Subject Description Form

<table>
<tr><td>Subject Code</td><td>AMA2702</td></tr>
<tr><td>Subject Title</td><td>Multivariable Calculus</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>2</td></tr>
<tr><td>Pre-requisite</td><td>Calculus (AMA1702) or equivalent</td></tr>
<tr><td>Exclusion</td><td>Mathematical Methods for Finance (AMA2703)</td></tr>
<tr><td>Objectives</td><td>This subject is to introduce students to the ideas and techniques of multivariable calculus and their applications.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon satisfactory completion of the subject, students should 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; apply the idea of Lagrange multiplier to constrained optimization problems;
b. develop the concept of multiple integral of a function of several variables over a plane or space domain and evaluate multiple integrals;
c. apply the techniques of multivariable calculus to real life problems.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>Differential Calculus for functions of several variables
Limits and Continuity of multivariable functions; partial derivatives; chain rule; directional derivatives and gradient vectors; Taylor’s formula; relative extrema; Lagrange multipliers; implicit differentiation; applications.

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

Vector Calculus
Vector fields; line and surface integrals; Green’s Theorem; divergence theorem and Stokes’ theorem.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The subject will be delivered mainly through lectures and tutorials. The lectures will be conducted to provide the students with an integrated knowledge required for the understanding of the basic mathematical concepts and techniques. To develop students’ ability for logical thinking, effective communication and ability to apply the theory they learn in lectures, tutorial and presentation sessions will be held.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning</td><td>
<table>
<tr><td>Specific assessment methods/tasks</td><td>% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td></td><td></td><td>a</td><td>b</td><td>c</td></tr>
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Outcomes

1. Assignments / Quizzes	15%	✓	✓	✓
2. Tests	25%	✓	✓	
3. Examination	60%	✓	✓	✓
Total	100 %			

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The subject focuses on knowledge, skill and understanding of **Multivariable Calculus**, thus, **Exam-based assessment** is the most appropriate assessment method, including 25% tests and 60% examination. Moreover, 15% worth of assignments and quizzes are included as a component of continuous assessment so as to keep the students in progress.
Continuous Assessment comprises of assignments and/or quizzes, and tests. 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 Other student study effort:	
• Self Study	33 Hrs.
• Assignments	33 Hrs.
Total student study effort	105 Hrs.

Reading List and References

References:

Stewart, J.	Calculus, 8th edition	Cengage Learning, 2016
Thomas, G.B., Weir, M.D. & Hass, J.R.	Thomas' Calculus, 14th edition	Pearson, 2018