

## Subject Description Form

<b>Subject Code</b>	AMA1120
<b>Subject Title</b>	Basic Mathematics II –Calculus and Linear algebra
<b>Credit Value</b>	3
<b>Level</b>	1
<b>Pre-requisite</b>	Basic Mathematics I – Calculus and Probability & Statistics (AMA1110)
<b>Objectives</b>	This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.
<b>Intended Learning Outcomes</b>	Upon completion of the subject, students will be able to: <ul style="list-style-type: none"> <li>a. Apply analytical reasoning to solve problems in science and engineering;</li> <li>b. Make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations;</li> <li>c. Apply mathematical modeling in problem solving;</li> <li>d. Demonstrate abilities of logical and analytical thinking.</li> </ul>
<b>Contribution to Programme Outcomes (Refer to Part I Section 10)</b>	<ul style="list-style-type: none"> <li>▪ Programme Outcome 1: Demonstrate an ability to apply knowledge of mathematics, science, and engineering appropriate to the Biomedical Engineering (BME) discipline. (Teach)</li> </ul>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Elementary calculus:</b> Mean Value Theorem with applications to optimization and curve sketching. 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 physics. Improper Integrals.</p> <p><b>Linear algebra:</b> Basic properties of matrices and determinants, linear systems, Gaussian elimination, inverse of a square matrix, Cramer’s rule, vectors in 2-space or in 3-space, applications to geometry.</p>
<b>Teaching/Learning Methodology</b>	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
1.Homework, quizzes and mid-term test	40%	✓	✓	✓	✓
2. Examination	60%	✓	✓	✓	✓
Total	100 %				

Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess students’ level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.

To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

*The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students’ progress in the course.*

**Student Study Effort Expected**

Class contact:	
▪ Lecture	26 Hrs.
▪ Tutorial	13 Hrs.
Other student study effort:	
▪ Homework and self-study	81 Hrs.
Total student study effort	120 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
- Larson, R., Edwards, B. *Single Variable Calculus*, Brooks/Cole 2012
- Larson, R. *Elementary Linear Algebra*, Brooks/Cole 2013