STA 1021 – Tue/Thu 4:30 to 5:45pm – room Furst 213
office hours – half-hour after each class and via email

Dr. Eryk Wdowiak
eryk.wdowiak@yu.edu
doviak.net/courses/statistics

Statistics
Yeshiva College – Fall 2025

Statistics is the proving ground of economic theory. A large share of the economic literature is devoted to comparing the predictions of theory to the data that we observe in practice. Statistics is also a very practical field. Businesses and governments frequently analyze data to understand market trends and make well-informed decisions.

This course has two sets of objectives: practical and academic. The academic objectives aim to teach you appropriate data analysis techniques, how to present and interpret data and how to test hypotheses. From a practical perspective, I hope that this course will help you appreciate data and learn how to create honest, informative statistics.

textbook, software and course materials

- Barbara Illowsky and Susan Dean (2023). *Introductory Statistics*, 2e. OpenStax.
- E. Wdowiak. *Statistics* (website). doviak.net/courses/statistics
- Gretl (software).

I have uploaded the syllabus and course materials to Canvas, yu.instructure.com. However, my teaching website, doviak.net/courses/statistics, provides a more comprehensive and convenient way to organize and distribute notes, homeworks, code, datasets and announcements. Please check the website regularly.

The required textbook is Illowsky and Dean's *Introductory Statistics*. As a publication of OpenStax – a non-profit initiative that creates peer-reviewed, openly licensed textbooks – it's available in PDF and web versions at no cost and it's available in a printed version at low-cost.

Please install Gretl on your computer. You'll need it for the homework assignments. I might provide a few examples written in the R language, but Gretl is a better tool for beginners. Gretl's drop-down menus make it easy to learn statistics. And it's open-source, so its price is zero and its users continuously enhance the software.

course requirements

During the semester, there will be two exams (a midterm and a final). The exams will consist of a set of problems and a set of short essays.

Homework will be assigned and the solutions will be reviewed in class. If you read the course material and do the homework regularly, you will develop a good knowledge of statistics and you will score higher on the exams.

In computing your final grade, I will give a weight of 35 percent to the midterm exam, 45 percent to the final exam and 20 percent for regular and constructive class participation.

students with disabilities

Students who will be requesting documented disability-related accommodations should make an appointment with the Office of Disability Services, wilfods@yu.edu, during the first week of class. The office is located in the Belz Building, suite 412. Once you have been approved for accommodations, please submit your accommodation letter and discuss any specifics with me to ensure the successful implementation of your accommodations.

academic integrity

Below is the lead paragraph of Yeshiva University's Academic Integrity Policy:

"Yeshiva University strives to do much more than impart information and skills to undergraduate students. At the core of our educational goals include character development and preparation for graduate school and the workplace based on our Jewish tradition and values. Rabbi Moshe Feinstein zt"l ruled that if you get a job using a cheated grade, every dollar you earn from it is considered stolen. It is during college that students define who they are and who they will be after graduation. The academic integrity expectations and policies that follow are intended to help foster the traits of honesty and integrity that students will need throughout life."

artificial intelligence and academic integrity

The best reason not to use artificial intelligence in economic research is that it won't help you.

Large language models generate a fluent sequence of words similar to the sequences in their training data. And the newer reasoning models can solve math problems. But they cannot replace the human thought necessary to design and implement a comprehensive and cohesive plan.

For example, when preparing this policy, I asked one prominent reasoning model to create a lesson plan which relates econometrics to artifical intelligence. It wrongly advised me to teach you that: "machine learning algorithms can help econometricians select the most important variables from a vast dataset to include in their causal models." The model wrongly thought that this approach would help "prevent 'model misspecification.'"

It is true that machine learning approaches can help identify correlates. But a simple correlation matrix does too. And, most importantly, correlation does not imply causation.

There should be a sound theoretic reason for including a variable in an econometric model. For example, even if a correlation exists between sunspots and economic fluctuations, that correlation does not imply a causal relationship. Unless the sun disappears from the sky, there's no reason to believe that changes in solar activity would affect GDP growth rates. Accordingly, we should not include sunspots in a model of economic growth. And we should not trust a reasoning model's reasoning.

That having been said, if *you* bring the mathematical reasoning that you learn in economics to a language model, the language model will help you write a fluent sequence of words with good mathematical reasoning. In other words, the critical ingredient is *you*. *You* must supply the good mathematical reasoning.

Accordingly, this course follows Yeshiva University's Academic Integrity Policy on Artificial Intelligence and allows students to use all forms of artificial intelligence without restriction. In following YU's policy, one must cite any content that a generative language model wrote. For example citations, YU's policy suggests the ones by the MLA and APA.

One must cite sources! So in cases where a student completely rewrote what a language model wrote, the student must still acknowledge use of a language model. For those cases, an acknowledgement with proper citation may be more appropriate than a standard citation.

course outline

Introductory Discussions

- Bender and Koller (2020). "Climbing towards NLU"
- Wdowiak. monopsonist and minimum wage
- Wdowiak (2017). minimum wage, employment and annual pay

Lecture 1 – introduction to data analysis

- Illowsky and Dean, chap. 1

Lecture 2 – measures of central tendency and measures of variability

- Illowsky and Dean, chap. 2
- homework 2

Lecture 3 – probability and the binomial distribution

- Illowsky and Dean, chaps. 3 and 4
- homework 3

Lecture 4 – the normal distribution

- Illowsky and Dean, chaps. 5 and 6

Lecture 5 – parameter estimation

- Illowsky and Dean, chaps. 7 and 8

Lecture 6 – hypothesis testing

- Illowsky and Dean, chaps. 9, 10 and 11

Lecture 7 – correlation and regression

- Illowsky and Dean, chap. 12
- Wdowiak. notes on regression
- homework 7

Lecture 8 – goodness of fit

- Illowsky and Dean, chap. 13
- homework 8