Subject Description Form

Subject Code	AMA1140
Subject Title	Mathematics for Construction and Environment
Credit Value	3
Level	1
Pre-requisite	Nil
Exclusion	Calculus and Linear Algebra (AMA1007) Basic Mathematics I – Calculus and Probability & Statistics (AMA1110) Calculus for Engineers (AMA1130) Calculus (AMA1131) Foundation Mathematics for Accounting and Finance (AMA1500) Calculus (AMA1702)
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 Learning Outcomes	Upon completion of the subject, students will be able to: (a) apply analytical reasoning to solve problems in engineering; (b) master the basics of calculus and its applications in engineering; (c) make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations; (d) demonstrate abilities of logical and analytical thinking.
Subject Synopsis/ Indicative Syllabus	Elementary calculus: Limit and continuity, derivatives and their geometric meaning, rules of differentiation, the derivatives of functions involving algebraic functions, trigonometric functions, inverse trigonometric functions, exponential functions and logarithmic functions, applications. - Concepts of definite and indefinite integrals, fundamental theorem of calculus, integration by parts, integration of rational functions using partial fractions, applications. Elementary Probability and Statistics: Descriptive statistics, random variables, probability and probability distributions, binomial and normal distributions, applications.

<table>
<tr><td></td><td>- Population and random samples. Sampling distributions related to sample mean. Concepts of a point estimator and a confidence interval. Point and interval estimates of a mean.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Emphasis is placed on a pro-active learning approach. Fundamental knowledge will be introduced in the lectures, with interspersed questions, exercises and quizzes for class discussion and after class self study. Formal tutorial classes will be conducted (1 hour per week), with additional worked examples and tutorial sheets being discussed. Students will be expected to read up, do exercises and reflect critically on the material covered in class.</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="4">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></tr>
<tr><td>1. Coursework</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>
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The coursework (continuous assessment) components include homework assignments, quizzes and midterm test. Students are assigned with certain problem sets and are required to explain and elaborate the answers in written format. This will allow the instructors to observe and assess individual student’s achievement of a particular learning outcome based on the coverage of the assigned problem set questions.
Final examination is used to gauge how much students have understood the overall subject contents and to assess students’ achievement of all learning outcomes.
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 elementary calculus and elementary statistics. 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.
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<tr><td rowspan="2">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hrs.</td></tr>
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	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Homework and self-study	81 Hrs.
	Total student study effort	120 Hrs.
Reading List and References	Chung, K.C. *A Short Course in Calculus and Matrices*, McGraw Hill 2013. Hung, K.F., Kwan, Wilson, Pong, T.Y. *Foundation Mathematics & Statistics*, McGraw Hill 2013. Thomas, GB, Weir, MD, & Hass, JR. Thomas' Calculus Early Transcendentals 14th ed. Pearson Education 2017. James Stewart, Calculus. 8th ed, Cengage Learning 2016 . Walpole, R.E., Myers, R.H., Myers, S.L. Ye, K. *Probability and Statistics for Engineers and Scientists*, Prentice Hall, 2012.	