Econ 138: Data Science for Economists

Second Semester, AY 2024-25

Instructor:	Roxanne Ballo	**Time:**	W 1730 - 2030
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Office Hours: By appointment

Objectives: This course aims to equip undergraduate economics students with foundational skills in data science, focusing on Python programming and econometric methods as essential tools for analyzing and interpreting real-world economic data. By the end of the course, students will:

1. Develop proficiency in Python for data wrangling, visualization, and statistical analysis.
2. Explore data science concepts such as machine learning and geospatial analysis to broaden their analytical toolkit.
3. Collaborate on a capstone project that integrates data science techniques to solve complex economic problems.

Prerequisites: An undergraduate-level understanding of probability, statistics, microeconomics, and econometrics.

Tentative Course Outline:

- **Module 0. Week 1: January 22**
  a. Introduction to the course and syllabus
  b. Introduction to Python [3] [5]
- **Module 1. Week 2: January 29**
  a. Basics of Python and Object-Oriented Programming [6]
  b. Coding Basics and Style [6] [4]
  c. Version Control and Git [6]
- **Module 2. Weeks 3-7: February 5 to March 5**
  a. The Data Frame Object [6] [7]
  b. Data Wrangling and Exploratory Data Analysis [3] [7]
  c. Data Visualization [3] [7]
- **Midterm Exam. Week 8: March 12**
- **Module 3. Weeks 9-11: March 19 to April 2**
  a. Econometrics using Python [6] [1]
  b. Machine Learning [2]
- **Reading Break. Weeks 12-13: April 9 and April 16**
- **Module 4. Weeks 14-15: April 23 to 30**
  a. Geospatial Mapping and Analysis
  b. Demand estimation
- **Capstone Project Presentation. Week 16: May 7**

Important Dates:

Problem Set 1 ..... February 14
Problem Set 2 ..... March 14
Problem Set 3 ..... April 11
Problem Set 4 ..... May 9
Midterm Exam ..... March 12
Submission of Group Members for Capstone Project: March 14
Submission of Proposed Capstone Project: .... April 11
Submmission of Draft Capstone Project ..... May 5
Capstone Project Presentation ..... May 7
Subission of Capstone Project Write-up ..... May 16

Grading Policy: Problem Sets (40%), Midterm Exam (20%), Capstone Project (40%).

Score	Grade Equivalent
92 – 100	1.0
88 – below 92	1.25
84 – below 88	1.5
80 – below 84	1.75
76 – below 80	2.0
72 – below 76	2.25
68 – below 72	2.5
64 - below 68	2.75
60 – below 64	3.0
Below 60	5
Missing or Unsatisfactory Requirement	INC

Course Policy:

- **Learning Management System (LMS):** The course LMS will be hosted on *GitHub Classroom*. Students are required to create their own GitHub accounts. The beadle will submit a list of all students' GitHub accounts, student numbers, and email addresses to the lecturer by **January 29, 2025**, to ensure proper enrollment in GitHub Classroom.
- **Announcements:** Announcements will be primarily sent via an official email list, with the beadle as a secondary channel for communication.
- **Safe Space Policy:** This class is a safe and inclusive space for learning. Discrimination, bullying, and harassment will not be tolerated. Refer to the *UP Gender Guidelines* (https://up.edu.ph/

up-gender-guidelines-2/) for additional rules. As a public university, UP upholds the dignity and rights of all individuals, fostering a community where diversity is celebrated and respected, regardless of sex, gender, marital or parental status, sexual orientation, or gender identity.

- **Attendance Policy:** Attendance will be checked before the 15-minute midclass break. Students are expected to attend and fully participate in all class activities.
- **Beadle System:** A beadle will be appointed to facilitate communication, manage administrative tasks, and liaise between the class and the instructor. Specific responsibilities include:
  - Collecting and submitting GitHub account details.
  - Reminding the instructor of announcements or recording requirements.
  - Reporting concerns or deviations from the syllabus.

Academic Integrity Policy:

- The course adheres to the *2012 Code of Student Conduct* of UP Diliman. Academic dishonesty, including cheating and plagiarism, will result in disciplinary action.

Submission Guidelines:

- All submissions must follow the format: [***Deliverable***]_**Surname.ipynb**.
- Assignments and projects must be submitted via GitHub Classroom unless specified otherwise.

Missed Deliverables or Exams Policy:

- If a student misses a deliverable or exam, they must notify the instructor or beadle within **two days** of the scheduled date.
- A make-up exam may be granted for valid reasons, such as medical emergencies.
- Failure to meet the deadline without valid reasons will result in a grade of zero.

References

[1] Florian Heiss and Daniel Brunner. *Using Python for Introductory Econometrics*. 1st. 2020. URL: https://www.urfie.net/downloads/PDF/UPfIE_web.pdf.

[2] Gareth James et al. *An Introduction to Statistical Learning with Applications in Python*. Springer, 2023. URL: https://hastie.su.domains/ISLP/ISLP_website.pdf.download.html.

[3] Wes McKinney. *Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter*. 3rd. Comprehensive guide to data analysis in Python, covering pandas, NumPy, and Jupyter Notebook. O'Reilly Media, 2022. URL: https://wesmckinney.com/book/.

[4] Guido van Rossum, Barry Warsaw, and Nick Coghlan. *PEP 8: Style Guide for Python Code*. 2001. URL: https://peps.python.org/pep-0008/.

[5] Joey Gonzalez Sam Lau and Deb Nolan. *Learning Data Science*. O'Reilly Media, 2023. URL: https://learningds.org/intro.html.

[6] A. E. Turrell. *Coding for Economists: A Gentle Introduction to Programming and Data Analysis in Economics*. 2024. URL: https://aeturrell.github.io/coding-for-economists/intro.html.

[7] Jake VanderPlas. *Python Data Science Handbook: Essential Tools for Working with Data*. O'Reilly Media, Inc., 2016.