

# City University of Hong Kong

## Information on a Course offered by Department of Mathematics with effect from Semester A in 2011 / 2012

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### Part I

Course Title: Selected Topics in Applied Mathematics I

Course Code: MA8011M

Course Duration: Throughout the years of the candidate's MPhil/PhD studies

No. of Credit Units: 3

Level: R8

Medium of Instruction: English

Prerequisites: (Course Code and Title) Nil

Precursors: (Course Code and Title) Advanced calculus, linear algebra, basic numerical computation knowledge, ordinary differential equations, introduction to partial differential equations

Equivalent Courses: (Course Code and Title) Nil

Exclusive Courses: (Course Code and Title) Nil

### Part II

#### 1. Course Aims:

This course is for research students under the Joint Research Supervision Collaboration Scheme with mainland universities. It aims to

- equip students with basic knowledge in different aspects of modern applied mathematics; and
- develop students' ability in applying new knowledge and methods to their research.

## 2. Course Intended Learning Outcomes (CILOs)

Upon successful completion of this course, students should be able to:

| No. | CILOs                                                                                                                     | Weighting (if applicable) |
|-----|---------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1.  | manipulate mathematical theory and computational techniques of selected advanced topics of applied mathematics.           | --                        |
| 2.  | formulate more sophisticated practical problems in terms of analytic and/or numerical methods.                            | --                        |
| 3.  | appreciate the development of new topics of applied mathematics from diverse classical branch(es) of related disciplines. | --                        |
| 4.  | explore research literature on topics investigated in classes.                                                            | --                        |
| 5.  | apply mathematical methods and techniques learnt from this course in their research appropriately.                        | --                        |

## 3. Teaching and Learning Activities (TLAs)

Indicative of likely activities and tasks students will undertake to learn in this course. Final details will be provided to students in their first week of attendance in this course.

| TLAs                                                                                                                                                                      | CILO No. | Hours/week                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------|
| Learning through teaching is primarily based on <b>lectures</b> .                                                                                                         | 1--5     | 39 hours in total<br>(consisting of 3-hour lectures) |
| Learning through <b>take-home assignments</b> helps students implement theory and computational techniques in selected topics of applied mathematics to diverse problems. | 1--2     | after-class                                          |

## 4. Assessment Tasks/Activities

100% Coursework (Attendance) on a Pass/Fail basis

| Assessment Tasks/Activities | CILO No. | Weighting (if applicable) | Remarks                                                                                                                                                                                                                                            |
|-----------------------------|----------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lecture attendance          | 1--5     | 100%                      | Attendance of lectures given by experts of specialized areas engages students in acquiring knowledge of more advanced topics of applied mathematics and developing their interest of exploring contemporary literature relevant to their research. |
| Hand-in assignments         | 1--2     | --                        | These are skills based assessment to help students implement theory and computational techniques in special topics of applied mathematics.                                                                                                         |

## **5. Grading of Student Achievement:**

Grading Pattern:

Standard

## **Part III**

Keyword Syllabus:

Asymptotic analysis. Change-point estimation for correlated sequences. Mathematical finance. Learning theory. Numerical methods and practical computation. Conservation laws and the Boltzmann equation. Modeling and computation of optical waveguides. Nonlinear dispersive waves in elastic media and phase transitions. Fluid mechanics and granular materials. Complexity theory and analysis of numerical algorithms. Selected topics in other applied mathematics areas.

Recommended Reading:

Text(s):

Online Resources: