

Subject Description Form

Subject Code	AMA1707
Subject Title	Introduction to Calculus
Credit Value	3
Level	1
Pre-requisite/ Co-requisite	Nil
Exclusion	Calculus and Linear Algebra (AMA1007) Calculus and Linear Algebra (AMA10071) 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 will provide students with a foundational understanding of calculus, including the concepts of limits, derivatives, and integrals, and simple linear differential equations to equip them with the skills to apply these concepts to solve problems in chemical and life science- related fields.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply mathematical reasoning to solve problems in science discipline. b. make use of the knowledge of mathematical techniques and adapt known solutions to various situations c. apply mathematical modeling in problem solving in applied sciences d. develop and extrapolate mathematical concepts in solving new problems
Subject Synopsis/ Indicative Syllabus	Review of basic algebra; Functions and inverse functions; Trigonometric functions, Logarithmic and exponential functions. Limit and continuity; Rates of change, Derivatives, Rules of differentiation, Implicit differentiation; Optimization (Maxima and Minima); Curve sketching; Linear approximation.

	<p>Definite and indefinite integrals; Methods of integration; Fundamental Theorem of Calculus; Improper Integrals;</p> <p>Applications to chemical and life sciences disciplines including exponential growth and decay and simple linear differential equations.</p>																																
Teaching/Learning Methodology	<p>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.</p>																																
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th></tr> <tr> <th>a</th><th>b</th><th>c</th><th>d</th></tr> </thead> <tbody> <tr> <td>1. Tests/assignments</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> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>By learning how to solve a collection of theoretical and practical mathematical problems designed and distributed in assignments, tests and examination, the students will master the basic techniques in calculus and linear algebra, and will be able to apply the techniques to model and solve simple practical problems in their discipline.</p>					Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				a	b	c	d	1. Tests/assignments	40%	✓	✓	✓	✓	2. Examination	60%	✓	✓	✓	✓	Total	100 %				
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Student Study Effort Expected	Class contact:																																
	▪ Lecture			26 Hrs.																													
	▪ Tutorial			13 Hrs.																													

	Other student study effort:	
	▪ Self-study	66 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	<p>K.C. Chung. A Short Course in Calculus and Matrices. McGraw Hill 2013</p> <p>K.F. Hung, Wilson C.K. Kwan and Glory T.Y. Pong. Foundation Mathematics & Statistics. McGraw Hill 2013</p> <p>James Stewart. Calculus. 8th ed. Cengage Learning 2016</p> <p>Thomas, G.B., Weir, M.D. & Hass, J. Thomas' Calculus 14th ed. Pearson Education, Inc. 2017</p> <p>Howard Anton & Chris Rorres. Elementary Linear Algebra 11th ed. John Wiley and Sons 2013</p> <p>Erin N. Bodine, Suzanne Lenhart, and Louis J. Gross, Mathematics for the Life Sciences, Princeton University Press 2014</p>	