IEDA4520 Numerical Methods for Financial Engineering

Instructor:	Prof. Xiaowei Zhang	**Office hour:**	By appointment
Email:	xiaoweiz@ust.hk	**Office:**	5541

Topics

- Monte Carlo simulation
  - Principles of MC methods and derivatives pricing
  - Generating sample paths
  - Variance reduction techniques
  - Estimation sensitivities
  - Nested simulation for risk management
- Machine learning methods
  - CAPM and multi-factor models
  - Regularized linear regression, tree-based methods, kernel methods
  - Applications in asset pricing
- Time series models
  - Exponential smoothing
  - Autogressive models
  - Moving average models

Programming

We will be using R for instruction, but Python is also acceptable for homework assignments and projects.

Reference Books

- Paul Glasserman (2003). *Monte Carlo Methods in Financial Engineering*, Springer.
- Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani (2021). *An Introduction to Statistical Learning*, 2nd edition, Springer. (`https://www.statlearning.com/`)
- Rob J. Hyndman and George Athanasopoulos (2021). *Forecasting: Principles and Practice*, 3nd edition, Otexts. (`https://otexts.com/fpp3/`)

Assessment

- Homework assignments (30%)
- Midterm exam (30%)
- Group project (40%)

Logistics

- Lectures: Monday and Wednesday 9:00–10:20am, Room 5508 (Lift 25-26)
- Tutorials: Tuesday (once every two weeks, 6 times in total) 4:30–5:20pm, Room 3207 (Lift 21)