

# Economics 491: Predictive Analytics Syllabus

## Fall 2023

### Contact Information

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Office Hours: Mondays and Wednesdays from 15:00 to 16:30 time of Urbana, IL.

**Always use your official University email account when you communicate with me.**

### Course Websites

- **Canvas**
  - <https://canvas.illinois.edu>
  - In Canvas, you will find
    - The slides I use in this class (without solutions).
    - The homework assignments
    - Practice Exams
    - Grades will be posted in the section “gradebook.”

### Material

- **Textbook**
  - Wackerly et. al., *Mathematical Statistics with Applications*. 7<sup>th</sup> Ed. Cengage.
- **Calculator**
  - Basic financial or statistical calculator.
  - The standard calculator is BAI Plus.
  - Calculators with functionality beyond BAI Plus are not allowed.
  - You should have your calculator in every class.
  - **Graphing calculators are not allowed!**

### Course Objective

This course teaches students how to construct predictions using statistical models. At the end of this course, students will be able to do the following:

1. Construct models of probabilistic and economic environments
2. Fit models using least squares, maximum likelihood, and the method of moments criteria
3. Test the validity of models
4. Perform bootstraps and Monte-Carlo Simulations
5. Interpret the results from model simulations

## Pre-requisites and Courses Related

Predictive Analytics is not an Econometrics course. It is an applied statistics course that teaches students how to fit models that characterize the structure of Data-Generating Processes that contain random components using data and relates those models with applications in Economics. Therefore, this course is an appropriate complement to ECON 471 (Intro to Applied Econometrics), and a solid foundation to understanding STAT 400, STAT 410, and STAT 420.

Students must take ECON 203 prior taking Predictive Analytics. Most content material in Predictive Analytics assumes that students have a solid understanding of ECON 203. Students are expected to have a solid understanding of Calculus before taking Predictive Analytics.

## Grading

The scale used to assign letter grades in the course will be the standard 90/80/70/60 scale with +/- grades given at +/- 3% around these cutoffs. Curves are at the discretion of the Professor. Once grades are assigned by the instructor at the end of the course, no exceptions will be made. We do not round grades. The following table summarizes the standard grading scale:

Final Score	Final Grade
97.00 – 100	A +
93.00 – 96.99	A
90.00 – 92.99	A –
87.00 – 89.99	B +
83.00 – 86.99	B
80.00 – 82.99	B –
77.00 – 79.99	C +
73.00 – 76.99	C
70.00 – 72.99	C –
67.00 – 69.99	D +
63.00 – 66.99	D
60.00 – 62.99	D –

### Grade Distribution Undergraduates

Midterm 1	20%
Midterm 2	20%
Final Exam	30%
Homework	30%

### Grade Distribution Graduate Students

Midterm I	20%
Midterm II	20%
Final Exam	30%
Homework	20%
Project	10%

## Instructional Activities

- Homework

- There are 5 homework assignments. The lowest grade among all your homework assignments will be dropped. Homework assignments that are not turned in will be given a grade of zero.
- **Exams**
  - There will be three exams (two midterms and a final). Each mid-term will only cover the material since the last exam. The final exam will be comprehensive. Basic calculators will be permitted.
  - **The are no make-ups for midterm exams.** If your absence to a midterm exam is properly documented, the weight of the midterm is transferred to the final exam.

### Academic Integrity

Violations of academic integrity as given in the [Code on Campus Affairs](#) will be taken extremely seriously. Students found cheating in the course (or helping others to cheat) will be penalized according to the Code's guidelines.

### Course Schedules

Week	Dates	Topic
01	08/21 – 08/27	Binomial Distribution and Method of Moments
02	08/28 – 09/03	Poisson Distribution and Maximum Likelihood Method
03	09/06 – 09/10	Geometric Distribution and Hypothesis Testing
04	09/11 – 09/17	Uniform Distribution and Bootstrapping
05	09/18 – 09/24	Normal Distribution and Monte-Carlo Simulation
06	09/25 – 10/01	Outliers, Fat Tails, and the Pareto Distribution
07	10/02 – 10/08	Review and Exam
08	10/09 – 10/15	Randomized-Controlled Trials: ATE, CATE, and ETT
09	10/16 – 10/22	Linear Model and Least Squares Method
10	10/23 – 10/29	Logit and Probit Models and Poisson Regressions
11	10/30 – 11/05	Bayesian Estimation
12	11/06 – 11/12	Structural Demand Model
13	11/13 – 11/19	Review and Exam
14	11/20 – 11/26	Fall Break
15	11/27 – 12/03	Demand and Supply Model
16	12/04 – 12/06	Real-Business Cycle Model

  

Date	Assignment
09/14	Homework 1 is due.
09/28	Homework 2 is due.
10/04	Midterm Exam 1
10/26	Homework 3 is due.
11/09	Homework 4 is due.
11/15	Midterm Exam 2
12/04	Homework 5 is due.