Subject Description Form

Subject Code	AMA1131
Subject Title	Calculus
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) Foundation Mathematics for Accounting and Finance (AMA1500) Calculus (AMA1702)
Objectives	To acquire knowledge of calculus up to first year university level, and to apply these tools for their feasible solution of practical problems in engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. master the basics of differentiation and recognize its usefulness applications in engineering problems; b. master the basics of integration and recognize its usefulness applications in engineering problems; c. apply the basics of calculus in formulating and applying to engineering problems;
Subject Synopsis/ Indicative Syllabus	1. 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. Mean Value Theorem in differentiation. 2. Definite and indefinite integrals, fundamental theorem of calculus, methods of integration (integration by substitution, integration by parts, integration of rational functions using partial fractions and integration of trigonometric and hyperbolic functions), reduction formulas, applications to geometry and engineering. Mean Value Theorem in integration.
Teaching/Learning Methodology	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

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<tr><td></td><td>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. A companion web site-cum-discussion forum will be available to facilitate questioning and discussion. Additional face-to-face discussion sessions can be arranged on request.</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="3">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1.Coursework</td><td>40</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Final Examination</td><td>60</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="3"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

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.</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorials</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Coursework and Self Study</td><td>81 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>120 Hrs.</td></tr>
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<tr><td>Reading List and References</td><td>Hung, KF, Kwan, WCK, Pong, GTY. Foundation Mathematics & Statistics. McGraw Hill 2013.</td></tr>
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	Thomas, GB, Weir, MD, & Hass, JR. Thomas' Calculus Early Transcendentals 14th ed. Pearson Education 2017. Lang, S. A First Course in Calculus, 3rd ed., Springer Verlag, 1986. James Stewart, Calculus. 8th ed, Cengage Learning 2016 Thomas, G.B., Weir, M.D. & Hass, J, Thomas' Calculus 14th edition, Pearson 2017