Department of Economics Spring 2023
Brooklyn College rev20230124

# ECON-4400W (MW9)
# Advanced Economics and Business Statistics: Syllabus

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| Faculty: | Prof. Dragos Ailoae (dailoae@gradcenter.cuny.edu) |
| Class Website: | Blackboard |
| Class Meets: | In-Person; Whitehead 503; Mon., Wed. 9:30–10:45 |
| Office Hours: | Wednesday 2–3pm (via Zoom; email me ahead of time for a time slot) |
| Final Exam: | There is no final exam. |

## COURSE DESCRIPTION

This course emphasizes the practical use of basic econometric techniques, a set of research tools used to estimate and test economic relationships. These methods can also be employed in the related business disciplines (accounting, finance, marketing, management) and in other social sciences.

Students who successfully complete ECON-4400w should be comfortable with basic statistics and probability. They should be able to use statistical software to estimate an econometric model and be able to report the results of their work in a non-technical and literate manner. Particularly, a student who successfully completes the course will be able to estimate and interpret linear regression models.

Areas of focus include:

1. Univariate linear regression - least squares method; coefficient of determination; model assumptions; tests for significance; analysis of variance; confidence intervals and prediction intervals for Y; scatter plots; residual analysis; and detecting outliers.
2. Multiple linear regression - least squares method; coefficient of determination; model assumptions and appropriateness of models; tests for significance; confidence intervals; residual analysis.
3. Regression analysis - model building: general linear model; determining when to add or remove independent variables; dummy variables; procedures for selecting variables.
4. Violation of assumptions – multicollinearity, heteroscedasticity, and autocorrelation.

Prerequisites: Econ 3400 or Math 3501 with a grade of C- or higher; and Econ 3410 with a grade of C- or higher; or Math 1231 or Math 1201.

## TEXTBOOK AND SOFTWARE

The primary textbook is J.H. Stock and M.W. Watson, *Introduction to Econometrics* (3rd edition). Two optional books, which will not be used in class, but which provide a complementary treatment that some students might find helpful, are J.M. Wooldridge, *Introductory Econometrics* and D. Gujarati, *Basic Econometrics*.

For graphics, data management, basic statistics, and econometric estimation we will rely on Microsoft Excel with the *Analysis ToolPak* add-in. Office 365 is available to all active CUNY students. For more details click the blue links below. Note that the add-in is not available on the mobile version of Excel.
*https://portal.brooklyn.edu/uPortal/f/welcome/normal/render.uP | https://www.cuny.edu/about/administration/offices/cis/virtual-desktop/ | https://libguides.brooklyn.cuny.edu/continuity/software*

## GRADING

You will be evaluated based on five homework assignments, two midterm exams, a class presentation, an empirical research paper (10 pages main text, double spaced 12pt Times New Roman font), attendance and class participation.

Weights are as follows: 15% Homework + 20% Midterm 1 (March 20) + 30% Midterm 2 (May 8) + 10% Presentation + 20% Research Paper + 5% Attendance/Participation

Final grades will be curved: around 30% A's, 30% B's, 30% C's and 10% D and F's.

### Homework Grades

You will obtain full credit for a homework assignment only if you spend enough time and effort on it. Homework grades will be assigned as follows:

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| √+ | 100 points: a considerable effort has been made in all problems with good overall results. A √+ is not a validation of your answers as 100% correct. It is your responsibility to verify your answers against the answer key and ask for help if you need clarification. |
| √ | 85 points: substantial, but incomplete, progress. |
| √- | 65 points: problem set poorly developed |
| 0 | problem set not submitted. |

Students caught submitting identical, or nearly identical, assignments will receive a zero grade for that assignment. Late assignments will receive a score of zero.

### Term Paper and Presentation

The term paper is an applied econometric research project that involves collecting an appropriate data set, conducting an econometric analysis, and writing the results in the form of a short research paper. The term paper is worth 20% of your course grade and should have at its core:

- an introduction that motivates your research topic, a description of the economic model used, and the empirical methodology used to test your hypothesis
- a section reporting your statistical findings (including regression analysis) using graphs, tables, etc. plus an economic analysis of these results
- a conclusion that summarizes your findings, how they compare with earlier literature, and addresses policy implications and unresolved issues

Term papers are graded both on the content AND the quality of writing. It is to be submitted to me via e-mail in PDF format along with related files on the due date (Dec 15). Late term papers may be accepted with penalties. You are responsible for proofreading and editing your work before submitting it for a grade.

The presentation is worth 10% of your grade and will be given in front of the class during the last four classes. This presentation will be around 10 minutes (depending on class enrollment) during which you are to motivate and summarize your research project. You are expected to use Power Point or similar software to present your work. Your attendance at the presentations of others is part of your presentation grade. The purpose is to encourage you to learn how to report economic questions, theory, and results.

**POLICIES**

1. Academic honesty is expected. (see https://www.brooklyn.cuny.edu/web/about/initiatives/policies.php) You will receive a mark of zero on any work where cheating or plagiarism occurs. Students suspected of cheating will be reported.

2. Attendance is required and taken for the course grade. I will take 10 attendances randomly, which, along with class participation, account for 5% of the course grade.

3. Come to class on time; you will not be given extra time if you are late for an exam.

4. There will be no makeup examinations. Exam dates are given in the course outline below. This is to avoid any potential conflicts.

5. Keep cell phones shut off during class. During exams, you may not use your cell phone as a calculator. You may bring a calculator without programming capabilities.

6. Students must turn the assignments on time. Late assignments will not be accepted.

7. Any re-grading requests must be submitted to me and in writing within one week of the date the graded exams are returned. The entire exam will then be re-marked in light of the information you provide, which may result in an increase or decrease in your grade.

8. If you decide to withdraw from this class, make sure you do so with the registrar. If you withdraw without permission, you will be assigned a failing grade.

9. If you have a learning disability or a physical disability that requires accommodation, please let me know as soon as possible. All needs that have been verified through the Services to Students with Disabilities will be accommodated.

10. In the event that a student needs to be out of class, relevant materials will be shared on Blackboard. Please email me if you will be out of class.

11. In the event that the course needs to be offered entirely online for a particular class meeting, we will meet synchronously at the standard class time using Zoom. Additional instructions about the particular details of class meetings or schoolwork will be emailed to you in the event of a shift to online instruction.

**COURSE OUTLINE**

This should be used as a rough guide for your reading. The lecture material will be greatly enhanced for you if you are up to date with your readings.

**1. Introduction (Chapter 1)** **Jan 24**

- Course introduction
- Association vs. causation
- Econometric data

**2. Review of Statistical Concepts (Chapters 2 and 3)** **Jan 30 – Feb 22**

- Random variables (discrete vs. continuous)
- Expected value
- Sample moments of a random variable
- The joint density function
- Marginal density, conditional density and independence
- Covariance and correlation
- The Normal density
- hypothesis tests
- p-values

**RESEARCH PROJECT: PROBLEM STATEMENT DUE** **Feb 22**

**3. The univariate linear regression model (Chapter 4)** **Feb 27– Mar 15**

- The econometric model
- The least squares principle
- Estimating the econometric model and interpreting the results
- The properties of the least squares estimate of an econometric model

**MIDTERM EXAM 1 (IN PERSON)** **Mar 20**

**4. Inference and prediction in the univariate model (Chapter 5)** **Mar 22 – Apr 3**

- Interval estimation and hypothesis testing
- Evaluating the univariate linear regression model

**RESEARCH PROJECT: MODEL DESCRIPTION DUE** **Apr 3**

**5. The multivariate linear regression model (Ch 6, 7, Sec 8.2 and 9.2)** **Apr 5 – May 3**

- The econometric model with more than one independent variable
- Estimating the multivariate model and interpreting the results
- Inference and prediction in the multivariate model
- Single and joint hypothesis tests of the parameters of the econometric model
- Model specification issues
- Violation of CLRM assumptions (multicollinearity, heteroscedasticity, and autocorrelation)

**MIDTERM EXAM 2 (IN PERSON)** **May 8**

**RESEARCH PROJECT: PRESENTATIONS** **May 10 – May 15**

**TERM PAPER DUE** **May 17**