

**City University of Hong Kong
Course Syllabus**

**offered by Department of Mathematics
with effect from Semester A 2017/18**

Part I Course Overview

Course Title: Selected Topics in Applied Analysis

Course Code: MA8004

Course Duration: One Semester

Credit Units: 3

Level: R8

Arts and Humanities

Proposed Area:
(for GE courses only)

Study of Societies, Social and Business Organisations

Science and Technology

Medium of Instruction: English

Medium of Assessment: English

Prerequisites:
(Course Code and Title) Nil

Precursors:
(Course Code and Title) Nil

Equivalent Courses:
(Course Code and Title) Nil

Exclusive Courses:
(Course Code and Title) Nil

Part II Course Details

1. Abstract

This course aims to

- give research students a broad training on various analytic techniques in modern applied mathematics;
- develop students' ability in approaching more sophisticated mathematical problems with knowledge from applied analysis and applying them in their own research.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs [#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Explain at high level concepts from advanced complex analysis, including analyticity of functions and conformality of mappings	10%	✓	✓	
2.	State clearly function theoretic and structural properties of frequently used higher transcendental functions and special functions	20%	✓	✓	
3.	Analyze problems with layers by matched asymptotic expansions	20%	✓	✓	
4.	Analyze asymptotic behaviour of solutions of boundary value problems	20%	✓	✓	
5.	Construct perturbation expansions for solutions of algebraic equations	10%	✓	✓	✓
6.	Obtain uniformly valid composite expansions for solutions of boundary value problems	20%		✓	✓
		100%			

* If weighting is assigned to CILOs, they should add up to 100%.

Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5	6	
Lectures	Learning through teaching is primarily based on lectures	✓	✓	✓	✓	✓	✓	3 hours/week
Assignments	Learning through take-home assignments helps students implement techniques of applied analysis (e.g. asymptotic and perturbation methods) to solve differential and integral equations, and to characterize analytic properties of solutions	✓	✓	✓	✓	✓	✓	After class

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4	5	6		
Continuous Assessment: <u>50%</u>								
Test	✓	✓	✓	✓			25-50%	Questions are designed for the first part of the course to see how well students have learned techniques of advanced complex analysis, mathematical applications of special functions as well as asymptotic and perturbation methods.
Hand-in assignments	✓	✓	✓	✓	✓	✓	0-25%	These are skills based assessment to help students manipulate theory and techniques of applied analysis to solve differential and integral equations, and to study analytic properties of solutions.
Examination: <u>50%</u> (duration: 3 hours)	✓	✓	✓	✓	✓	✓	50%	Examination questions are designed to see how far students have achieved their intended learning outcome. Questions will primarily be skills and understanding based to assess the student's versatility in techniques of applied analysis.
							100%	

* The weightings should add up to 100%.

5. Assessment Rubrics

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Test	DEMONSTRATION of the understanding of the first part of the course	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand in assignments	DEMONSTRATION of the understanding of the basic materials	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	DEMONSTRATION of skills and versatility in applied analysis	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

Complex Analysis, ordinary differential equations, special functions, asymptotic methods, distribution theory, partial differential equations, waves, singular perturbations, stability, external problems.

2. Reading List

2.1 Compulsory Readings

1.	
2.	
3.	
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2.2 Additional Readings

1.	
2.	
3.	
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