



北京理工大学国际特色课程

Beijing Institute of Technology Global Courses

ECON9440 - APPLIED FINANCIAL ECONOMETRICS *Syllabus*

July. 1 - July. 19, 2024

Term Duration: July. 1 - July. 19, 2024

Credit Points: 4

Level: Postgraduate

Instructor Name: TBA

Home Institution: Beijing Institute of Technology

Lecture Hour: 12:30-15:30

Course Description

This course offers a rigorous examination of financial econometrics, starting with the foundational principles of probability and econometrics, and advancing towards complex models and modern applications in finance. Students will embark on a methodological journey through time-series analysis, volatility modeling, and the critical assessment of market efficiency. The course also delves into behavioral finance to understand market anomalies, before exploring risk management practices and the innovative domain of machine learning in finance. The curriculum is designed to equip students with the analytical tools necessary for high-frequency financial data analysis and the practical skills to apply advanced models in real-world scenarios.

Course Aims:

Upon successful completion of this course, students should be able to:

1. understand and apply the fundamental concepts of probability, statistics, and econometrics as they pertain to financial data analysis;
2. develop expertise in modeling asset returns using ARMA models and extend this knowledge to multivariate time series analysis;
3. skillfully apply ARCH/GARCH models to analyze and forecast financial market volatility, including advanced multivariate volatility models;
4. critically evaluate the concept of market efficiency and its implications for the predictability of asset prices, incorporating the analysis of behavioral finance and market anomalies;
5. assess financial risks using Value at Risk (VaR) and other risk management tools, and understand the practical challenges in measuring and predicting risk and return in financial markets;
6. integrate machine learning algorithms into financial analysis and leverage high-frequency data to enhance the understanding of realized volatility and its applications in finance;
7. utilize statistical software to model high-frequency financial data, appreciating the challenges and opportunities presented by this data type.

Language of Instruction

English

Required Textbook

Principles of Econometrics, 5th Edition

Author: R. Carter Hill, William E. Griffiths, Guay C. Lim

Publisher: Wiley

ISBN: 9781118452271

The Econometrics of Financial Markets, 2nd Edition

Author: John Y. Campbell, Andrew W. Lo, A. Craig MacKinlay, Andrew Y. Lo

Publisher: Princeton University Press

ISBN: 9780691043012

Other materials provided by the course lecturer.

Course Hours

This course requires 48 hours of contact including 42 hours of lectures and one 6-hour field trip. Lectures are from Monday to Friday.

Prerequisite Course

Students are expected to have taken **Econometrics** or to possess a thorough knowledge of the topics covered in the mentioned course.

Course Schedule

Week	Day	Lecture	Topic	Assignment/ Notes
Week 1	Day 1	Lecture 1	Introduction to Probability and Basic Econometrics; Time Series and Statistical Review	R. Carter Hill (Chap 10) John Y. Campbell (Chap 2)
	Day 2	Lecture 2	Modelling Asset Returns with ARMA Models	R. Carter Hill (Chap 12) John Y. Campbell (Chap 7)
	Day 3	Lecture 3	Time Series Models, with a section on ARCH/GARCH	John Y. Campbell (Chap 13)
	Day 4	Lecture 4	Modeling and Forecasting Volatility	John Y. Campbell (Chap 13)
	Day 5	Lecture 5	Advanced Multivariate Volatility Models	R. Carter Hill (Chap 11) John Y. Campbell (Chap 8)
Week 2	Day 6	Lecture 6	Market Efficiency and the Analysis of Predictive Power	R. Carter Hill (Chap 8) John Y. Campbell (Chap 6)
	Day 7	Lecture 7	Behavioral Finance and Market Anomalies	Recommended Reading Materials Provided in Class
	Day 8	Lecture 8	Risk and Return; Value at Risk	R. Carter Hill (Chap 9) John Y. Campbell (Chap 10)
	Day 9	Lecture 9	Combining Forecast Models	R. Carter Hill (Chap 14)

				John Y. Campbell (Chap 11)
	Day 10	Industrial Visit		
Week 3	Day 11	Lecture 10	Machine Learning in Finance	Recommended Reading Materials Provided in Class
	Day 12	Lecture 11	High-Frequency Financial Data Analysis	John Y. Campbell (Chap 14)
	Day 13	Lecture 12	Realized Volatility and Its Applications	R. Carter Hill (Chap 11)
	Day 14	Guided Revision		
	Day 15	Final Exam		

Note: Students will be notified if the schedule of the field trip changes according to the situation.

Grading Policy

Method	Percentage
Participation	10%
Assignments	20%
Mid-Semester Test	20%
Final Exam	50%
Total	100%

Participation: Students are expected to attend all course sessions punctually. Absences will impact the attendance grade. We will have some case studies, quizzes and group discussion in class and the performance will be considered as partial attendance points or bonus.

Assignments: Each student is required to individually complete two assignments. Assignments will be a combination of theoretical questions and problem-solving exercises related to the topics covered in lectures.

Mid-Semester Test: The test will span a duration of 2 hours and will assess students on the material covered in the first half of the course. Students are expected to demonstrate their knowledge and analytical skills through this examination.

Final Exam: The final exam will be a comprehensive assessment encompassing all course content. This exam will have a duration of 3 hours, and students will be evaluated on their understanding and application of the material covered throughout the course.

Academic Honesty

Academic honesty is not only a fundamental part of learning and teaching, but also a core value that this course embraces. Behaviors of academic dishonesty, as outlined hereinafter, are unacceptable and will be penalized:

- a) Plagiarism where students present work for assessment, publication or otherwise that is not their own, without appropriate attribution or reference to the original source. Plagiarism can include:
 - i) paraphrasing or copying published and unpublished work without a reference;
 - ii) adopting the ideas or concepts of others, including the structure of an existing analysis without due acknowledgement by way of reference to the original work or source.
- b) Collusion, where students present work as independent work when it has in fact been produced in whole or in part with others unless prior permission for joint or collaborative work has been given by the Course Coordinator. Collusion can include:
 - i) a student inappropriately assisting with or accepting assistance with the production of an assessment task;
 - ii) submitting work which is the same or substantially similar as another student's work for the same assessment task.
- c) Cheating, where a student acts in such a way as to seek to gain unfair advantage or assist another student to do so. Cheating can include:
 - i) submitting falsified, copied or improperly obtained data relating to results of practicum, field trips or other work as if they were genuine; submitting an assessment task with the intention of deceiving or misleading the instructor about the student's contribution to the work;
 - ii) submitting an assessment task written or answered for the student by another person or which the student has copied from another person;
 - iii) submitting the same or a substantially similar piece of work for assessment in two different courses (except in accordance with approved study and assessment schemes);
 - iv) a student falsely indicating that they have been present at an activity where attendance is required;
 - v) completing an assessment task outside the conditions specified for that task.
- d) Cheating in Examinations means engaging in dishonest practice or breaching the rules regarding examinations, which can include:
 - i) communicating in any way during an examination with any person who is not an examination supervisor inside or outside the examination venue;
 - ii) giving or accepting assistance from any person who is not an examination supervisor whilst in the examination venue;
 - iii) reading, copying from or otherwise using another student's work in an examination or knowingly allowing a student to do so;
 - iv) possessing, referring to or having access to any material or device containing information directly or indirectly related to the subject matter under examination, other than that explicitly approved by the Course Coordinator;
 - v) acquiring, or attempting to acquire, possess or distribute examination materials or information without approval;
 - vi) permitting another person to attend an examination on a student's behalf or attending an examination on behalf of another student;
- e) Other dishonest acts including but not limited to:

- i) altering or falsifying any document or record for the purposes of gaining academic advantage;
- ii) offering or giving money or any item or service to a University staff member or any other person to gain academic advantage for the student or another person;
- iii) inventing references.