

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	AMA3730
Subject Title	Complex Variables
Credit Value	3
Level	3
Pre-requisite	AMA2702 Multivariable Calculus
Objectives	The subject aims to introduce students to the fundamental concepts and techniques of complex analysis and their applications.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) understand the concepts and properties of the complex number system and analytic functions; (b) develop the concept of contour integrals and evaluate them; (c) understand the series form of functions with singularities and use it to study complex functions; (d) compute residues and use them to evaluate definite and indefinite integrals.
Subject Synopsis/ Indicative Syllabus	<u><i>Complex Numbers</i></u> Algebraic properties of complex numbers; products, quotients, powers and roots in exponential form; the complex plane. <u><i>Differentiation and Analytic Functions</i></u> Limits, continuity and derivatives for complex functions; Cauchy-Riemann equations; analytic functions; examples of elementary functions. <u><i>Integrals</i></u> Contour integrals; Cauchy-Goursat Theorem; Cauchy integral formula; Liouville's theorem and maximum modulus principle. <u><i>Series and Residuals</i></u> Taylor series and Laurent series; residues and poles; residue theorem; applications to definite and improper integrals; argument principle.
Teaching/Learning Methodology	Concepts, theorems, examples and techniques of complex 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. Assignments	10%	√	√	√	√
	2. Test	30%	√	√	√	√
	3. Exam	60%	√	√	√	√
	Total	100 %				
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on knowledge, skills and understanding of complex variables, thus exam-based assessment is the most appropriate assessment method, including 30% test and 60% examination. Continuous Assessment comprises of assignments and test. A written examination is held at the end of the semester.					
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	Complex Variables and Applications, 9 th ed, James Ward Brown & Ruel V. Churchill, McGraw-Hill, 2014 Complex Analysis, Theodore W. Gamelin, Springer, 2001 Complex Analysis, 3 rd ed, Lars V. Ahlfors, McGraw-Hill, 1979					