# MA6632: STATISTICAL ANALYSIS OF FINANCIAL BIG DATA

**Effective Term**
Semester A 2025/26

## Part I Course Overview

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

**Subject Code**
MA - Mathematics
**Course Number**
6632

**Academic Unit**
Mathematics (MA)

**College/School**
College of Science (SI)

**Course Duration**
One Semester

**Credit Units**
3

**Level**
P5, P6 - Postgraduate Degree

**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

**Precursors**
Nil

**Equivalent Courses**
Nil

**Exclusive Courses**
Nil

# Part II Course Details

**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.

**Course Intended Learning Outcomes (CILOs)**

| | CILOs | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|---|---|---|---|---|---|
| 1 | perform hypothesis testing on data sets and draw appropriate inferences about the underlying populations. | 30 | x | x | |
| 2 | construct statistical models and experimental designs from regression and analysis of variance. | 20 | x | x | |
| 3 | implement multivariate methods of analysis to data sets with inherent interdependence among variables. | 20 | x | x | |
| 4 | present a range of statistical methods for evaluating product quality and forecasting time series processes. | 20 | x | x | x |
| 5 | carry out statistical calculations and analyses with software packages. | 10 | | x | x |

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 real-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.

**Learning and Teaching Activities (LTAs)**

| | LTAs | Brief Description | CILO No. | Hours/week (if applicable) |
|---|---|---|---|---|
| 1 | teaching | Learning through teaching is primarily based on lectures. | 1, 2, 3, 4, 5 | 3 hours/week |
| 2 | take-home assignments | Learning through take-home assignments helps students implement advanced theory for better understanding | 1, 2, 3, 4, 5 | After-class |

**Assessment Tasks / Activities (ATs)**

| | ATs | CILO No. | Weighting (%) | Remarks ("-" for nil entry) | Allow Use of GenAI? |
|---|---|---|---|---|---|
| 1 | Test | 1, 2 | 20 | - | No |
| 2 | Hand-in assignments | 1, 2, 3, 4, 5 | 10 | - | Yes |

**Continuous Assessment (%)**

30

**Examination (%)**

70

**Examination Duration (Hours)**

3

**Minimum Examination Passing Requirement (%)**

30

**Additional Information for ATs**

30% Coursework

70% Examination (Duration: 3 hours, at the end of the semester)

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

**Assessment Rubrics (AR)**

**Assessment Task**

1. Test (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

Problem solving ability on statistical models and experimental designs

**Excellent**

(A+, A, A-) Consistently demonstrates a thorough understanding of statistical models and designs experiments for complex problems

**Good**

(B+, B, B-) Adequately demonstrates an understanding of statistical models and designs experiments for moderately complex problems

**Fair**

(C+, C, C-) Demonstrates some understanding of statistical models and designs experiments for simple problems

**Marginal**

(D) Demonstrates limited understanding of statistical models and has limited ability to design experiments for complex problems

**Failure**

(F) Demonstrates little understanding of statistical models and is unable to design experiments for complex problems

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**Assessment Task**

2. Hand-in assignments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

Comprehensive understanding of statistical methods and software usage

**Excellent**

(A+, A, A-) Consistently demonstrates a thorough understanding of statistical models and designs experiments for complex problems on software

**Good**

(B+, B, B-) Adequately demonstrates an understanding of statistical models and designs experiments for moderately complex problems on software

**Fair**

(C+, C, C-) Demonstrates some understanding of statistical models and designs experiments for simple problems on software

**Marginal**

(D) Demonstrates limited understanding of statistical models and has limited ability to design experiments for complex problems on software

**Failure**

(F) Demonstrates little understanding of statistical models and is unable to design experiments for complex problems on software

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**Assessment Task**

3. Examinations (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

Creativity and problem solving ability based on comprehensive understanding

**Excellent**

(A+, A, A-) Consistently demonstrates a thorough understanding of statistical models and designs experiments for complex problems

**Good**

(B+, B, B-) Adequately demonstrates an understanding of statistical models and designs experiments for moderately complex problems

**Fair**

(C+, C, C-) Demonstrates some understanding of statistical models and designs experiments for simple problems

**Marginal**

(D) Demonstrates limited understanding of statistical models and has limited ability to design experiments for complex problems

**Failure**

(F) Demonstrates little understanding of statistical models and is unable to design experiments for complex problems

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**Assessment Task**

1. Test (for students admitted from Semester A 2022/23 to Summer Term 2024)

**Criterion**

Problem solving ability on statistical models and experimental designs

**Excellent**

(A+, A, A-) Consistently demonstrates a thorough understanding of statistical models and designs experiments for complex problems

**Good**

(B+, B) Adequately demonstrates an understanding of statistical models and designs experiments for moderately complex problems

**Marginal**

(B-, C+, C) Demonstrates some understanding of statistical models and designs experiments for simple problems

**Failure**

(F) Demonstrates little understanding of statistical models and is unable to design experiments for complex problems

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**Assessment Task**

2. Hand-in assignments (for students admitted from Semester A 2022/23 to Summer Term 2024)

**Criterion**

Comprehensive understanding of statistical methods and software usage

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(A+, A, A-) Consistently demonstrates a thorough understanding of statistical models and designs experiments for complex problems on software

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# Part III Other Information

**Keyword Syllabus**

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

**Reading List**

**Compulsory Readings**

| | Title |
|---|---|
| 1 | Course materials provided |

**Additional Readings**

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