Subject Description Form

Subject Code	AMA2707
Subject Title	Intermediate Calculus and Linear Algebra
Credit Value	3
Level	2
Pre-requisite	Calculus and Linear Algebra (AMA1007) or Basic Mathematics II – Calculus and Linear Algebra (AMA1120) or Calculus for Engineers (AMA1130) or Calculus (AMA1131) or Foundation Mathematics for Accounting and Finance (AMA1500) or Calculus (AMA1702)
Exclusion	Intermediate Calculus and Linear Algebra (AMA2007) Mathematics I (AMA2111) Mathematics II (AMA2112) Mathematics for Engineers (AMA2131/AMA2308) Engineering Mathematics (AMA2380) Applied Mathematics I (AMA2511) Applied Mathematics II (AMA2512) Mathematics for Scientists and Engineers (AMA2882) Engineering Mathematics (AMA290)
Objectives	This subject aims to introduce students to the basic concepts and applications of elementary calculus and matrices. 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 the differentiability of multivariable functions to compute derivatives using various rules of differentiation; apply differential calculus to calculate rates of change, locate local extrema; (b) develop the concept of multiple integral of a function of several variables over a plane or space domain and evaluate multiple integrals; (c) perform basic operations of matrix algebra and apply them to study system of linear equations; (d) discuss the basic concepts of vector space, linear transformations and inner product; (e) apply the techniques of linear algebra to problems in applied mathematics
Subject Synopsis/ Indicative Syllabus	**Calculus:** *Differential Calculus for functions of several variables:* Partial derivatives; chain rule; Taylor's Formula; relative extrema; Lagrange multipliers; linear and nonlinear constrained optimization.

Multiple Integrals:
Double and triple integrals; the change of variables formula.

Linear algebra:
Basic properties of matrices, linear systems, linear dependence; inner product, norm; orthogonality; Gram-Schmidt orthogonalization process; diagonalization of symmetric matrices; eigenvalues and eigenvectors.

Teaching/Learning Methodology

Basic concepts and elementary techniques of differential and integral calculus and linear algebra 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)				
		a	b	c	d	e
1. Homework and mid-term test	40%	✓	✓	✓	✓	✓
2. Examination	60%	✓	✓	✓	✓	✓
Total	100 %					

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The subject focuses on knowledge, skills and understanding of **Intermediate Calculus and Linear Algebra**, thus, Exam-based assessment is the most appropriate assessment method, including 60% examination. Continuous Assessment methods comprising individual assignments and tests (40%) are included so as to keep the students in progress. A written examination is held at the end of the semester.

Student Study Effort Expected

Class contact:	
Lecture	26 Hrs.
Tutorial	13 Hrs.
Other student study effort:	
Homework and self-study	78 Hrs.
Total student study effort	117 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.
Anton, H., Elementary Linear Algebra 10th edition, John Wiley & Sons 2010.
Larson, R. *Elementary Linear Algebra*, Brooks/Cole 2013.
Chan, C.K, Chan, C.W., Hung, K.F., *Basic Engineering Mathematics,* McGraw Hill 2011.