

Subject Description Form

Subject Code	AMA2112
Subject Title	Mathematics II
Credit Value	3
Level	2
Pre-requisite	Mathematics I (AMA2111)
Exclusion	Intermediate Calculus and Linear Algebra (AMA2007/AMA2707) Introduction to Differential Equations (AMA2008)
Objectives	This subject is a continuation of AMA2111. It aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> 1. apply mathematical reasoning to analyze essential features of different problems in science and engineering; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; 3. develop and extrapolate the mathematical concepts in synthesizing and solving new problems 4. demonstrate abilities of logical and analytical thinking; 5. search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	<ol style="list-style-type: none"> 1. <u>Multiple integrals</u> Double and triple integrals, change of variables, applications to problems in geometry and mechanics. 2. <u>Vector calculus</u> Vector and scalar fields, the del operator, line and surface integrals, the theorems of Green, Gauss and Stokes, applications to electromagnetic theory and fluid mechanics. 3. <u>Series expansion</u> Infinite series, Taylor's expansion, Fourier series expansion of a periodic function.

	<p>4. <u>Partial differential equations</u> Formulation of PDE of mathematical physics, separation of variables, initial-boundary value problems, introduction to Fourier transforms.</p>																																					
Teaching/Learning Methodology	<p>The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.</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="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>1. Assignments, quizzes and mid-term test</td> <td>40%</td> <td>✓</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> <td>✓</td> </tr> <tr> <td>Total</td> <td>100%</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					1	2	3	4	5	1. Assignments, quizzes and mid-term test	40%	✓	✓	✓	✓	✓	2. Examination	60%	✓	✓	✓	✓	✓	Total	100%					
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<p>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.</p> <p>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.</p> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p><i>The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. 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.</i></p>																																						
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**Reading List and
References**

1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, McGraw-Hill, 2015.
2. Anton, H. *Elementary Linear Algebra* (11th edition). Wiley, 2014.
3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley.
4. James, G. (2015). *Modern Engineering Mathematics*, 5th ed. Pearson Education Limited
5. Thomas, G. B., Weir, M. D. & Hass, J. R. *Thomas' Calculus*, 14th ed. Pearson Education 2017