



THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學



PolyU 理大商學院
Business School
Innovation-driven Education and Scholarship

School of
**ACCOUNTING
& FINANCE**
會計及金融學院

Week 13: La Dernière Classe - Final Exam Review

AF3214 Python Programming for Accounting and Finance

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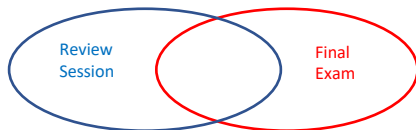
R508, 8:30 am – 11:20 am, Wednesdays, Semester 2, AY 2024-25

Overview

- The Final Exam Schedule and Venue:

2 May 2025 (Friday), 8:45 - 11:45, QR403

- Please bring along your laptop's power adaptors. It is your own responsibility to have a well-functioning laptop.
- Final Exam covers both lecture slides and Jupyter Notebook scripts.
- In this review session, we will touch upon important topics taught from Week 1 to Week 12 and will not go into details.
- Caveat: Not every topic covered in this review session will be in the exam; not every topic in the exam will be from this review session.
- Open Book Open Computer Open Internet.
- **Per AR request, No web-based Generative AI (GenAI) tools can be used during the final exam.**



Question Types

- Three Parts, total 100 points:

1. Part One: Multiple Choices (10 points)

- 10 questions, 1 point each
- one and only one correct answer for each question

2. Part Two: True/False (10 points)

- 10 questions, 1 point each
- if False, to explain why. w/o or wrong explanation, receive only 0.5 point

Summarize your Part One & Part Two answers in the designated area.

3. Part Three: Short Answer Questions (80 points)

- 5 questions; total points vary for each question
- may have sub-questions for each short answer question
- only key code block(s) are needed for each (sub)question
- no extra answer book will be provided

General Rules of Final Exam

1. Generative AI tool is **not** allowed for this final exam.
 2. Cellphones, iPads, smart watches, earphones, any instant P2P communication software applications, and E-mails are **not** allowed.
 3. You are **not** allowed to discuss with anyone or share any information about this exam with anyone.
- **You will receive an F and will be subject to disciplinary action if you violate above rules in any way.**
 - **Please bring your student ID or HKID.**

Week 1-4

- Python Bootcamp covers everything taught from slides and demos from Jupyter Notebook.
- Note that some Python packages/modules, functions, and APIs to appear in the final exam may not be 100% covered in our class.
- Topics include but are not limited to:
 - Arithmetic and logical operators, Python data types and their conversion, local and global variables
 - Manipulating strings, Functions definition and writing
 - Basic statistics
 - List, Dictionary, try/except error, for loop, while loop, if/else statement
 - Importing packages/modules, read/write files, convert a file into a list/dictionary
 - Pandas dataframes (series, dataframes, data indexing and selection, grouping, concatenate and merge, read/write files from/into dataframe, basic plotting)
 - Database not required.

Week 6

- Cornerstones of scientific computing: replication and reproducibility
- Types of data:
 - Cross-sectional
 - Time series
 - Panel
- Another classification of data types
 - Quantitative: prices, balance sheets, forecasts, etc.
 - Qualitative: news, managerial discussions, meeting transcripts, etc.
- Log returns: $\ln(P_t) - \ln(P_{t-1})$
- Simple returns: $(P_t - P_{t-1})/P_{t-1}$
- Descriptive statistics
 - Mean/average
 - Mode
 - Median
 - Variance
 - Standard deviation (volatility)
 - Correlation matrix

Week 6

- HTTP
 - The standard protocol for transferring web pages and content across the internet
- HTTP Request
 - Request Line
 - Headers
 - Optional Body of Request
- Request Line
 - GET – request data from a specified source; can be cached; should not be used when sending sensitive data; length restriction
 - POST - send data to a server to create/update a resource; not cached; no restriction on length
- Header
 - HTTP Request contains zero or more Headers
 - Between Request Line and Request Body
 - Pass additional information about the request to the server

Week 6

- Request Body
 - Optional
 - Send additional information required by the server to process current request properly
- HTTP Response
 - Packet of information sent by Server to the Client
 - Status Line
 - Headers
 - Optional Body
- Status Line: status code (200, 300, 400, 404, 500...)
- Python Request
- Beautiful Soup
- API

Week 7 - Take Home Lecture Notes

- Assets
 - Stocks
 - Bonds
 - Options
 - Forex
 - ETF
 - Cryptocurrency
- Market Players
 - Exchanges
 - Broker/dealer
 - Buy-side/Sell-side
- Execution Methods
 - Algorithm
 - Direct Market Access (DMA)
 - Sponsored Access

Week 7 - Take Home Lecture Notes

- Algorithm
 - A set of instructions for accomplishing a given task
 - 1st gen – TWAP, VWAP
 - 2nd gen – Transaction costs analysis (price and risk sensitive)
 - 3rd gen – Search for liquidity, electronic crossing networks (matches buy and sell orders electronically for execution without first routing the order to an exchange or other displayed market)
- DMA
 - Investors and buy-side traders can get direct access allowing them to place orders on many of the worlds' financial marketplaces
 - With DMA, the client can take advantage of the broker's infrastructure to send their orders to the exchange.
 - A key concern is leaking of information; therefore DMA services are run by brokers as a separate entity to protect client orders from being viewed by the rest of the broker's traders

Week 7 - Take Home Lecture Notes

- Sponsored Access
 - Similar to DMA, but it allows clients to connect directly to the market using the broker's trading identifier, but allowing them to use their own infrastructure
 - This allows high-frequency trading strategies that need ultralow latency connections to execute
- Primary Market
- Secondary Market
- Liquidity
 - Depth – total quantity of buy and sell orders
 - Tightness – bid-ask (offer) spread
 - Resilience – how quickly the market recovers from a shock
- Quote-drive and Order-driven market
- Trading frequency
 - Continuous
 - Periodic
 - Request-driven

Week 7 - Take Home Lecture Notes

- Market order
 - Demands Liquidity
 - Require immediate trading at the best price available
- Limit order
 - Provides liquidity
 - Standing orders with inbuilt price limits, which must not be breached
- Duration
- Fill instructions
 - Immediate-or-cancel (all or part, immediately)
 - Fill or Kill (all, immediately)
 - All-or-none (all, no requirement for immediacy)
- Preference and directed orders
- Routing instructions
 - Do-not-route
 - Directed-routing
 - Intermarket sweep

Week 7 - Take Home Lecture Notes

- Transaction costs
- Investment-related: Taxes, delay cost, opportunity cost
- Trading-related
 - Spreads
 - Market impact
 - Price trend
 - Timing risk
 - Opportunity cost
- Pre-trade analysis
 - Price data
 - Liquidity data
 - Risk data
 - Expected difficulty of trading
 - Potential transaction costs
- Post-trade analysis
 - Execution performance and cost measurement

Week 7-9

- Risk and Return
 - *Realized Return*
 - *Expected Return*
 - *Excess Return*
 - *Risk Premium*
 - Mean, Variance, Standard Deviation
 - Correlation
- Properties for Efficient Markets
- Categories of Risk
 - Systematic Risk
 - Unsystematic Risk
- Common Risk Measures
 - Standard Deviation, Alpha, Beta
- Risk-Return Tradeoff
- Managing Portfolio
 - Value of portfolio, weights calculation, types of portfolio

Week 7-9

- Risk and Return
 - Variance
 - Standard Deviation
 - Covariance
 - Correlation
- Difference between Variance and Standard Deviation
- Covariance Matrix and Formula
- Correlation Matrix and Formula
- Portfolio Returns:
 - weighted average of the individual asset return
- Modern Portfolio Theory
 - Expected return of portfolio
 - Variance and volatility of portfolio
 - Correlation of portfolio
 - Efficient Frontier
 - Sharpe Ratio

Week 10

- Machine Learning
 - Difference between AI, machine learning, deep learning
 - Unstructured and Structured Data
 - Supervised vs unsupervised learning
 - Classification and clustering
 - What are features?
 - Overfitting
 - Confusion Matrices
 - "false positives" versus "false negatives"
 - "true positives" versus "true negatives"
 - Sensitivity, Specificity, Positive Predictive Value
 - Machine Learning Python demo not required.

- Textual Analysis

- What is textual analysis
- What is NLP
- Differences between textual analysis and NLP
- Text Data Readability

- Large Language Models - LLM

- What is LLM
- What are parameters
- What is neural network
- What are the steps to train a GenAI

eSFQ - Electronic Student Feedback Questionnaire System

<https://esfqprod.polyu.edu.hk/esfqstud/login.zul>



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