

# Economics 490: Predictive Analytics Syllabus

## Spring 2022

### Contact Information

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Office Hours: Mondays from 11:00 to 13:00 time of Urbana, IL.

To schedule office hours, send me an email with the subject "Econ490 Office Hours."

Depending on your preference, office hours can be virtual or face-to-face.

**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
    - The homework assignments
    - The exams
    - Grades will be posted in the section "gradebook."

### Material

- **Textbooks (not mandatory, just for reference).**
  - Prince, Jeff. *Predictive Analytics for Business Strategy*. 2019. Mc Graw Hill Education.
  - Wackerly et. al., *Mathematical Statistics with Applications*. 7<sup>th</sup> Ed. Cengage.
- **Calculator**
  - Basic financial or statistical calculator.
  - The standard calculator is BAI1 Plus.
  - Calculators with functionality beyond BAI1 Plus are not allowed.
  - You should have your calculator in every class.
  - **Graphing calculators are not allowed!**

### Course Objective

This course will introduce students to the standard statistical models that professionals use to analyze, interpret, and evaluate data to inform decision-making processes.

At the end of this course, students will be able to do the following:

1. Construct models of standard probabilistic environments.
2. Calibrate those models using least squares, maximum likelihood, and the method of moments.
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. Rather, it is an applied statistics course that teaches students how to calibrate/estimate models that characterize the structure of Data-Generating Processes with 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.

## 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	20%
Homework	20%
Project Part A	20%

### Grade Distribution Graduate Students (MSPE)

Midterm I	20%
Midterm II	20%
Final Exam	20%
Homework	20%
Project Part A	10%
Project Part B	10%

## Instructional Activities

- **Homework**
  - There are 6 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. This policy applies at most once.

## 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 Schedule

<b>Week</b>	<b>Topics</b>	<b>Date</b>	<b>Assignment</b>
01/17 – 01/23	Introduction (online)	02/06	Homework 1 is due.
01/24 – 01/30	Binomial Distribution and Method of Moments	02/20	Homework 2 is due.
01/31 – 02/06	Poisson Distribution and Maximum Likelihood Method	03/06	Homework 3 is due.
02/07 – 02/13	Geometric Distribution and Hypothesis Testing	03/09	Midterm Exam 1
02/14 – 02/20	Uniform Distribution and Bootstrapping	04/03	Homework 4 is due.
02/21 – 02/27	Normal Distribution and Monte-Carlo Simulation	04/17	Homework 5 is due.
02/28 – 03/06	Outliers, Fat Tails, and the Pareto Distribution	04/20	Midterm Exam 2
03/07 – 03/13	Review and Exam	05/04	Homework 6 is due.
03/21 – 03/27	Randomized-Controlled Trials: ATE, CATE, and ETT		
03/28 – 04/03	Linear Model and Least Squares Method		
04/04 – 04/10	Logit and Probit Models		
04/11 – 04/17	Poisson Regressions		
04/18 – 04/24	Review and Exam		
04/25 – 05/01	Structural Demand Model		
05/02 – 05/04	Competitive Market Model		