

City University of Hong Kong
Course Syllabus

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

Part I Course Overview

Course Title: Applied Probability and Statistics

Course Code: ADSE8203

Course Duration: One semester

Credit Units: 3

Level: R8

Medium of Instruction: English

Medium of Assessment: English

Prerequisites: Nil

Precursors: Nil

Equivalent Courses: SEEM8203 Applied Probability and Statistics (offered until 2021/22)

Exclusive Courses: Nil

Part II Course Details

1. Abstract

This course provides students with a solid foundation of the concepts, theory, and methods in probability and statistics, including random variable and distributions, statistical estimation and inference methods, and multivariate statistics and linear models. Emphasis will be placed on intuitive and rigorous understanding of the fundamentals of probability statistics but implementation of the methods via computer programming in R or Matlab will be an important part of the course as well.

2. Course Intended Learning Outcomes (CILOs)

| No. | CILOs | Weighting (if applicable) | Discovery-enriched curriculum related learning outcomes (please tick where appropriate) | | |
|-----|--|------------------------------|---|----|----|
| | | | A1 | A2 | A3 |
| 1. | Define the various fundamental concepts and principles in probability and statistics. | 30% | ✓ | ✓ | |
| 2. | Derive probability theory and statistical inference formulas and procedures from given assumptions. | 20% | ✓ | ✓ | |
| 3. | Perform probability analysis for real-world problems | 25% | | ✓ | ✓ |
| 4. | Perform statistical analysis for the real-world problems. | 25% | ✓ | | ✓ |
| | | 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)

| TLA | Brief Description | CILO No. | | | | | Hours/week (if applicable) |
|------------------------|--|----------|---|---|---|---|----------------------------|
| | | 1 | 2 | 3 | 4 | 5 | |
| Large Class Activities | Learning through teaching is primarily based on lectures. Mini-lectures and tutorials will be used to facilitate understanding and applications of various concepts and methods. | ✓ | ✓ | ✓ | ✓ | ✓ | 26 hrs/ semester |
| Tutorial Exercises | The homework exercises provide students with the opportunities to familiarize themselves with the methods learnt during the lectures. | ✓ | ✓ | ✓ | ✓ | ✓ | 21 hrs/ semester |

4. Assessment Tasks/Activities (ATs)

| Assessment Tasks/Activities | CILO No. | | | | | Weighting | Remarks |
|--|----------|---|---|---|---|-----------|---------|
| | 1 | 2 | 3 | 4 | 5 | | |
| Continuous Assessment: <u>75</u> % | | | | | | | |
| Midterm exam | ✓ | ✓ | ✓ | ✓ | ✓ | 25% | |
| Assignments | ✓ | ✓ | ✓ | ✓ | ✓ | 50% | |
| Examination: <u>25</u> % (duration: 2 hrs , if applicable) | | | | | | | |
| | | | | | | 100% | |

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

5. Assessment 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) |
|-----------------|---|--------------------------|-----------------|-------------------------|----------------|
| 1. Assignments | Students' ability to apply relevant procedures, draw informed conclusions in probability theory, data analysis, and perform statistical analysis. | Excellent | Good | Marginal | Failure |
| 2. Midterm exam | It assesses students' understanding of the concepts, theory, and methods. | Excellent | Good | Marginal | Failure |
| 3. Final exam | It assesses students' understanding of the concepts, theory, and methods. | Excellent | Good | Marginal | Failure |

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) |
|-----------------|---|--------------------------|---------------------|---------------------|-----------------|-----------------------------------|
| 1. Assignments | Students' ability to apply relevant procedures, draw informed conclusions in probability theory, data analysis, and perform statistical analysis. | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| 2. Midterm exam | It assesses students' understanding of the concepts, theory, and methods. | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| 3. Final exam | It assesses students' understanding of the concepts, theory, and methods. | High | Significant | Moderate | Basic | Not even reaching marginal levels |

Part III Other Information

1. Keyword Syllabus

- Random variables
- Discrete and continuous random variables
- Point Estimation
- Confidence Intervals
- Hypothesis Testing
- Linear Regression
- Analysis of Variance

2. Reading List

2.1 Compulsory Readings

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| 1. | Wasserman, L. (2013). <i>All of statistics: a concise course in statistical inference</i> . Springer Science & Business Media. |
|----|--|

2.2 Additional Readings

| | |
|----|---|
| 1. | Khuri, A. I. (2003). <i>Advanced calculus with applications in statistics</i> (Vol. 486). John Wiley & Sons. |
| 2. | Rosenthal, J. S. (2006). <i>A first look at rigorous probability theory</i> . World Scientific Publishing Co Inc. |
| 3. | Blitzstein, J. K., & Hwang, J. (2014). <i>Introduction to probability</i> . CRC Press. |
| 4. | Martinez, W. L., & Martinez, A. R. (2007). <i>Computational statistics handbook with MATLAB</i> (Vol. 22). CRC press. |
| 5. | Manuel D. Rossetti. (2015). <i>Simulation Modeling and Arena</i> , 2nd Edition. Wiley. |