Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates UG OBTL+ or PG OBTL+
If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to Data Transformation Status for more information.

Expected Implementation in Academic Year	AY2024-2025
Semester/Trimester/Others (specify approx. Start/End date)	Semester 2
Course Author * Faculty proposing/revising the course	Hong Seok Young
Course Author Email	seokyoung.hong@ntu.edu.sg
Course Title	Financial Econometrics
Course Code	MH4519
Academic Units	4
Contact Hours	51
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	MH2500 or MH1820
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course provides an introduction to financial econometrics, which refers to the application of statistical tools in finance. With your prior background in basic probability and statistics, you will learn various econometric methods used in analysing and modelling financial data.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Describe the stylised facts of asset prices and returns
ILO 2	Make use of modern econometric tools for modelling financial data
ILO 3	Conduct volatility modelling for financial investment decisions
ILO 4	Use statistical software packages for econometric analysis

Course Content

This course will cover the following topics:

1. Financial Econometrics: An Introduction and Financial Market I
2. Financial Market II
3. Basics of Statistical Inference, Financial Time Series, and Probability Theory
4. Linear Time Series Models
5. Return Predictability
6. Volatility
7. Multivariate Time Series Models
8. Factor Models and PCA
9. High-Frequency Financial Econometrics
10. Market Microstructure
11. Nonparametric and Nonlinear Methods

Reading and References (if applicable)

- Linton, Oliver (2017). Probability, Statistics and Econometrics, Academic Press (ISBN: 9780128104958)
- Taylor, Stephen (2005). Asset Price Dynamics, Volatility and Prediction, Princeton University Press (ISBN: 0-691-11537-0)
- Tsay, Ruey (2010). Analysis of Financial Time Series, Wiley (ISBN: 9780470414354)
- Bodie, Zvi, Kane, Alex, and Marcus, Alan (2013). Investments, McGraw-Hill (ISBN:9780077861674)

NOTE: The above readings comprise the foundational readings for the course and more up-to-date relevant readings will be provided when they are available.

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Financial Econometrics: An Introduction and Financial Market I	1, 2, 4	Taylor (2005), Chapters 1, 2, 4; Tsay (2010), Chapter 1; Bodie, Kane, Markus (2010), Chapters 6, 7	In-person	
2	Financial Market II	2, 4	Bodie, Kane, Markus (2010), Chapters 6, 7	In-person	
3	Basics of Statistical Inference, Financial time Series, and Probability Theory	2, 4	Linton (2017), Chapters 10-13; Tsay (2010), Chapter 1	In-person	
4	Linear Time Series Models	2, 4	Taylor (2005), Chapter 3 Tsay (2010), Chapter 2	In-person	
5	Return Predictability I	2, 4	Taylor (2005), Chapters 5, 6, 7	In-person	
6	Return Predictability II	2, 4	Taylor (2005), Chapters 5, 6, 7	In-person	
7	Mid-Term Test / Volatility I	2, 3, 4	Tsay (2010), Chapter 3; Taylor (2005), Chapters 8, 9, 10, 11	In-person	Mid-Term Test (NB. Mid-Term Test will be conducted at the beginning of Lecture 7)
8	Volatility II	2, 3, 4	Tsay (2010), Chapter 10; Taylor (2005), Chapters 8, 9, 10, 11	In-person	
9	Multivariate Time Series Models	2, 4	Tsay (2010), Chapter 8	In-person	
10	Factor Models and PCA	2, 3, 4	Tsay (2010), Chapter 9	In-person	

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
11	High-Frequency Financial Econometrics	1, 2, 3, 4	Taylor (2005), Chapter 12; Tsay (2010), Chapter 5	In-person	
12	Market Microstructure	1, 2, 3, 4	Tsay (2010), Chapter 5	In-person	
13	Nonparametric and Nonlinear Methods	2, 3, 4	Tsay (2010), Chapter 4	In-person	

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Explain the core idea and principles of the course contents and motivate students. Present some important econometric tools developed and used in modern financial econometrics. Derive mathematical details and proofs for the theorems taught.
Tutorials	Reiterate some key messages given in lectures. Provide students with the opportunity to practice problem solving skills and ask questions.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Summative Assessment (EXAM): Final exam(Final Examination)	1, 2, 3, 4		60	Individual	Analytic	Relational
2	Continuous Assessment (CA): Assignment(Assignment)	1, 2, 3, 4		10	Individual	Analytic	Relational
3	Continuous Assessment (CA): Test/Quiz(Mid-term test)	1, 2, 4		30	Individual	Analytic	Relational

Description of Assessment Components (if applicable)

Assignment (10%): Students will complete an individual coursework assignment designed to assess their understanding and application of key course concepts. This assignment will involve solving an important question about some key concepts covered in the course. Detailed instructions and grading criteria will be provided in advance.

Mid-term Test (30%): This 1-hour in-class exam will assess students' comprehension and application of the material covered in the first half of the course. It will consist of open-ended questions similar in style and difficulty to those encountered in the final exam.

Final Exam (60%): This comprehensive exam will evaluate students' overall understanding and application of the key concepts, theories, and methods covered throughout the entire course. The exam will cover material from all lectures and tutorials.Assignment: The lecturer will set some coursework to be completed individually. The mid-term: a 1-hour test with questions at the level of those that will appear in the final exam.

Formative Feedback

Solution sheets will be provided for the mid-term test and the coursework (assignment).
Students will also be given detailed answers for the questions covered in tutorial sessions every week.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Creative Thinking	Advanced
Global Perspective	Advanced
Problem Solving	Advanced
Transdisciplinarity	Advanced
Critical Thinking	Advanced

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

You are expected to complete all assigned readings, activities, assignments, attend all classes punctually and complete all scheduled assignments by due dates. You are expected to take responsibility to follow up with assignments and course related announcements. You are expected to participate in all project critiques, class discussions and activities.

Policy (Absenteeism)

The mid-term should be taken in person at the time advertised in advance. Valid reasons for the non-attendance include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities.

Policy (Others, if applicable)

Students are strongly advised to attend all lecture and tutorial sessions. They are required to complete the assignment by the due date given by the instructor and take the mid-term test & final examination on the dates announced beforehand.

There will be penalties for late submissions of your assignment: 30% deduction for late submissions up to 3 hours, 70% deduction for late submissions up to 1 day, and 100% deduction for late submissions more than 1 day.

If a student misses a test, a mark of zero will be given unless prior permission is given by the course instructor, or a leave of absence is approved by the School. In case of a missed test, the student must inform the instructor via email within 3 days of the test.

If you are sick and unable to attend a mid-term test or missed the deadlines for your coursework (assignment), you must 1. Inform the instructor via email AND 2. Submit the medical certificate issued by a medical practitioner registered with the Singapore Medical Association to your school administrator, not later than 7 working days after the medical leave. In this case, the missed assessment component will not be counted towards your final grade. There will be no make-up mid-term test or make-up assignment.

*Diversity and inclusion policy

Integrating a diverse set of experiences is important for a more comprehensive understanding of science.

It is our goal to create an inclusive and collaborative learning environment that supports a diversity of perspectives and learning experiences, and that honours your identities; including ethnicity, gender, socioeconomic status, sexual orientation, religion or ability.

To help accomplish this:

If you are neuroatypical or neurodiverse, have dyslexia or ADHD (for example), or have a social anxiety disorder or social phobia;
If you feel like your performance in the class is being impacted by your experiences outside of class;
If something was said in class (by anyone, including the instructor) that made you feel uncomfortable;

Please speak to your teaching team, our school pastoral officer or a peer or senior (either in-person or via email) about how we can help facilitate your learning experience.

As a participant in course discussions, you should also strive to honour the diversity of your classmates. You can do this by: using preferred pronouns and names; being respectful of others opinions and actively making sure all voices are being heard; and refraining from the use of derogatory or demeaning speech or actions.

All members of the class are expected to adhere to the NTU anti-harassment policy. if you witness something that goes against this or have any other concerns, please speak to your instructors or a faculty member.

Appendix 1: Assessment Criteria/Rubrics for Final Exam

	Advanced	**Functional - Proficient**	**Developing**
Understanding of core concepts	Excellent understanding of core concepts.	Good understanding of core concepts.	Fair understanding of core concepts.
Application of knowledge	Accurate and insightful application of knowledge.	Mostly accurate application of knowledge.	Some inaccuracies in application of knowledge.
Critical thinking	Strong critical thinking skills demonstrated.	Good critical thinking skills demonstrated.	Limited critical thinking skills demonstrated.
Problem-solving	Effective and creative problem-solving.	Competent problem-solving.	Basic problem-solving with some errors.
Communication	Clear, concise, and persuasive communication.	Clear and understandable communication.	Adequate communication with some areas for improvement.

Appendix 2: Rubric for Assignment

	Advanced	**Functional - Proficient**	**Developing**
Knowledge recall	Excellent recall of key knowledge.	Good recall of key knowledge.	Fair recall of key knowledge.
Concept comprehension	Accurate interpretation of econometric concepts.	Mostly accurate interpretation of econometric concepts.	Some inaccuracies in interpreting econometric concepts.
Application	Strong application of principles to solve problems.	Good application of principles with minor errors.	Fair application of principles with some significant errors.

Appendix 3: Assessment Criteria/Rubrics – Mid-term test

	Advanced	**Functional - Proficient**	**Developing**
Understanding of core concepts	Excellent understanding of core concepts.	Good understanding of core concepts.	Fair understanding of core concepts.
Application of knowledge	Accurate and insightful application of knowledge.	Mostly accurate application of knowledge.	Some inaccuracies in application of knowledge.
Critical thinking	Strong critical thinking skills demonstrated.	Good critical thinking skills demonstrated.	Limited critical thinking skills demonstrated.
Problem-solving	Effective and creative problem-solving.	Competent problem-solving.	Basic problem-solving with some errors.
Communication	Clear, concise, and persuasive communication.	Clear and understandable communication.	Adequate communication with some areas for improvement.