SYLLABUS

Course: Python and Data Science for Economics
Textbooks/Resources:
A First Course in Quantitative Economics with Python (Sargent, Stachurski)
Python Data Science Handbook
Data Visualisation with Python

Textbooks are for reference only and physical copies need not be purchased. The online versions of all of these are available for free.

Motivation:
Modern economic analysis is heavily reliant on data and computational resources. It is critical to be able to make the best use of these resources in order to be able to solve problems of practical as well as academic relevance. This course is meant to bridge the gap between theory and practice using Python, arguably the most important programming phenomenon of our generation. Students will learn to utilize the vast resources of Python and also revisit the core concepts of statistical and economic analyses with this course.

Modality and Logistics:
The course will be taught through lectures twice a week of 1.5 hrs each. Students may opt to attend lectures virtually or in-person. Lecture videos shall also be posted along with slides and other teaching materials each week.

There will be worksheets and assignments to be completed and submitted every week for evaluation. There will be a final project to be completed in groups of 4/5 students. The groups are to be formed autonomously but in case of mismatches, the instructor may intervene and re-arrange them.

Students may discuss anything relevant to the course outside class during either the Office Hours (Mon, Thu 10-11.30 am) or may set up a time via email.

Classes: Tue, Fri 2-3.30 pm, BRB 1.102 (map link)
Zoom link:
Course discord:

Grading:
There will be a total of 8 assignments in this course. The assignments will have both analytical and programming components. For the programming parts, the codes may be e-mailed to me or submitted to Canvas. For the analytical portion, you may submit the assignments in-class or submit screenshots on Canvas. You are encouraged to work independently but discuss with your peers and instructors if need be.

Each assignment must be submitted at the latest by the Friday 11.59 pm of the corresponding week. Assignments may be accepted up to one week after the due date but would incur 10% penalty.

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The final-grade weightage for the assessments is as follows:

1. Assignments (8) - 40%
2. Project - 60%

Project Evaluation:
The project would be due the last Friday before the Finals week. A group member must submit the Github link to the project complete with the README file detailing the scope and the details of the project. There will be group presentations during the finals week.

The projects will be scored on:

1. Originality
2. Execution of coding and Analysis
3. Presentation of results
4. Clarity of concepts and code

Course Outline:

The goal of this course is to introduce Master's level students to programming and data analysis in Python, revisit some core concepts in data science and bayesian statistics and then apply them to real-world problems.

Learning outcomes:

At the end of this course, the student is expected to be proficient in:
(i) Basic programming in python
(ii) Using Python data structures effectively
(iii) Practical application of statistical inference in economic and business problems

And develop intermediate skills in:
(i) Mathematical modeling
(ii) Solving economic models
(iii) Application of linear algebra
(iv) Optimization
(v) Statistics theory

Course Timeline

Week 1&2
Programming in Python
Control flow, Variable typing, I/O in Python, Shell scripting, Using git and GitHub
Week 3&4
Data Structures in Python, Introduction to Data Analysis with Pandas, Causal inference in Python, Monte Carlo methods

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Week 5&6
Basics of statistical modelling, Likelihood Hypothesis testing, Model selection, Estimating regression models, Panel estimation, k-means clustering/regression,

Week 7&8
State space models, Time series models, Markov Processes (Optional),
Kalman Filtering, Markov Chain Monte Carlo methods

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