ACCT 4720: Equity Investment with Machine Learning

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Course Description

The objective of the course is to familiarize students with theories and techniques of equity analysis with machine learning. This course is designed for students with an interest in the asset management business and equity investing, especially for those who aspire to learn the application of quantitative and machine learning methods in the asset management industry. The course will cover a wide range of topics in equity investing, including active vs. passive investing, quantitative investment process, multi-factor stock-selection models, portfolio construction methods, performance evaluation, and applications of AI/machine learning technology in equity investing. This is a very hands-on course. Students will be required to evaluate, design, build and backtest equity investment strategies. We will also read a number of research studies and books and integrate the insights into their strategies. There is no final exam. However, there will be a number of assignments and a final project.

About the Instructors

Professor You is a Professor of Accounting and Co-Director of Center for Securities Analysis with Financial Technology at HKUST. He holds a PhD degree in Accounting from University of California, Berkeley. Prior to joining HKUST, he worked at the quantitative equity investment team at Barclays Global Investors (BGI). He also served as the Director of Quantitative Equity Research at China Investment Corporation, helping the sovereign wealth fund develop global and Asian quantitative equity strategies.

Course Learning Outcomes

On completion of the course, students will be able to:

1. Understand the current landscape and challenges of the asset management industry
2. Understand the philosophy, theory, and process of quantitative equity investing.
3. Evaluate the performance of equity funds and investment strategies.
4. Be familiar with multifactor stock-selection models.
5. Understand the potential applications of machine learning technology in equity investment.
6. Design and develop quantitative investment strategies.
7. Conduct backtests on quantitative strategies and evaluate their performance.

Reading and Supplementary Materials

PowerPoint slides will be provided on canvas (http://canvas.ust.hk) the day before class or earlier.

Required Textbook: *Quantitative Analysis and Machine Learning for Equity Investing*, Wiley, 2020 (https://w5.ab.ust.hk/cgi-bin/std_cgi.sh/WService=broker_ba_p/prg/ba_stdt_main.r)

Recommended Reading (for reference only):

Factor Investing, From Traditional to Alternative Risk Premia, by Emmanuel Jurczenko, Elsevier, 2017.

(Digital copy available via HKUST Library: https://ebookcentral.proquest.com/lib/hkust-ebooks/detail.action?docID=5104284)

Big Data and Machine Learning in Quantitative Investment, by Tony Guida, Wiley, 2019.

(Digital copy available via HKUST Library: https://onlinelibrary.wiley.com/doi/book/10.1002/9781119522225)

An Introduction to Statistical Learning, 7th edition, by Gareth Jame, Daniela Witten, Trevor Hastie, and Robert Tibshirani, Springer, 2013.

(http://faculty.marshall.usc.edu/gareth-james/ISL/ISLR%20Seventh%20Printing.pdf)

Big Data and AI Strategies, Machine Learning and Alternative Data Approach to Investing, by Markov Kolanovic and Rajesh T. Krishnamachari, JP Morgan, 2017.

(https://www.cfasociety.org/cleveland/Lists/Events%20Calendar/Attachments/1045/BIG-Data_AI-JPMmay2017.pdf)

Assessments

Students taking this course will be assessed by their class participation, quality of assignments, a final group project (presentation and written report), and peer evaluation of their contribution to the group assignments and final project.

Class participation will be mainly assessed by students' involvement in in-class discussion.

There will be several individual assignments and one final project. They are intended for helping students to consolidate the knowledge learnt and to apply it in a real-life context. The assignments will be due one day before the designated class.

For the final project, students are expected to work into groups.

Weightings allocated to different modes of assessment are as follow:

Class participation & presentations	15%
Assignments	40%
Final Group Project	40%
Peer Evaluation	5%
Total	100%

Academic Integrity

The University places a strong emphasis on academic integrity and has introduced regulations to back this up. To help students to understand the policy, a website has been established that explains the regulations, provides assistance for students in avoiding plagiarism. Please visit the website at http://tl.ust.hk/integrity.

Tentative Schedule (Subject to Change)

	Topics	**Readings**	**Assignments**
6-Feb	Introduction		
8-Feb	Overview and Passive Investing	eBook: Passive Equity Investing	Assignment 1
13-Feb	Fama and French Models & Factor Investing Case	eBook: Using Multifactor Models	Assignment 2*
15-Feb	Multifactor Models		Assignment 3
20-Feb	Application of Multifactor Models	Paper: Fama and French (2020)	Assignment 4
22-Feb	Smart Beta Strategies		
27-Feb	Review of Active Equity Strategies	eBook: Active Equity Investing: Strategies	Assignment 5
1-Mar	Factor Evaluation and Identification	Paper: Sloan (1996)	Assignment 6*
6-Mar	Value & Profitability	Paper: Bartram and Grinblatt (2018)	Assignment 7*
8-Mar	Accounting Quality	Paper: Beneish, Lee and Nichols (2013)	Assignment 8
13-Mar	Fundamental Momentum & Overinvestment		
15-Mar	Investor Recognition	Paper: Richardson, Sloan and You (2012)	Assignment 9*
20-Mar	Portfolio Construction	Paper: Elavia, Kothari, Li and You (2020)	Assignment 10*
22-Mar	Linear Machine Learning Models	eBook: Machine Learning (p. 463-477)	
27-Mar	Overfitting		Assignment 11
29-Mar	Application in Sector Rotation	Paper: Rapach, Strauss, Tu and Zhou (2019)	Assignment 12*
3-Apr	Logistic Regression and ANN		
12-Apr	Decision Tree (CART)		
17-Apr	Application in Style Timing	Paper: Miller, Ooi, Li and Giamouridis (2013)	Assignment 13*
19-Apr	Bagging, Random Forest and Boosting	eBook: Machine Learning (p. 481-484, 499-502)	Assignment 14
24-Apr	Support Vector Machine	Paper: Rasekhschaffe and Jones (2019)	Assignment 15*
26-Apr	Application in Fundamental Analysis	Paper: Cao and You (2020)	Assignment 16*
3-May	Alternative/Big Data	eBook: Big Data Projects	Assignment 17*
8-May	Final project presentation		