QF635 - Introduction to Market Microstructure and Algorithmic Trading

MSc in Quantitative Finance (MQF), 2024

Module Objectives:

Electronic trading is central to financial markets and this course is designed to cover the following concepts and skills:

- Market microstructures and mechanics of order book construction
    - Market liquidity
    - Price discovery
- Types of algorithmic trading and high-frequency trading strategies
- Requirements and design of a real-time trading system
- Exchange connectivity and application programming interface (API)
- Programming in Python using financial and trading packages
- Modern trading framework by asynchronous event processing
- Formulate and quantify trading ideas to form a strategy
- Analytics, orders, positions and risks
- Backtesting and strategy performance evaluation

Suggested Readings

Market Liquidity: Theory, Evidence, and Policy by Thierry Foucault, Marco Pagano and Ailsa Röell (2013)

Flash Boys: A Wall Street Revolt by Michael Lewis (2015)

Group Assignments

Students will form <u>teams of four</u> to work collaboratively on a group assignment to develop an algo trading strategy. Each group will research, design, code and evaluate performance of a trading strategy. Final submission shall include a short <u>presentation</u> in class and a Gitlab repository link to <u>codes</u>.

Trading Mechanism of Financial Securities

- Trading vs investing
- Trading purpose
- Public trading vs private trading
- Manual trading vs automated trading
- Human vs computerized trading
- Market is hybrid - search, bargaining, auctions, dealer markets, exchange-traded
- There are many prices - depending on sizes, locations, time of day, direction (buy or sell), speed of execution, relationship (price tiers)
- Liquid vs illiquid markets
- Trading frequencies (yearly, quarterly, monthly, weekly, daily, hourly, minutes, seconds, milliseconds)
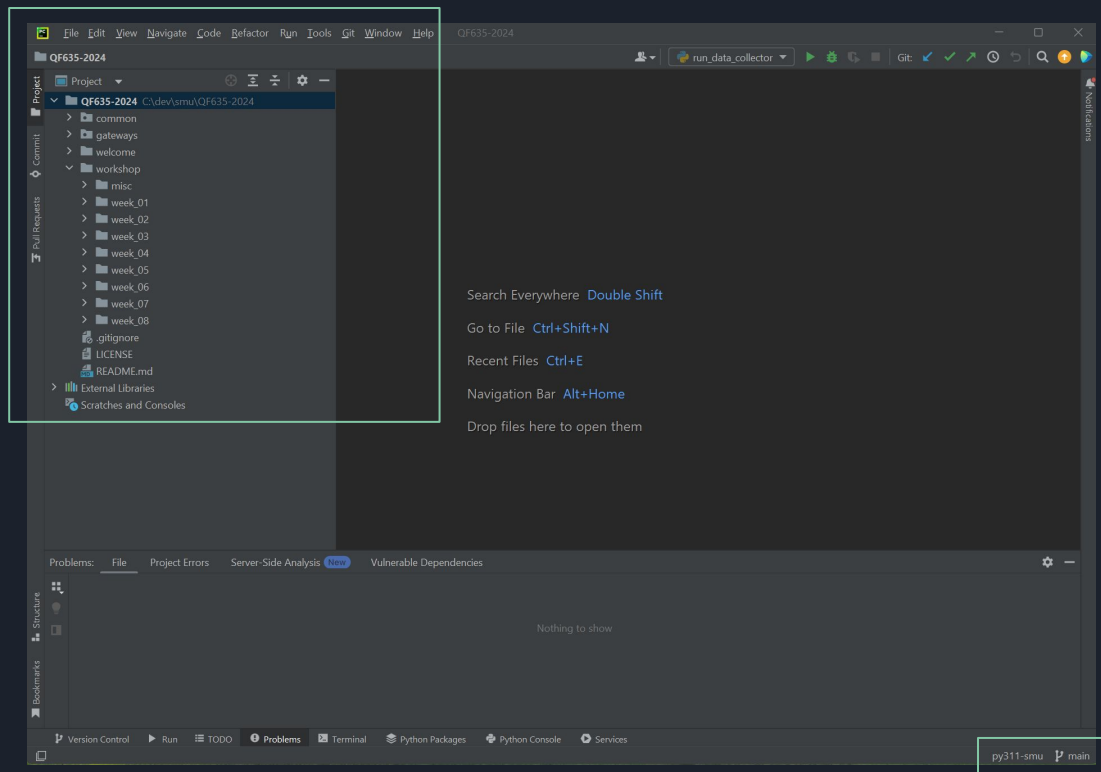
Programming Notes

Code repository and setup instructions are here:

https://github.com/aiver-workshop/QF635-2024

Install the following software:

1. PyCharm (community edition) - https://www.jetbrains.com/pycharm/
2. Anaconda - https://www.anaconda.com/
3. Git - https://git-scm.com/

PyCharm

Open a testnet account with APIs access

WARNING:

Opening a testnet account that supports APIs access is strictly for education purpose. This is not a financial advice nor endorsement of any trading exchanges. No party will be held liable to any losses or damages resulting from the use of the information presented in this course.

Classroom exercises: week_01

- Debugging your first program
- Variables
- Functions
- List
- Dictionary
- Working with JSON data