Subject Description Form

Subject Code	AMA1110
Subject Title	Basic Mathematics I – Calculus and Probability & Statistics
Credit Value	3
Level	1
Pre-requisite /Co-requisite / Exclusion	Nil
Objectives	This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. apply analytical reasoning to solve problems in science and engineering; 2. make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations; 3. apply mathematical modeling in problem solving; 4. demonstrate abilities of logical and analytical thinking.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcomes 4 and 5. Category B: Attributes for all-roundedness • Programme Outcomes 9 and 10.
Subject Synopsis/ Indicative Syllabus	**Elementary calculus** Limit and continuity, derivatives and their geometric meaning, rules of differentiation including chain rule, Leibniz's rule and L'Hopital's rule, exponential and logarithmic functions, trigonometric functions and their inverses, hyperbolic and inverse hyperbolic functions, applications of differential calculus in optimization. **Elementary Probability and Statistics** Descriptive statistics, random variables, probability and probability distributions, binomial, Poisson and normal distributions, applications. Population and random samples. Sampling distributions related to sample mean, sample proportions, and sample variances. Concepts of a point estimator and a confidence interval. Point and interval estimates of a mean and the difference between two means.
Teaching/Learning Methodology	Basic concepts and elementary techniques of limit, differential calculus, probability and statistics will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		1	2	3	4
1. Homework, quizzes and mid-term test	50%	✓	✓	✓	✓
2. Examination	50%	✓	✓	✓	✓
Total	100 %				

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

Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.

To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.

Student Study Effort Expected		
	Class contact:	
	• Lecture	26 Hours
	• Tutorial	13 Hours
	Other student study effort:	
	• Homework and self study	81 Hours
	Total student study effort:	**120 Hours**

Reading List and References

1. K.C. Chung, *A Short Course in Calculus and Matrices*, McGraw Hill 2013.
2. K.F. Hung, Wilson Kwan, T.Y. Pong, *Foundation Mathematics & Statistics*, McGraw Hill 2013.
3. R Larson, B. Edwards, *Single Variable Calculus*, Brooks/Cole 2012.
4. R.E. Walpole, R.H. Myers, S.L. Myers, K. Ye, *Probability and Statistics for Engineers and Scientists*, Prentice Hall, 2012.

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Prepared by	AMA Department