THE CATHOLIC UNIVERSITY OF AMERICA
DEPARTMENT OF ECONOMICS
Spring 2020

ECON 223: Statistics for Business and Economics

"Between a good and a bad economist this constitutes the whole difference — the one takes account of the visible effect; the other takes account both of the effects which are seen, and also of those which it is necessary to foresee…" (Frédéric Bastiat, 1850).

CREDIT HOURS: 3

PREREQUISITES: The Student is expected to be familiar with calculus and to have taken ECON

101 or 103, ECON 102, 104 or HSSS 102, MATH 111 and 112, and ECON 241.

CLASS SCHEDULE: Mondays and Wednesdays, 2:10-3:25pm

PROFESSOR: Clara E. Jace

EMAIL: cjace@gmu.edu

OFFICE HOURS: Wednesdays 12-2:00pm, Adjunct Faculty Offices (Econ. Department)

COURSE DESCRIPTION
Perhaps no other skill is in more demand today than the ability to grasp and communicate insights from data analysis. Students will be introduced to the tool of statistics through this semester—its various powers, its limitations, as well as its future trajectories of growth. Success in this course will mean not only a knowledge of the hard science of statistics but also of the softer art of applying it to shed light on real-world problems.

We will cover the basic elements of probability and statistics, covers descriptive statistics, elements of probability theory, properties of discrete and continuous random variables, sampling estimation, hypothesis testing, analysis of variance and regression analysis. The application of these concepts to problem solving in business and economics is emphasized.

COURSE GOALS AND GOALS FOR STUDENTS LEARNING
At the end of the course, students should be able to:
- Understand the basic terminology and concepts of probability and statistics.

- Be able to analyze data using descriptive statistics.
- Be able to work with discrete and continuous probability distributions.
- Understand sampling, sampling distributions, and variance.
- Understand how to conduct hypothesis testing.
- Know the basics of regression analysis.
- Learn how to communicate findings and the basics of data visualization.

REQUIRED TEXTS
- James et al. (2013). *Introduction to Statistical Learning*.
- Brase, Charles H., & Brase, Corrinne P. (2013). *Understanding Basic Statistics.*
- Harvard Business Review (2018). *Data Analytics Basics for Managers.*
- Muller, Jerry Z. (2018). *The Tyranny of Metrics.*

All other readings—including detailed lecture notes—will be provided during the relevant class lecture and on Blackboard as well.

COURSE REQUIREMENTS

The final grade for this course will be based on the following assignments and weights:

Assignment	Weight
Midterm Exam	*30%*
Final Exam	*30%*
Weekly Quizzes	*20%*
Book Review	*10%*
Class Participation	*10%*

- Readings for each week should be done before the Wednesday class in preparation for the lectures. To encourage you in this, we have a short weekly quiz each Wednesday on Blackboard. These will be helpful later to study from later, as they reflect the types of questions that will be on the exams.
- I am requiring you to review the book *The Tyranny of Metrics* in a 4-page essay. Though this will not be due until the end of the semester, you are most welcome to complete and turn it in earlier.
- The class participation portion of the course grade is based upon the significance and quality of your contribution to the class discussion. You are expected to be prepared for class. Students who do miss an occasional class are responsible for getting the notes and finding out what they missed.

ACADEMIC HONESTY

The university's policies and procedures for academic integrity are strict and may be found here:

- http://policies.cua.edu/academicundergrad/integrityfull.cfm
- http://policies.cua.edu/academicundergrad/integrityprocedures.cfm

Specifically, the policy states:

 "The following are the major categories of academic dishonesty:

A. Plagiarism is the act of presenting the work or methodology of another as if it were one's own. It includes quoting, paraphrasing, summarizing or utilizing the published work of others without proper acknowledgment, and, where appropriate, quotation marks. Most frequently, it involves the unacknowledged use of published books or articles in periodicals, magazines, newspapers and electronic media. However, any unacknowledged use of another's words, ideas or electronic processes constitutes plagiarism, including the use of papers written by other students, oral presentations, interviews, radio or TV broadcasts, any published or unpublished materials (including Web-based materials, letters, pamphlets, leaflets, notes or other electronic or print documents), and any unauthorized or inadequately credited use of foreign language, scientific and/or mathematical calculation and/or modeling programs or online services.

B. Improper use of one's own work is the unauthorized act of submitting work for a course that includes work done for previous courses and/or projects as though the work in question were newly done for the present course/project.

C. Fabrication is the act of artificially contriving or making up material, data or other information and submitting this as fact.

D. Cheating is the act of deceiving, which includes such acts as receiving or communicating or receiving information from another during an examination, looking at another's examination (during the exam), using notes when prohibited during examinations, using electronic equipment to receive or communicate information during examinations, using any unauthorized electronic equipment during examinations, obtaining information about the questions or answers for an examination prior to the administering of the examination or whatever else is deemed contrary to the rules of fairness, including special rules designated by the professor in the course.

E. Attempts to engage in any of the conduct described above or the facilitation of any of this conduct by another individual will be treated as conduct constituting academic dishonesty for purposes of this policy."

The following sanctions are presented in CUA procedures related to Student Academic Dishonesty: "The presumed sanction for undergraduate students for academic dishonesty will be failure for the course. There may be circumstances, however, where, perhaps because of an undergraduate student's past record, a more serious sanction, such as suspension or expulsion, would be appropriate."

MAKE-UP POLICY AND ASSIGMENT DEADLINES

Students will NOT be allowed to take an exam in advance of its scheduled date. A student who

misses a test will be allowed to write a make-up test only if s/he provides a relevant medical certificate. Late assignments will not be accepted, no extensions are granted.

CAMPUS RESOURCES FOR STUDENT SUPPORT

Any student who feels she/he may need an accommodation based on the impact of a disability should contact the instructor privately to discuss specific needs. Please contact Disability Support Services (at 202-319-5211, Room 207 Pryzbyla Center) to coordinate reasonable accommodations for students with documented disabilities. To read about the services and policies, please visit the website: http://disabilitysupport.cua.edu.

ASSESMENT

The grading scale applied to this class is as follows:

A 96-100	**C+ 71-75**
A- 91-95	**C 66-70**
B+ 90-86	**C- 60-65**
B 81-85	**D 55-59**
B- 76-80	**F 54-0**

COURSE OUTLINE AND READINGS*

Units	Dates	Topics	Readings and HW
1	Jan. 13th Jan. 15th	Introduction to statistics	• Hayek: "The Use of Knowledge in Society" • HBR Ch. 2 • Brase 1.1-1.3
2	Jan. 20th Jan. 22th	No class (MLK holiday) Descriptive statistics	• HBR Ch. 3 • Brase 3.1-3.2
3	Jan. 27th Jan. 29th	Probability & distributions	• Brase 2.1 • Brase 5.1-5.2
4	Feb. 3rd Feb. 5th	Random variables & introduction to R	• Brase 6.1 • R introduction videos
5	Feb. 10th Feb. 12th	Sampling estimation	• Brase 7.1-7.5
6	Feb. 17th Feb. 19th	Hypothesis testing	• Brase 9.1-9.2
7	Feb. 24th Feb. 25th† Feb. 26th	Midterm exam Review exam	
8	Mar. 2rd Mar. 4th	Correlation & causation	• James et al. Introduction – 2.3
	Mar. 9th Mar. 11th	No classes (spring break!)	
9	Mar. 16th Mar. 18th	Univariate regression analysis	• James et al. 2.3 – 3.2
10	Mar. 23th Mar. 25th	Multivariate regression analysis	• James et al. 3.2 – 3.7 • Arruñada: "Protestants and Catholics: Similar Work Ethic, Different Social Ethic"
11	Mar. 30th Apr. 1st	Prediction & time series	• HBR Ch. 13 • Brase 8.1
12	Apr. 6th Apr. 8th	Data communication & visualization	• HBR Ch. 17-19 • Chetty: "Reviving the American Dream: Lessons from Big Data"

* As a roadmap for our class, this is subject to revision as we progress.
† Technically this is an administrative Monday, but we will not meet for class. You are encouraged to begin reading for your book review assignment.

13	Apr. 13th Apr. 15th	No class (Easter Monday) Real-world applications	• Lazear: "Balanced Skills and Entrepreneurship" • Liang et al.: "Demographics and Entrepreneurship"
14	Apr. 20th Apr. 22nd	The future of data: Big Data & machine learning	• HBR Ch. 11-12 • Book review of *The Tyranny of Metrics* due
15	Apr. 27th Apr. 29th	Review for final No class (Reading Day)	
	Week of May 5th	Final exam period	