

FE 570 Market Microstructure - Course Syllabus



FE570 - Market Microstructure (A/WS)

School of Business

Fall 2023

Instructor: Dan Pirjol

Canvas Course Address: <https://sit.instructure.com/courses/68619/>

Course Schedule: Monday 6:30-9:00 pm.

WS section: Lectures will be broadcast at this time also on Zoom, and will be recorded. There is no attendance requirement for the WS section.

Contact Info: dpirjol@stevens.edu (<mailto:dpirjol@stevens.edu>.)

Virtual Office Hours: Monday 2:00-3:00pm (tentative)

Virtual session URL: Zoom link available in the Canvas shell

TA: TBD

COURSE DESCRIPTION

This course offers an overview of the modern financial markets for equities and futures, the main types of traders and order types.

The course is divided into two parts:

- The first part covers market mechanisms, orders and their properties, empirical properties of microstructure markets with special emphasis on volatility and liquidity.
- The second part covers the main market microstructure models used for describing price formation: zero-intelligence models, sequential and information-based models, and limit-order book models.

STUDENT LEARNING OUTCOMES

After successful completion of this course, students will:


1. Understand the functioning of the financial markets: types of markets and orders.
2. Understand the concept of liquidity in financial markets, and its importance for the functioning of the financial markets.
3. Have an understanding of the empirical facts of the market microstructure, and models of market microstructure: Roll model of trade prices, inventory models, and information-based models.
4. Be familiar with the main types of trading strategies using intraday data: optimal execution, market making and some arbitrage strategies.

COURSE FORMAT AND STRUCTURE

The course is delivered in person, once a week on Mondays 6:30 - 9:00pm. Lecture slides and additional reading material (as needed) will be posted on Canvas prior to the lecture.

Attendance will be taken for Section A using the code in Canvas. At the beginning of each class I will communicate the code which you have to enter into Canvas.

For section WS attendance on Zoom is not mandatory, although you are welcome to attend in person, space permitting.

To access the course, please visit stevens.edu/canvas  (<http://stevens.edu/canvas>). For more information about course access or support, contact the TRAC by calling 201-380-6599 or 201-216-5500.

Course Logistics

Deadlines are an unavoidable part of being a professional and this course is no exception. Course requirements must be completed and posted or submitted on or before specified due date and delivery time deadline. Due dates and delivery time deadlines are defined as Eastern Time (as used in Hoboken, NJ).

Instructor's Online Hours

I will be available via email and will respond generally within 24-48 hours.

Virtual Office Hours

Virtual Office Hours are a synchronous session (through Zoom) to discuss questions related to weekly readings and/or assignments. The day will be established after the first week of classes. To connect to the weekly session, click on Zoom and click on Join.

Online Etiquette Guidelines

Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Our differences, some of which are outlined in the University's inclusion statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambience. Please read the Netiquette rules for this course:

- Do not dominate any discussion. Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Keep an open mind and be willing to express even your minority opinion.
- Think and edit before you push the "Send" button.
- Do not hesitate to ask for feedback.

COURSE SCHEDULE

Date	Topics	Reading
Week 1	Introduction to financial markets	Harris Ch. 1,3
Week 2	Modern financial markets and their stylized facts	Hasbrouck Ch. 1,2 FPR Ch. 1
Week 3	Orders and their properties	Harris Ch. 4,6,7
Week 4	Empirical properties of microstructure data and liquidity	Harris Ch. 19,20 FPR Ch. 2
Week 5	The Roll model of trade prices	Hasbrouck Ch. 3
Week 6	Volatility: Estimation and forecasting	Readings to be provided
Week 7	Microstructure models I: Zero Intelligence Models	Readings to be provided
Week 8	Midterm exam	
Week 9	Microstructure models II: Sequential and Information-based models	Hasbrouck Ch. 5 (Glosten-Milgrom model), Ch. 6
Week 10	Microstructure models III: Strategic and Inventory models	Hasbrouck Ch. 7 (Kyle model)
Week 11	Microstructure models IV: Limit Order Models	Hasbrouck Ch. 12,13 (Parlour model)
Week 12	Optimal Order Execution	Schmidt Ch. 12,13
Week 13	Arbitrage Trading Strategies	Schmidt Ch. 11
Week 14	Market Making Models	Readings to be provided

COURSE MATERIALS

Textbooks:

Joel Hasbrouck, *Empirical Market Microstructure*, Oxford University Press, 2007

T. Foucault, M. Pagano and A. Roell - *Market Liquidity - Theory, Evidence and Policy*, 2013

Selected chapters from Foucault, Pagano, Roell will be provided.

Additional readings will be provided in Canvas.

Recommended:

Larry Harris, *Trading and Exchanges: Market Microstructure for Practitioners*. Oxford University Press 2002

Anatoly B. Schmidt, *Financial Markets and Trading: An Introduction to Market Microstructure and Trading Strategies*, Wiley, 2010

COURSE REQUIREMENTS

Attendance: As per [university requirements](https://my.stevens.edu/office-provost/content/fall-2020-attendance-seating-arrangements) [↗](https://my.stevens.edu/office-provost/content/fall-2020-attendance-seating-arrangements) (<https://my.stevens.edu/office-provost/content/fall-2020-attendance-seating-arrangements>) attendance will be taken.

Participation: Questions and comments are strongly encouraged.

Homework: Homework should be submitted as a report explaining the approach used and results. R Markdown with explanations is acceptable. Posting only the code without any explanations is not acceptable. The TA will not run the code to check the result.

Late submissions without prior approval will result in 20% penalty (up to 2 days late). After this date no submissions will be accepted.

Project: There will be a class project which will explore a topic of market microstructure in depth. This could be about implementing a model, calibrate it to data, analyze a microstructure data set or implement a trading strategy.

Exams: A mid-term exam will be given, testing the mastery of the theoretical topics taught in the first half of the course.

TECHNOLOGY REQUIREMENTS

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Canvas

Technology skills necessary for this specific course

- Live web conferencing using Zoom
- Recording a slide presentation with audio narration

Required Equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Required Software

- Current or first previous major release of Chrome, Firefox, Edge, or Safari browser
- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint

GRADING PROCEDURES

Grades will be based on:

Class Participation	10%
Homework	30%
Mid-term exam	30%
Project	30%
Total	100%


Late Policy

Assignments posted after the due date but not later than 2 days will have 20% points subtracted. Assignments received after this date will not be considered, unless advance agreements are made.

Academic Integrity

Graduate Student Code of Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at www.stevens.edu/provost/graduate-academics  <http://www.stevens.edu/provost/graduate-academics>.

Special Provisions for Undergraduate Students in 500-level Courses

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

EXAM CONDITIONS

The following procedures apply to quizzes and exams for this course. As the instructor, I reserve the right to modify any conditions set forth below by printing revised Exam Conditions on the quiz or exam.

1. Students may use the following materials during quizzes and/or exams. Any materials that are not mentioned in the list below are not permitted.


Material	Permitted?	
	Yes	No
Handwritten Notes Conditions: i.e. size of note sheet	x	
Typed Notes Conditions: i.e. size of note sheet	x	
Textbooks Conditions: i.e. specific books	x	
Readings Conditions: i.e. specific documents	x	

Other (specify)		
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2. Students are not allowed to work with or talk to other students during quizzes and/or exams.

LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/office-disability-services>  (<https://www.stevens.edu/office-disability-services>). If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu (<mailto:pgehman@stevens.edu>) or by phone 201-216-3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to


have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.



Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). CAPS is open daily from 9:00 am – 5:00 pm M-F. Evening hours are available by appointment in the Fall / Spring semesters and up-to-date information regarding the availability of evening appointments can be found by visiting www.stevens.edu/CAPS  (<http://www.stevens.edu/CAPS>). To schedule an appointment, call 201-216-5177.

Due to the pandemic, in-person appointments may be limited until further notice. Up-to-date information about the availability of in-person services can be found at www.stevens.edu/CAPS  (<http://www.stevens.edu/CAPS>). Teletherapy (therapy via secure video platform) is available to registered students physically located in the states of New York or New Jersey. Students located outside of NY / NJ are encouraged to pursue local treatment through their personal health insurance. To learn more about the process of finding a therapist please visit the CAPS webpage on [Seeking Help Off-Campus](https://www.stevens.edu/directory/counseling-and-psychological-services/seeking-help-campus)  (<https://www.stevens.edu/directory/counseling-and-psychological-services/seeking-help-campus>).

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu (<mailto:care@stevens.edu>). A member of the CARE Team will respond to your concern as soon as possible.