Subject Description Form

Subject Code	DSAI1103
Subject Title	Principles of Data Science
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This course introduces students to the fundamental concepts of probability, descriptive statistics, and statistical estimation and inference.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply knowledge on descriptive statistics to organize and summarize data; b. develop and apply probabilistic concepts to synthesize information and solve problems; c. find confidence intervals for the sample mean, sample variance and sample proportion; d. discuss the concepts of hypothesis testing, including the type I error, type II error, and one-sided and two sided tests; e. demonstrate the abilities of logical and analytical thinking.
Subject Synopsis/ Indicative Syllabus	**Descriptive Statistics** Variables; types of data; data collection and sampling techniques; frequency distributions; tables; graphs; measures of central tendency, variation and position. **Introduction to Probability** Experiment; events and probability; counting rules; conditional probability; independence; Bayes' Theorem. **Random Variables** Probability mass function; introduction to discrete random variables including binomial, Poisson, hypergeometric; expectation and variance; probability density function; introduction to continuous random variables including normal and chi-square; central limit theorem. **Estimation** Sampling distributions: mean, proportion and differences; confidence intervals: mean, proportion, variance and differences. **Hypothesis Testing** Type I and Type II errors; hypothesis testing: mean, proportion, variance and differences.

<table>
<tr><td>Teaching/Learning Methodology</td><td>The course will be delivered primarily through lectures and tutorials. Lectures will introduce the basic concepts outlined in the syllabus, which will be reinforced through learning activities, including demonstrations, tutorial exercises and assignments.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>1. Assignments</td><td>15 %</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Mid-term Test</td><td>25 %</td><td>✓</td><td>✓</td><td></td><td></td><td>✓</td></tr>
<tr><td>3. Examination</td><td>60 %</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="5"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The subject focuses on knowledge, skills and understanding of Basic Probability and Statistics, thus, Exam-based assessment is the most appropriate assessment method, including 25% mid-term test and 60% examination. Additionally, 15% of grades is based on assignments, which serve as a component of continuous assessment so as to keep the students' learning in progress.
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<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Assignments</td><td>20 Hrs.</td></tr>
<tr><td>▪ Self-study</td><td>58 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>117 Hrs.</td></tr>
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<tr><td>Reading List and References</td><td>Bluman, AG. Elementary Statistics: A step by step approach, 11th ed. McGraw-Hill 2022.

Mendenhall, W., Beaver, R.J. & Beaver, B.M. Introduction to Probability and Statistics. 15th ed. Thomson 2019</td></tr>
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