

**City University of Hong Kong
Course Syllabus**

**offered by Department of Architecture and Civil Engineering
with effect from Semester A 2022/23**

Part I Course Overview

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|--|---|
| Course Title: | Statistical Methods and Data Analytics |
| Course Code: | CA6110 |
| Course Duration: | 1 Semester (Some courses offered in Summer Term may start a few weeks earlier than the normal University schedule. Please check the teaching schedules with CLs before registering for the courses.) |
| Credit Units: | 3 |
| Level: | P6 |
| Medium of Instruction: | English |
| Medium of Assessment: | English |
| Prerequisites: <i>(Course Code and Title)</i> | Nil |
| Precursors: <i>(Course Code and Title)</i> | Nil |
| Equivalent Courses: <i>(Course Code and Title)</i> | Nil |
| Exclusive Courses: <i>(Course Code and Title)</i> | Nil |

Part II Course Details

1. Abstract

This course aims to enrich students' knowledge and skills in handling large amount of data for decision-making in construction industry. Theories and techniques of big data analysis with relevance to engineering management are introduced. Topics will cover principles of descriptive and inferential statistics, sampling and surveying methods, operations research methods and mathematical modelling for big data analysis.

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. | explain the conceptual framework of managing big data | | | ✓ | |
| 2. | relate the theories to the analysis of managerial problems in the context of construction industry; | | | ✓ | |
| 3. | apply various quantitative and qualitative analysis skills to handle large amount of information during decision-making process of construction and/or development projects. | | | | ✓ |
| | | 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 | |
| Lectures | Various topics relating to decision analysis | ✓ | ✓ | ✓ | |
| Tutorials | In class discussions and activities on decision making problems relating to lecture contents | ✓ | ✓ | ✓ | |
| Hand-on exercise | Demonstration in solving decision making problems using numerical exercises | | | ✓ | |

| | |
|----------------------------------|---|
| Semester Hours: | - hours per week |
| Lecture/Tutorial/Laboratory Mix: | Lecture (-); Tutorial (-); Laboratory (-) |
| | Lec: 2 hrs x 2 days/wk Tut: 1 hr x 2 days/wk Lab/Others: 0 hr(s)/wk. The course is offered in Summer Term. Students are required to attend 2 lectures and 2 tutorials per week for 7 weeks. |

4. Assessment Tasks/Activities

(ATs are designed to assess how well the students achieve the CILOs.)

| Assessment Tasks / Activities | CILO No. | | | Weighting | Remarks |
|--|----------|---|---|-----------|---------|
| | 1 | 2 | 3 | | |
| Continuous Assessment: 50% | | | | | |
| Assignment | | ✓ | ✓ | 30% | |
| Mid-term test | ✓ | ✓ | ✓ | 20% | |
| Examination: 50% (duration: 2 hour(s)) | | | | | |
| Examination | | | | 50% | |
| | | | | 100% | |

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%

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 (A+, A, A-) | Good (B+, B) | Marginal (B-, C+, C) | Failure (F) |
|-----------------|--|-----------------------|--------------|----------------------|-----------------------------------|
| Assignment | CAPACITY to EXPLORE, INVESTIGATE, and ORGANIZE knowledge and ideas in an independent fashion in topics pertaining to decision analysis | High | Significant | Basic | Not even reaching marginal levels |
| Mid-term test | ABILITY to UNDERSTAND various taught theories and knowledge to topics related to decision analysis | High | Significant | Basic | Not even reaching marginal levels |
| Examination | ABILITY to APPLY the correct theories and solution methods to solve practical problems related to decision analysis | High | Significant | Basic | Not even reaching marginal levels |

Applicable to students admitted before Semester A 2022/23

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B, B-) | Fair (C+, C, C-) | Marginal (D) | Failure (F) |
|-----------------|--|-----------------------|------------------|------------------|--------------|-----------------------------------|
| Assignment | CAPACITY to EXPLORE, INVESTIGATE, and ORGANIZE knowledge and ideas in an independent fashion in topics pertaining to decision analysis | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| Mid-term test | ABILITY to UNDERSTAND various taught theories and knowledge to topics related to decision analysis | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| Examination | ABILITY to APPLY the correct theories and solution methods to solve practical problems related to decision analysis | 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.)

Concepts and examples of big data collection for decision making; Quantitative analysis techniques including principles of descriptive and inferential statistics, sampling and surveying methods, operations research methods for data analysis, mathematical modelling of surveyed data for predictions.

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. | Nil |
|----|-----|

2.2 Additional Readings

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

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| 1. | Bonini, C. P. Hausman, W.H. and Bierman, H. 1997, Quantitative Analysis for Management, 9th edition, Irwin, Chicago. [HD30.25 .B53 1997] |
| 2. | Davis, D. 2005, Business Research for Decision Making, 6th edition, Thomson/Brooks/Cole, Belmont. [HD30.4 .D38 2005] |
| 3. | Oakshott, L. 2009, Essential Quantitative Methods for Business Management & Finance, 4th edition, Palgrave Macmillan, New York. [HF5691 .O243 2009] |
| 4. | Cook, A. E. 1991, Construction Tendering: Theory and Practice, B.T. Batsford/CIOB, London. [TH435 .C727 1991] |
| 5. | LaForge, R.L. and Kroeber, D.W. 1980, The Manager's Guide to Statistics and Quantitative Methods, McGraw-Hill, New York. [Shatin Branch - C0032805] |
| 6. | Boussabaine, A.H. 1996, 'The use of ANN in construction management: a review', Construction Management and Economics, Vol 14, Issue 5, pp 427-436. [HD9715.A1 C667] |
| 7. | Fausett, L.V. 1994, Fundamentals of Neural Networks: Architectures, Algorithms, and applications, Prentice-Hall, Englewood Cliffs. [QA76.87 .F38 1994] |
| 8. | Bauer, R. J. (1994), Genetic Algorithms and Investment Strategies, Wiley, New York. [HG4515.2 .B38 1994] |
| 9. | EMC 2015, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley, EMC Education Services (Editor) ISBN: 978-1-118-87613-8 |