

**City University of Hong Kong  
Course Syllabus**

offered by College/School/Department of Mathematics  
with effect from Semester A 2022 / 23

---

---

**Part I Course Overview**

**Course Title:** Statistical Analysis of Financial Big Data

**Course Code:** MA6632

**Course Duration:** 1 semester

**Credit Units:** 3 CUs

**Level:** P6

**Medium of Instruction:** English

**Medium of Assessment:** English

**Prerequisites:** MA2172 Applied Statistics for Sciences and Engineering OR  
MA2506 Probability and Statistics OR equivalent course of elementary  
statistics  
*(Course Code and Title)*

**Precursors:** Nil  
*(Course Code and Title)*

**Equivalent Courses:** Nil  
*(Course Code and Title)*

**Exclusive Courses:** Nil  
*(Course Code and Title)*

## Part II Course Details

### 1. Abstract

This course aims to

- introduce students statistical concepts and techniques of data analysis; and
- demonstrate applications of statistical methods and modeling techniques to scientific and engineering problems; and
- develop the use of computer software in statistical calculations.

### 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<br>(if applicable) | Discovery-enriched curriculum related learning outcomes (please tick where appropriate) |    |    |
|-----|--|------------------------------|---|----|----|
|     |  |                              | A1  | A2 | A3 |
| 1.  | perform hypothesis testing on data sets and draw appropriate inferences about the underlying populations.    | 30%                          | ✓   | ✓  |    |
| 2.  | construct statistical models and experimental designs from regression and analysis of variance.              | 20%                          | ✓   | ✓  |    |
| 3.  | implement multivariate methods of analysis to data sets with inherent interdependence among variables.       | 20%                          | ✓   | ✓  |    |
| 4.  | present a range of statistical methods for evaluating product quality and forecasting time series processes. | 20%                          | ✓   | ✓  | ✓  |
| 5.  | carry out statistical calculations and analyses with software packages.                                      | 10%                          |   | ✓  | ✓  |
|     |  | 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 | 6 |                            |
| teaching              | Learning through teaching is primarily based on lectures.  | ✓        | ✓ | ✓ | ✓ | ✓ |   | 3 hours/week               |
| take-home assignments | Learning through take-home assignments helps students implement advanced theory for better understanding | ✓        | ✓ | ✓ | ✓ | ✓ |   | After-class                |

### 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 | 6 |           |         |
| Continuous Assessment: <u>30</u> %                        |          |   |   |   |   |   |           |         |
| Test  | ✓        | ✓ |   |   |   |   | 20        |         |
| Hand-in assignments                                       | ✓        | ✓ | ✓ | ✓ |   |   | 10        |         |
| Examination   | ✓        | ✓ | ✓ | ✓ |   |   | 70        |         |
| Examination: <u>70</u> % (duration: 3 hrs, if applicable) |          |   |   |   |   |   |           |         |
|   |          |   |   |   |   |   | 100%      |         |

## 5. Assessment Rubrics

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

Applicable to students admitted in Semester A 2022/23 and thereafter

| Assessment Task        | Criterion   | Excellent<br>(A+, A, A-) | Good<br>(B+, B) | Marginal<br>(B-, C+, C) | Failure<br>(F)                    |
|------------------------|---|--------------------------|-----------------|-------------------------|-----------------------------------|
| 1. Test                | Problem solving ability   | High                     | Significant     | Basic                   | Not even reaching marginal levels |
| 2. Hand-in assignments | Comprehensive understanding   | High                     | Significant     | Basic                   | Not even reaching marginal levels |
| 3. Examinations        | Creativity and problem solving ability based on comprehensive understanding | High                     | Significant     | Basic                   | Not even reaching marginal levels |

Applicable to students admitted before Semester A 2022/23

| Assessment Task        | Criterion   | Excellent<br>(A+, A, A-) | Good<br>(B+, B, B-) | Fair<br>(C+, C, C-) | Marginal<br>(D) | Failure<br>(F)                    |
|------------------------|---|--------------------------|---------------------|---------------------|-----------------|-----------------------------------|
| 1. Test                | Problem solving ability   | High                     | Significant         | Moderate            | Basic           | Not even reaching marginal levels |
| 2. Hand-in assignments | Comprehensive understanding   | High                     | Significant         | Moderate            | Basic           | Not even reaching marginal levels |
| 3. Examinations        | Creativity and problem solving ability based on comprehensive understanding | High                     | Significant         | Moderate            | Basic           | Not even reaching marginal levels |

**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.)*

Arbitrage theory, Hedging, Binomial model, Ito's formula, Black-Scholes equation, Option Greeks

**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.)*

|     |                           |
|-----|---------------------------|
| 1.  | Course materials provided |
| 2.  |                           |
| 3.  |                           |
| ... |                           |

**2.2 Additional Readings**

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

|     |  |
|-----|--|
| 1.  | Derivatives Markets, by R. McDonald, Pearson; 3rd edition                |
| 2.  | Options, Futures and Other Derivatives, by J. Hull, Pearson; 9th edition |
| 3.  |  |
| ... |  |