

## Subject Description Form

<b>Subject Code</b>	AMA251
<b>Subject Title</b>	Further Calculus
<b>Credit Value</b>	3
<b>Level</b>	2
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Pre-requisite: Calculus (AMA140 or AMA150 or AMA150A)
<b>Objectives</b>	<p>This subject is to provide an introduction to two variable calculus and the basic theory of ordinary differential equations and their applications to solving problems in sciences and engineering.</p> <p>This subject is a continuation of AMA150. It introduces the concepts and skills of Calculus of functions of several variables. It is of essential importance in disciplines such as multivariate statistics, differential equations, financial mathematics and optimization. The emphasis will be on the basic understanding of the concepts, techniques and applications.</p>
<b>Intended Learning Outcomes</b>	<p>Upon satisfactory completion of the subject, students should be able to:</p> <ol style="list-style-type: none"> <li>1. discuss the concepts of limit and continuity;</li> <li>2. develop the understanding of partial derivative and its geometric meaning, and compute derivatives using appropriate rules of differentiation;</li> <li>3. apply differential calculus to calculate rates of change, locate local extrema and approximate <math>\Delta f</math> by the total differential of <math>f</math>;</li> <li>4. apply the idea of Lagrange Multiplier to constrained optimization problems;</li> <li>5. develop the concept of multiple integral and evaluate multiple integrals by iterated integrals;</li> <li>6. evaluate multiple integrals by the Change of Variables Formula;</li> <li>7. apply multiple integration to problems in geometry and physics.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><i>Differential Calculus for functions of several variables: (20 hours)</i> Partial derivatives, total differential, chain rule, Taylor's Formula, relative extrema, Lagrange multipliers, applications.</p> <p><i>Multiple Integrals: (19 hours)</i> Multiple integral for function of two variables; change of variables, geometric and physical applications.</p>
<b>Teaching/Learning Methodology</b>	<p>The subject will be delivered mainly through lectures and tutorials. The lectures aim to further development students understanding and skills in calculus with AMA150 as a basis. The emphasis will be on the differential and integral calculus for functions of several variables. Applications on geometry, statistics, physics and engineering will also be addressed.</p>

<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	Specific assessment methods	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						
			1	2	3	4	5	6	7
	a. Assignments/Quizzes	20%	✓	✓	✓	✓	✓	✓	✓
	b. Tests	20%	✓	✓	✓	✓			
	c. Examination	60%	✓	✓	✓	✓	✓	✓	✓
Total	100 %								
<p>Continuous Assessment comprises of assignments and/or quizzes, and tests. A written examination is held at the end of the semester.</p> <p>To pass this subject, students are required to obtain Grade D or above in <b>both</b> the Continuous Assessment and the Examination components.</p>									
<b>Student Study Effort Required</b>	Class contact:								
	▪ Lecture		26 Hrs.						
	▪ Tutorial and Student Presentations		13 Hrs.						
	Other student study effort:								
	▪ Assignment		39 Hrs.						
	▪ Self-study		39 Hrs.						
	Total student study effort		117 Hrs.						
<b>Reading List and References</b>	<u>Textbook:</u>								
	Stewart, James	Calculus 7 <sup>th</sup> ed.	Brooks Cole Cengage Learning, c2012						
	<u>References:</u>								
	Stein, S.K. & Barcellos, A.	Calculus and Analytic Geometry 5 <sup>th</sup> edition	McGraw Hill 1992						
Thomas, G.B., Weir, M.D. & Hass, J.R.	Thomas' Calculus 12 <sup>th</sup> edition	Addison Wesley 2009							