City University of Hong Kong
Course Syllabus

offered by Department of Management Sciences
with effect from Semester B 2022/23

Part I   Course Overview

Course Title:	**Advanced Regression Techniques**
Course Code:	**MS8956**
Course Duration:	**One Semester**
Credit Units:	**3**
Level:	**R8**
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**MS8952 Introduction to Mathematical Statistics**
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**Nil**
Exclusive Courses: *(Course Code and Title)*	**Nil**

Part II   Course Details

1.   Abstract
(A 150-word description about the course)

This is a Ph.D. level course introducing fundamental knowledge of regression models.

2.   Course Intended Learning Outcomes (CILOs)
(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs#	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Understand the advanced theories of regression.		✓	✓	✓
2.	Understand and prove important theorems in regression.		✓	✓	✓
3.	Apply the theory to applications.		✓	✓	✓
…					

* If weighting is assigned to CILOs, they should add up to 100%.   100%

A1:   Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2:   Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3:   *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)
(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5		
Lectures	The topics will be introduced and discussed in depth. We will motivate the topic, introduce the model and selected special cases and/or generalizations where applicable. Important theorems like Gauss-Markov theorem will be discussed and the students will be taught how to prove them.	✓	✓	✓				3 hours per week
Assignments	Assignments will be provided for students to explore the concepts in further detail. The assignments extend the lectures by covering applications and special cases and/or generalizations of the models introduced.	✓	✓	✓				3 hours per week

4. Assessment Tasks/Activities (ATs)
(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4	5			
Continuous Assessment: __40__ %								
Assignments	✓	✓	✓				40%	
Examination: __60__ % (duration: __3 Hours__ , if applicable)								
Examination	✓	✓	✓				60%	
The weightings should add up to 100%.							100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
Assignments	Able to apply the methodology and knowledge to solve problems.	High	Significant	Moderate	Fail to understand the core concepts
Examination	Evidence of knowledge of subject matter and capability to formulate, and analyse the fundamental theoretical problems in regression models.	High	Significant	Moderate	Fail to understand the core concepts

Part III Other Information (more details can be provided separately in the teaching plan)

1. **Keyword Syllabus**
    (An indication of the key topics of the course.)

    1. OLS regression: finite sample properties, Gauss Markov theorem, hypothesis testing, generalized least squares, large sample theory.

    2. Panel data models.

    3. Instrumental Variable and General Method of Moments (GMM).

    4. Bayesian Inference.

    5. Tentative: linear or nonlinear time series models, other selected topics.

2. **Reading List**

2.1 **Compulsory Readings**
    (Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

    Nil.

2.2 **Additional Readings**
    (Additional references for students to learn to expand their knowledge about the subject.)

    Hayashi, Fumio. Econometrics. Princeton University Press, 2011.

    Freedman, David. Statistical Models: Theory and Practice. Cambridge University Press, 2009.

    Hastie, Trevor, Robert Tibshirani, and Martin Wainwright. Statistical Learning with Sparsity: The Lasso and Generalizations. CRC, 2015.

    Hoff, Peter D. A first course in Bayesian statistical methods. Springer, 2009.