

Subject Description Form

Subject Code	AMA3707
Subject Title	Real Analysis
Credit Value	3
Level	3
Pre-requisite	Nil
Exclusion	Real Analysis (AMA3007)
Objectives	The subject aims to introduce students to the fundamental concepts in real analysis and the nature and techniques of mathematical proofs.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a) understand the construction and properties of the real number system. b) understand limits and how they are used in sequences, series, functions, differentiation and integration, compute the limits and test the convergence of sequences, functions and series. c) comprehend the proofs of theorems and know when and how to apply the theorems in problems. d) construct rigorous mathematical proofs in real analysis.
Subject Synopsis/ Indicative Syllabus	<ol style="list-style-type: none"> 1. Sets operations; relations; functions; countable and uncountable sets; cardinality. 2. Construction and properties of real numbers; Dedekind cut; completeness; open, closed, compact and connected sets on the real line. 3. Limits of sequences; Cauchy sequence; subsequence and Bolzano-Weierstrass Theorem; properties and convergence of series. 4. Limits of functions; continuity and discontinuity; properties of continuous functions; The Intermediate Value Theorem and its applications. 5. Derivatives; differentiability and continuity; intermediate value property; The Mean Value Theorem and its applications. 6. Riemann integral; integrability; properties of the integral; The Fundamental Theorem of Calculus. 7. Sequences and series of functions; uniform convergence; power series and Taylor series.
Teaching/Learning Methodology	Concepts, theorems, examples and techniques of real analysis will be taught in lectures and students will learn the skills of problem solving in the tutorials.

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. Quizzes and Test	40%	✓	✓	✓	✓
	2. Exam	60%	✓	✓	✓	✓
	Total	100%				
<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on knowledge, skills and understanding of Real Analysis, thus, Exam-based assessment is the most appropriate assessment method, including 60% examination. Continuous Assessment methods comprising tests and quizzes (40%) are included so as to keep the students in progress. A written examination is held at the end of the semester.</p>						
Student Study Effort Expected	Class contact:					
	▪ Lectures		26 Hrs.			
	▪ Tutorials		13 Hrs.			
	Other student study effort:					
	▪ Homework and self-study		78 Hrs.			
	Total student study effort		117 Hrs.			
Reading List and References	<p>Introduction to Real Analysis, William F. Trench, Prentice Hall/Pearson Education, 2003 Analysis, With an introduction to Proof, 5th ed., Steven R. Lay, Pearson, 2014 Understanding Analysis, 2nd ed., Stephen Abbott, Springer, 2015 Transition to Analysis with Proof, Steven G. Krantz, CRC Press, 2018</p>					