few words, such as 'yes' or 'no' questions. Questions whose answers involve explaining class material are not appropriate over e-mail. For answers to these questions you should come to office hours.
  - Always include a subject that is brief but still has sufficient detail, *including the class your are in (ECO 120)*.
  - Look at your class notes and syllabus before sending an e-mail. Do not ask a question whose answer is on the syllabus or announced in class (unless you missed class for a legitimate reason).
  - Always spell check, grammar check, and re-read your e-mail before sending it.
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## Students with Disabilities

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Any student with a documented disability (e.g. ADHD, Autism Spectrum Disorder, Acquired Brain Injury, PTSD, Physical, Sensory, Psychological, or Learning Disability) who needs to arrange academic accommodations should contact The ACCESS Center (165 Murphy Library, 608-785-6900, [ACCESSCenter@uwlax.edu](mailto:ACCESSCenter@uwlax.edu)) and meet with an advisor to register and develop an accommodation plan. In addition to registering with The ACCESS Center, it is the student's responsibility to discuss their academic needs with their instructors. You can find out more about services available to students with disabilities at The ACCESS Center website: <http://www.uwlax.edu/access-center>.

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## Academic Misconduct

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Academic misconduct is a violation of the UW-L Student Honor Code and is unacceptable. I expect you to submit your own original work and participate in the course with integrity and high standards of academic honesty. The UW-L Student Honor Code can be found online at <http://catalog.uwlax.edu/undergraduate/academicpolicies/studentconduct/>. In the event a student is caught committing academic misconduct, I will pursue the harshest penalties allowed according to the UWS 14 Student Academic Disciplinary Procedures, which can be found here <http://www.uwlax.edu/Student-Life/Student-handbook/#14>.

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## Topics Schedule

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Below is a tentative list of topics and textbook readings for this class.

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1. Introduction / R overview
  - (a) Review of hypothesis testing for single and two variables, interpretation
  - (b) Review of confidence intervals for single and two variables, interpretation
  - (c) Using R: importing data and conducting simple statistical analyses
  - (d) Economic data, economic modeling. *Wooldridge, Chapter 1*
  - (e) Expectations for class project, datasets

2. Simple Regression, *Wooldridge, Chapter 2*
  - (a) Estimating the simple model
  - (b) Interpretations of the results
  - (c) Variance decomposition
  - (d) Assumptions and properties
  - (e) Functional form
3. Multiple Regression, *Wooldridge, Chapter 3*
  - (a) Estimating the model, interpreting results
  - (b) Variance decomposition
  - (c) Assumptions and issues using multiple explanatory variables
    - i. Multicollinearity
    - ii. Omitted variable bias
    - iii. Over-specification (including irrelevant variables)
4. Hypothesis testing in Regression Analysis, *Wooldridge, Chapter 4*
  - (a) T-tests and confidence intervals on regression coefficients
  - (b) F-test for overall model fit
  - (c) F-test for multiple exclusions
  - (d) Testing general linear restrictions
5. Regression Model Specification, *Wooldridge, Chapter 6*
  - (a) Standardized regression
  - (b) Functional forms: logs and quadratics
  - (c) Interaction terms and marginal effects
6. Binary (Dummy) Variables *Wooldridge, Chapter 7*
  - (a) Single dummy variable
  - (b) Dummy variables for multiple categories
  - (c) Interact with dummies
  - (d) Dependent dummy: linear probability model
7. Regression with Time Series Data *Wooldridge, Chapter 10*
  - (a) Autoregressive models
  - (b) Distributed lag models
  - (c) Autoregressive distributed lag models
  - (d) Assumptions for OLS with time series data
  - (e) Regression with time trends
  - (f) Seasonal dummies
8. Advanced Issues in Time Series *Wooldridge, pieces of chapters 11, 12, and 18*
  - (a) Highly persistent time series, unit root tests
  - (b) Serial correlation
  - (c) Heteroskedasticity
  - (d) Autoregressive conditional heteroskedasticity models
  - (e) Cointegration and error correction model