City University of Hong Kong
Course Syllabus

offered by Department of Advanced Design and Systems Engineering
with effect from Semester B 2022/23

Part I Course Overview

Course Title:	**Engineering Statistics and Experimentation**
Course Code:	**ADSE2100**
Course Duration:	**One Semester**
Credit Units:	**3**
Level:	**B2**
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**Nil**
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)

The aim of this course is to provide students with an understanding of statistical data analysis methods and design, execution and analysis of experiments for engineering application. The principles and techniques of data analysis and experimentation such as systematic data collection, estimation of models using the collected data, and the interpretation and practical implementation of the results are introduced.

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.	**Elaborate on applications of** Engineering Statistics and experimentation	25%	√		
2.	**Design, execute** experiments and **analyse and interpret** the experimental results	25%			√
3.	**Understand** the basic theory and principles of Engineering Statistics and experimentation	25%	√		
4.	**Apply** software to solve case study and engineering statistics projects	25%		√	
		100%			

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

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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	
Lectures	Weekly lectures. Lectures will be supplemented by: - Discussions - Cases - Small group exercises to facilitate conceptual understanding and introduction to applications.	√		√	√	2 hr / week
Laboratory	Weekly lab with Q&A and discussion. Labs are supplemented by: - Cases - Presentation by students - Small group exercises		√		√	1 hr / week
Individual Consultation	Individual student can meet with the instructor for clarifying concepts.	√	√	√	√	1 hr/ 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		
Continuous Assessment: 50%						
Tests	√		√		10%	Written exam paper half-way the course.
Assignments and laboratory work		√		√	40%	Group and individual assignments to assess student's understanding.
Examination: 50% (duration: 2 hours)	√	√	√		50%	Written exam paper at the end of the course.
**The weightings should add up to 100%.*					100%	

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

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, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
Tests	Tests to assess students' conceptual understanding of statistical engineering and experimental design methods and ability to correctly analyze data.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Assignment & Lab work	Students' ability to analyze data, apply relevant statistical tools, and draw informed conclusions about an experiment are assessed. Explanation and presentation of results are also assessed.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Examination	Examination questions are designed to assess student's level of achievement of the intended learning outcomes, with emphasis placed on conceptual understanding and correct application, mostly through numerical calculation, of the various statistical design and analysis of experiments methodologies.	High	Significant	Moderate	Basic	Not even reaching marginal levels

The test, assignments, laboratory work and examination will be numerically-marked and grades-awarded accordingly.

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.)

- Design of experiments
- Measurement system analysis
- Process variability and it relevance to modern statistical engineering
- Analysis of variance and regression
- Engineering statistics
- Process improvement

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.	Lecture notes and slides

2.2. Additional Readings

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

1.	Box, Hunter and Hunter, Statistics for Experimenters, 2nd edition Wiley.
2.	D.C. Montgomery, Introduction to Statistical Quality Control, 7th ed., Wiley, 2012
3.	D.C. Montgomery, Design and Analysis of Experiments, 8th ed., Wiley, 2012
4.	Mason, R.L., Gunst, R.F., and Hess, J.L. (2003). Statistical Design and Analysis of Experiments with Applications to Engineering and Science (2nd Edition). New York: John Wiley & Sons