Subject Description Form

Subject Code	AMA2104
Subject Title	Probability and Engineering Statistics
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	The lectures aim to provide students with an integrated knowledge required for the understanding and application of statistical techniques. To develop students' ability for logical thinking and effective communication, tutorial and presentation sessions will be held.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. apply mathematical reasoning to analyze essential features of different statistical problems in engineering; 2. apply appropriate probabilistic techniques to model and solve problems in engineering; 3. make use of stochastic and Markov processes to solve typical engineering problems; 4. search for useful information and use statistical software in solving statistical problems in the context of engineering.
Subject Synopsis/ Indicative Syllabus	1. Probability Theory Probability and random variables; Probability distributions; Sampling distributions; Sampling means; The Central Limit Theorem; Significance and test of hypothesis. 2. Stochastic Process Bernoulli process; Poisson process; time averaging and ergodicity; Spectral analysis; Correlation and spectra; Wiener-Khintchine theorem; White noise; Narrow-band noise; thermal noise; Signal-to-noise ratio and probability of error; Effective noise temperature and noise figure.

<table>
<tr><td></td><td>3. <u>Markov Process</u>
Recursions and Markov chains; Applications to queuing theory; Birth-death process.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>A two hour mass lecture will be conducted each week to initiate students into the ideas, concepts and techniques of the topics in the syllabus, which is then reinforced by a one hour tutorial designed to consolidate and develop students' knowledge through discussion and practical problem solving.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><th rowspan="2">Specific assessment methods</th><th rowspan="2">% weighting</th><th colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>1. Continuous Assessment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="4"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Continuous Assessment comprises of assignments, in class quizzes, online quizzes and a mid-term test. A 3-hour examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess the student's level of understanding of the basic concepts and their ability to use mathematical and statistical techniques in solving problems in science and engineering.</td></tr>
</table>

Student Study Effort Expected	**Class contact:**	
	▪ Lecture	26 Hrs.
	▪ Tutorial	13 Hrs.
	▪ Mid-term Test and Examination	5 Hrs.
	Other student study effort:	
	▪ Assignments and self-study	73 Hrs.
	Total student study effort:	117 Hrs.
Reading List and References	**Textbooks:** 1. D. McDonald, *Elements of Applied Probability: for Engineering, Mathematics and Systems Science*, World Scientific, 2004. 2. A.H. Haddad, *Probabilistic Systems and Random Signals*, Prentice-Hall, 2006. **Reference Books:** 1. R.E. Walpole, R.H. Myers, S.L. Myers and K.Y. Ye, *Probability and Statistics for Engineers and Scientists*, 9th ed., Prentice-Hall, 2012. 2. A.V. Balakrishnan, *Introduction to Random Processes in Engineering*, Wiley-Interscience, 2005.	