# City University of Hong Kong
## Course Syllabus

## offered by Department of Systems Engineering
## with effect from Semester A 2024 / 25

### Part I    Course Overview

**Course Title:** Statistical Modeling and Design of Experiments

**Course Code:** SYE8011

**Course Duration:** One semester

**Credit Units:** 3

**Level:** R8

**Medium of Instruction:** English

**Medium of Assessment:** English

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

**Precursors:**
*(Course Code and Title)* Knowledge in Basic Probability and Statistics

**Equivalent Courses:**
*(Course Code and Title)* SEEM8011 Statistical Modeling and Design of Experiments
(offered until 2021/22)/ ADSE8011 Statistical Modeling and Design of Experiments (offered until 2023/24)

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

**Part II    Course Details**

1.  **Abstract**

    This course aims to develop students' abilities to understand the theory and application methods on statistical modeling of observational data and design of experiment data, including linear models, regression models, and analysis of variance models.

2.  **Course Intended Learning Outcomes (CILOs)**

| No. | CILOs | Weighting (if applicable) | Discovery-enriched curriculum related learning outcomes | | |
|-----|-------|------|------|------|------|
| | | | *A1* | *A2* | *A3* |
| 1. | Develop a familiarity with basic statistical estimation and hypothesis testing ideas and methods | 10% | ✓ | ✓ | |
| 2. | Understand simple and multiple linear regression models and corresponding inference methods for process characterization and prediction. | 30% | ✓ | | |
| 3. | Understand motivations and needs for design of experiments in manufacturing and other applications. | 10% | ✓ | | |
| 4. | Understand design and analysis of experiments methods to characterize and improve systems and processes. | 30% | ✓ | | |
| 5. | Understand and apply regression methods and design of experiment methods to analyze and solve real life problems and applications. | 20% | ✓ | | |
| | | 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. Learning and Teaching Activities (LTAs)

| LTA | Brief Description | CILO No. | | | | | Hours/week (if applicable) |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | |
| Lecture | - large class activity<br>- questions and discussion | ✓ | ✓ | ✓ | ✓ | ✓ | 39 hours/sem |

## 4. Assessment Tasks/Activities (ATs)

| Assessment Tasks/Activities | CILO No. | | | | | Weighting | Remarks |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | | |
| Continuous Assessment: 100 % | | | | | | | |
| Group Work | | ✓ | ✓ | ✓ | ✓ | 40% | |
| Individual Coursework | ✓ | ✓ | | ✓ | | 25% | |
| Test | | ✓ | ✓ | ✓ | | 35% | |
| Examination: 0 % (duration: , if applicable) | | | | | | | |
| | | | | | | 100% | |

**5. Assessment Rubrics**

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

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B, B-) | Fair (C+, C, C-) | Marginal (D) | Failure (F) |
|---|---|---|---|---|---|---|
| 1. Group Work | Application of class materials and teamwork | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| 2. Individual Coursework | Application of class materials | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| 3. Test | Understanding of class materials | High | Significant | Moderate | Basic | Not even reaching marginal levels |

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

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B) | Marginal (B-, C+, C) | Failure (F) |
|---|---|---|---|---|---|
| 1. Group Work | Application of class materials and teamwork | Excellent | Good | Marginal | Failure |
| 2. Individual Coursework | Application of class materials | Excellent | Good | Marginal | Failure |
| 3. Test | Understanding of class materials | Excellent | Good | Marginal | Failure |

**Part III   Other Information**

**1.    Keyword Syllabus**

- Statistical estimation and hypothesis testing
- Data collection, data analysis, and model prediction
- Regression modeling and analysis
- Design and analysis of Experiments
- Analysis of Variance modeling
- Process estimation and prediction
- Process characterization and improvement
- Robust design and parameter design

**2.    Reading List**
**2.1   Compulsory Readings**

| 1. | Applied Linear Statistical Models by Kutner, Nachtsheim, Neter, and Li, 5th edition, McGraw Hill |
|---|---|
| 2. | Lecture notes |

**2.2   Additional Readings**

*NIL*