

CA6110: STATISTICAL METHODS AND DATA ANALYTICS

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Statistical Methods and Data Analytics

Subject Code

CA - Civil and Architectural Engineering

Course Number

6110

Academic Unit

Architecture and Civil Engineering (CA)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

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.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 app.)		DEC-A2	DEC-A3
1	explain the conceptual framework of managing big data			x	
2	relate the theories to the analysis of managerial problems in the context of construction industry			x	
3	apply various quantitative and qualitative analysis skills to handle large amount of information during decision-making process of construction and/or development projects				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	Lectures	Various topics relating to decision analysis	1, 2, 3	
2	Tutorials	In class discussions and activities on decision making problems relating to lecture contents	1, 2, 3	
3	Hand-on exercise	Demonstration in solving decision making problems using numerical exercises	3	

Additional Information for LTAs

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.

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignment	2, 3	30	
2	Mid-term test	1, 2, 3	20	

Continuous Assessment (%)
50

Examination (%)
50

Examination Duration (Hours)
2

Additional Information for ATs
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%

Assessment Rubrics (AR)

Assessment Task
Assignment (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
CAPACITY to EXPLORE, INVESTIGATE, and ORGANIZE knowledge and ideas in an independent fashion in topics pertaining to decision analysis

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Mid-term test (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
ABILITY to UNDERSTAND various taught theories and knowledge to topics related to decision analysis

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Examination (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

ABILITY to APPLY the correct theories and solution methods to solve practical problems related to decision analysis

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Assignment (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

CAPACITY to EXPLORE, INVESTIGATE, and ORGANIZE knowledge and ideas in an independent fashion in topics pertaining to decision analysis

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Mid-term test (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

ABILITY to UNDERSTAND various taught theories and knowledge to topics related to decision analysis

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

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(B-, C+, C) Basic

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(F) Not even reaching marginal levels

Assessment Task

Examination (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

ABILITY to APPLY the correct theories and solution methods to solve practical problems related to decision analysis

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

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.

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
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