

**THE UNIVERSITY OF HONG KONG
FACULTY OF BUSINESS AND ECONOMICS**

PhD Course Syllabus

Course Code/Title: **MKTG6008 Empirical Methods in Business: Modeling and Estimation**

Course Description: Applied research in business typically consists of four key components – research questions, data, model, and estimation. Researchers first have to understand what type of data to collect with the purpose of addressing specific research questions. Then they have to understand the data generation process and limitations in the collected data. Based on that they have to decide what is the appropriate model and what are the appropriate econometric methods to be applied to the data, hence the estimation results will be useful in addressing the research questions.

This course consists of two parts. The first half of the course will focus on simple models and the identification of causal effects from data. The second half will cover more advanced modeling and estimation techniques that are required to deal with complicated data and research questions. The target of this course is Ph.D. students in the business school in their 1st or 2nd year without much econometric training and especially without much experience in estimating models from data.

Course Objectives: The major objectives of this course are to train Ph.D. students to understand

- how to use data to address research questions;
- how to build econometric models that can be applied to data;
- how to estimate the econometric models using statistical packages.

Although students may have taken statistical and econometric courses before, this course emphasizes empirical data handling and estimation issues. Past experience shows that students often struggle with these issues when they conduct independent applied research in business. This course will provide experience for students to get "dirty with their hands" with data and estimation. It is hoped that students at the end will be better prepared for their dissertation research or collaborating in research with the faculty.

Pre-requisite: None

Assessment: 80% coursework; 20% class participation

Remarks: All PhD courses are non-credit-bearing and will be assessed on a pass/fail basis.

Course Learning Outcomes (CLOs) On completion of this course, students should be able to:	Aligned PLOs*				
	1	2	3	4	5
1. Understand advanced quantitative methods required for independent research	v				

2. Develop original research ideas and apply appropriate methodology to address research questions		v	v		v
3. Improve research paper writing and presentation skills				v	

***Programme Learning Outcomes (PLOs) for Research Postgraduate Programme:**

1. Demonstrate critical understanding, at an advanced level, of up-to-date knowledge and research methodology of a particular field
2. Implement effective academic and personal strategies for carrying out research projects independently and ethically
3. Contribute original knowledge in response to issues in their specialist area
4. Communicate research findings at a diverse range of levels and through a variety of media
5. Evaluate one's own research in relation to important and latest issues in the field

COURSE DETAILS (*subject to change at instructor's discretion*)

Year/Semester: 2023-24, First Semester (Fall semester)

Time/Venue: Thursday 13:30-16:20, Venue: KK1235

Instructor: [Prof. Tat Chan]

Email: chan@wustl.edu

Office: KKL-XXX (office hours: by appointment)

I. Teaching and Learning Activities

In-class and Out-of-class Activities (<i>e.g. lectures, class discussion, papers reading, proposal writing</i>)	Expected hour	% of student study effort
1. Lectures	25	42%
2. Class discussion	5	8%
3. Assignments	20	33%
4. Papers reading	15	25%
	60	100%

II. Assessment

Assessment Components (<i>e.g. assignments, proposal, presentation, examination</i>)	Weight	CLOs to be assessed				
		1	2	3	4	5
1. Assignments (about 10)	80%	v	v	v	v	v
2. Class discussion	20%				v	
Total	100%					

Students will be assessed based on the following performance standards:

Course Grade	Performance Standard
Pass	Attending classes diligently, actively participating in class, submitting assignments on time, and submitting the final proposal on time

Fail	Missing classes, failing to submit any assignments, and not submitting the final proposal
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Assessment Component 1. Assignments (about 10)

Score	Performance Standard
80%	Given the emphasis on empirical application, I will try to give one class assignment each week. The usual format is a dataset together with a few research questions. To answer these questions you are typically required to write down a statistical / econometric model in one assignment, then do empirical analysis using the data and your model, and finally write a short report. For advanced topics (e.g. when involved non-linear models), students have to submit the code they used for the model estimation.

Assessment Component 2. Class Discussion

Score	Performance Standard
20%	Active in-class participation regarding the assignments, required readings and other course materials. I will frequently ask questions. There are no right or wrong answers, but I expect students to share the class their thoughts.

III. Course Content and Tentative Schedule

Below is just a tentative schedule. We probably do not have enough time to cover all of the topics below. I will make adjustments depending on the actual progress.

1. Linear Regression Models
 - Simple regression
 - Multivariate regression
 - Inference, hypothesis testing
 - Multicollinearity
 - Heteroscedasticity
 - Serial correlation
 - Non-linear models, data transformation
2. Maximum Likelihood
 - Three classical test statistics
 - Non-linear models
3. Generalized Method of Moments (GMM) and Instrumental Variables (IVs)
 - Endogeneity issues
 - Two-stage least squares and IV method
 - M-estimators and criterion functions, estimation with conditional moments
 - Identification and overidentifying restrictions
4. Panel Data
 - Fixed effects and random effects models
 - Dynamic panel data
5. Causal Effect Models
 - Regression and IV approaches
 - Matching
 - Difference-in-difference
 - Regression-discontinuity

- Other advanced methods
- 6. Discrete Dependent Variables
 - Binary choices – logit and probit models
 - Multiple choices– logit, GEV, and probit models
 - Ordered responses
- 7. Limited Dependent Variable Models
 - Truncated data
 - Censored data
- 8. Selection Models
 - Generalized Tobit Models
- 9. Unobserved Heterogeneity and Factors in Responses
 - Random coefficients model
 - Latent class model
- 10. Structural Models

We will not have time to go through all of the topics below. I will only introduce the concept and use one or two examples as motivation, and briefly describe the main estimation methods. Below are useful references for those who are interested in this topic.
- 11. Duration, Search and Matching models

IV. Recommended Readings [tentative]

You are required to have at least one econometric textbook that covers the wide range of topics covered in this course. The following are my recommendation:

- *Estimation and Inference in Econometrics*, Davidson R. and MacKinnon, J.G.
- *Econometric Analysis*, Greene, W.H.
- *The Theory and Practice of Econometrics*, Judge, G.G., Griffiths, W.E., Hill, R.C., Lutkepohl, H., and Lee, T-C

(A more basic version at the undergraduate level is called *Introduction to the Theory and Practice of Econometrics* by the same authors. For students who do not have much statistical and econometric background, this is a good one to start.)

There will be more papers to read in each class. I will send you the digital version of the papers later.

V. Course Policy

The University Regulations on academic dishonesty will be strictly enforced! Academic dishonesty is behaviour in which a deliberately fraudulent misrepresentation is employed in an attempt to gain undeserved intellectual credit, either for oneself or for another. It includes, but is not necessarily limited to, the following types of cases:

- a. **Plagiarism** - The representation of someone else's ideas as if they are their own. Where the arguments, data, designs, etc., of someone else are being used in a paper, report, oral presentation, or similar academic project, this fact must be made explicitly clear by citing the appropriate references. The references must fully indicate the extent to which any parts of the project are not one's own work. Paraphrasing of someone else's ideas is still using someone else's ideas, and must be acknowledged. Please check the University Statement on plagiarism on the web: <http://www.hku.hk/plagiarism/>

- b. Unauthorized Collaboration on Out-of-Class Projects - The representation of work as solely one's own when in fact it is the result of a joint effort.
- c. Cheating on In-Class Exams - The covert gathering of information from other students, the use of unauthorized notes, unauthorized aids, etc.
- d. Unauthorized Advance Access to an Exam - The representation of materials prepared at leisure, as a result of unauthorized advance access (however obtained), as if it were prepared under the rigors of the exam setting. This misrepresentation is dishonest in itself even if there are not compounding factors, such as unauthorized uses of books or notes.

You are expected to do your own work whenever you are supposed to. Incident(s) of academic dishonesty will NOT be tolerated. Cheating or plagiarism of any kind would result in an automatic FAIL grade for the course plus strict enforcement of all Faculty and/or University regulations regarding such behaviour.