NAME COURSE: Market Microstructure — Theory and Practice

<div align="center">**CONTENT PROGRAMME**</div>

Content

Description of the programme	This course provides a concise introduction to the field of Market Microstructure, which studies how prices, quotes, and trades interact on a high-frequency time scale. The course will start with a brief review of how the organization of financial markets has changed dramatically over the last decades, moving from discretionary actions of human "pit traders" to a complex fragmented landscape of electronic limit order books, where a lot of activity is carried out by efficient algorithms. The course will then cover a number of basic equilibrium models that allow to understand some of the key economic tradeoffs in this context, such as asymmetric information, inventory risk, and their implications both for liquidity providers and liquidity takers. To provide an introduction of how these basic principles can be leveraged in practice, the second part of the course then moves on to state-of-the art reduced form models that can be used for the quantitative analysis of problems such as optimal trading or market making. We will review some of the analytical and numerical tools that are available in this context, and will also discuss how to fit such models to real price and trading data.
Subjects / learning objectives	-Learn about the setup of today's electronic markets. -Understand basic economic tradeoffs such as adverse selection and inventory management, and their implications for price formation, liquidity provision, and trading on proprietary information. -Learn how to implement and leverage these ideas using quantitative "reduced form models" for market making and optimal trading. -See how the models can be calibrated to real trading data

Lecturer(s) of the programme

Lecturer(s)/speaker(s)	Johannes Muhle-Karbe is the of Head of the Mathematical Finance Section in the Department of Mathematics at Imperial College London, and the Director of the CFM-Imperial Institute of Quantitative Finance. He held faculty positions at Carnegie Mellon University, University of Michigan, and ETH Zürich. Widely recognized for his influential publications in leading finance journals, Johannes Muhle-Karbe has been a guiding force in advancing the field of market microstructure theory. With an international reputation for delivering keynote addresses at esteemed conferences worldwide, Johannes Muhle-Karbe bridges theory and practice on a global scale.

Target group	Academic researchers, Master students from SFM and computational finance
Level	Master
Required prior knowledge?	Bachelor in Mathematics, statistics, econometrics or actuarial sciences.

Practical information

Date(s)	Tuesday 28 May, 9:00 -12:00 and Wednesday 29 May, 9:00 - 12:00
Duration *(days, weeks)*	2 times two days
Registration fee	500 Eur for early bird registrations (before April 30) 600 Eur for late bird registrations (after April 30) For registration send an e-mail to: a.khedher@uva.nl

Detailed description of the content of the course:

Block 2: Actionable Models

- Reduced-form models for price impact.
    - The models of Almgren and Chriss (2001) and Obizhaeva and Wang (2013).
- Solution without stochastic control.
    - Even with practically important features like alpha signals, time-varying liquidity, concave impact
    - Based on Muhle-Karbe, Wang and Webster (2023), Hey, Mastromateo, Muhle-Karbe and Webster (2023)
- Model fitting with real data.
    - Results using the public trading tape (Muhle-Karbe, Wang and Webster, 2023)
    - Result using proprietary metaorders (Hey, Mastromateo, Muhle-Karbe and Webster, 2023)
- Applications beyond optimal trading.
    - Illusionary profits in risk management (Kolm and Webster, 2023)
    - Pre-hedging of client orders (Muhle-Karbe and Oomen, 2023)

References:
- Almgren and Chriss (2001): Optimal execution of portfolio transactions. Journal of Risk 3:5 − 40.
- Hey, Mastromatteo, Muhle-Karbe and Webster (2023): Trading with Concave Price Impact and Impact Decay - Theory and Evidence. Preprint.
- Kolm and Webster (2023): Do you really know your P&L? The Importance of impact-adjusting the P&L. Preprint.
- Muhle-Karbe, Wang and Webster (2023): Stochastic Liquidity as a Proxy for Nonlinear Price Impact. Operations Research, to appear.
- Muhle-Karbe and Oomen (2023): Pre-hedging. Preprint.

- Obizhaeva and Wang (2013). Optimal trading strategy and supply/demand dynamics. Journal of Financial Markets 16(1):1–32, 2013.
- Webster (2023): Handbook of Price Impact Modeling. CRC Press, Boca Raton, FL.