香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

HKUST Dual Program 2022
(Introduction to Pre-stage Level: Mathematics)

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Program Coordinator of Mathematics

10 Sept 2022

Introduction of Dual Program (Mathematics) Structure

3-level progressive structure

Pre-stage Level *: Bridging Courses to Level 1

Level 1 *: Accelerated Matching Courses in Secondary School Level

Level 2 #: Introductory University Level

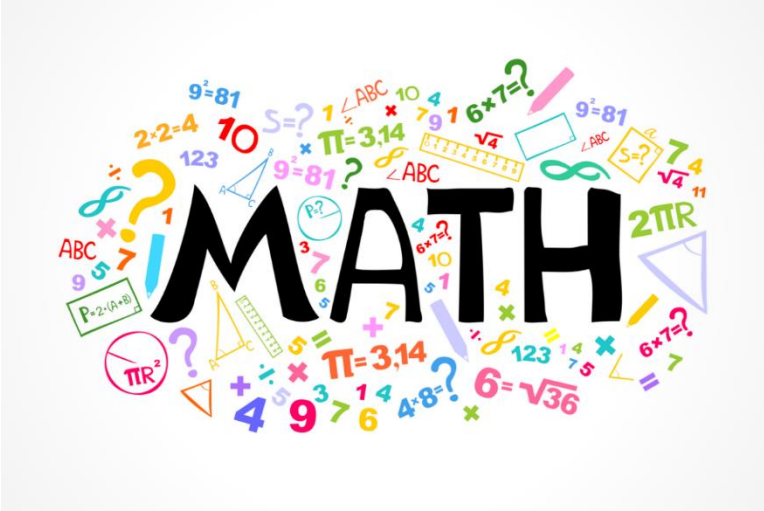
Level 3 #: University Level Courses on Specialized Subjects

*: Non credit-bearing

#: Credit-bearing

Aims of Pre-stage Level

- Equip students with basic and necessary **mathematics knowledge and techniques** (mostly in **Algebra**) for learning elementary Calculus
- Build up **good foundation** of mathematics for "Level 1" onwards
- Develop **appreciation of the beauty of mathematics** from different perspectives



About Pre-stage Course

Content:

Mainly based on selected topics of **HKDSE Core Mathematics**, with some **additional topics** delivered.

Course Instructors:

Dr. Hugo Wai Leung MAK (Class A, tentative)

Dr. Kwun Lun Alan CHU (Class B, tentative)

Common Lecture Notes (in English) will be used for all classes

Duration:

16 **"3-hour lectures"** plus 2 **"3-hour tutorials"**, **Saturdays** of **Nov 2022 – Apr 2023 (2:00 pm – 5:00 pm)**

https://cdgt.hkust.edu.hk/download/Dual_Program/2022/L1/Timetable/Schedule_PS_Math.pdf

Pre-requisites*:

Basic understanding of **elementary Algebra**.

Certain **mathematical maturity / related experience** will be a bonus.

**** From 2022/23 onwards, all applicants are required to sit for a screening test.***

The performance will be an important selection criteria.

About Pre-stage Course

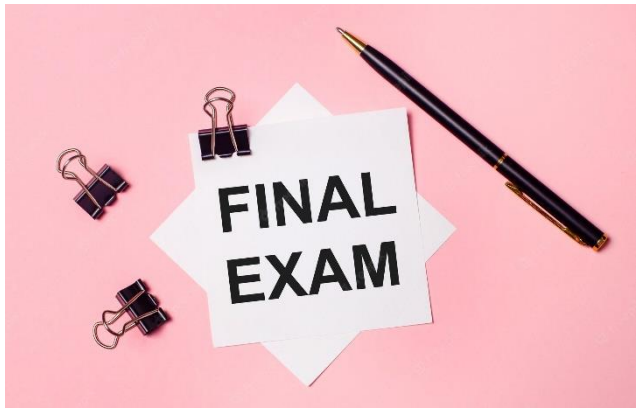
Assessment:

4 HWs (30%)

1 Midterm Test (28 Jan 2023) (30%)

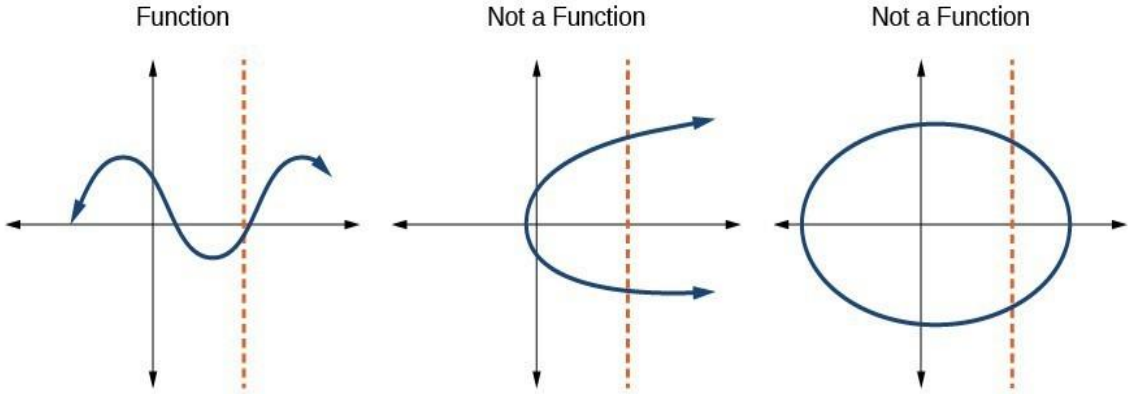
1 Final Examination (15 Apr 2023) (40%).

***Outstanding students will be promoted to DP Level 1.**



Topics Covered:

- Numbers and Basic Algebra
- Polynomials
- Basic Concepts of Functions
- Functions and its Geometric Applications
- Trigonometric Formulae
- Sequences and Series

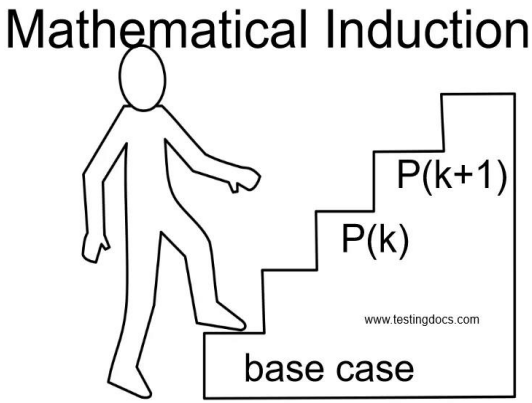


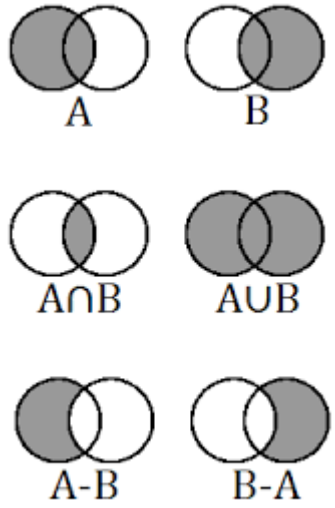
Brief Descriptions of Topics

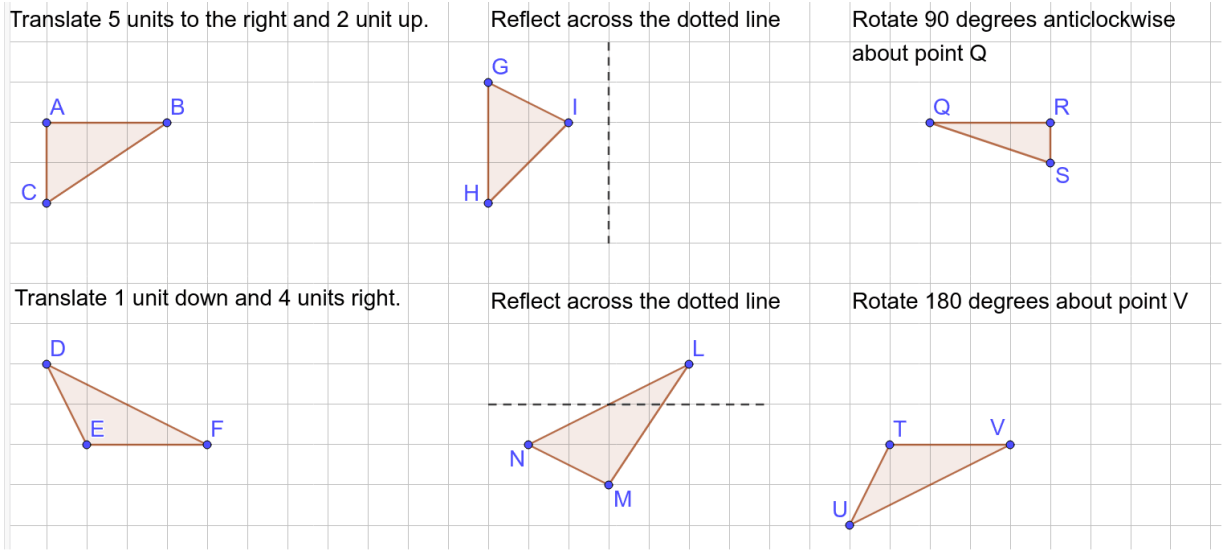
Numbers and Basic Algebra: Basic Set Theory and Number System, Mathematical Induction, Binomial Expansion, Proof by Contradiction etc.

Polynomials: Algebra of Polynomials, Partial Fraction Decomposition, Factor and Remainder Theorem

Functions and its Geometric Applications: Definition of a Function, Graphs of a Function, Trigonometric Functions and some Geometric Implications, Coordinate System, Translation and Rotation etc.







Brief Descriptions of Topics

Trigonometric Formulae: Double-Angle Formula, Sum to Product / Product to Sum

Sequences and Series:

Sigma notation
Arithmetic Sequence and Series
Geometric Sequence and Series
Applications

Sum to Product Formulas

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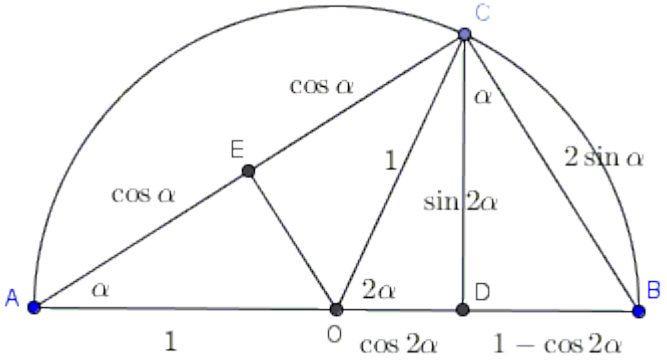
THE MATH EXPERT

$$\sin A + \sin B = 2 \sin\left(\frac{A+B}{2}\right) \cos\left(\frac{A-B}{2}\right)$$

$$\sin A - \sin B = 2 \sin\left(\frac{A-B}{2}\right) \cos\left(\frac{A+B}{2}\right)$$

$$\cos A - \cos B = -2 \sin\left(\frac{A+B}{2}\right) \sin\left(\frac{A-B}{2}\right)$$

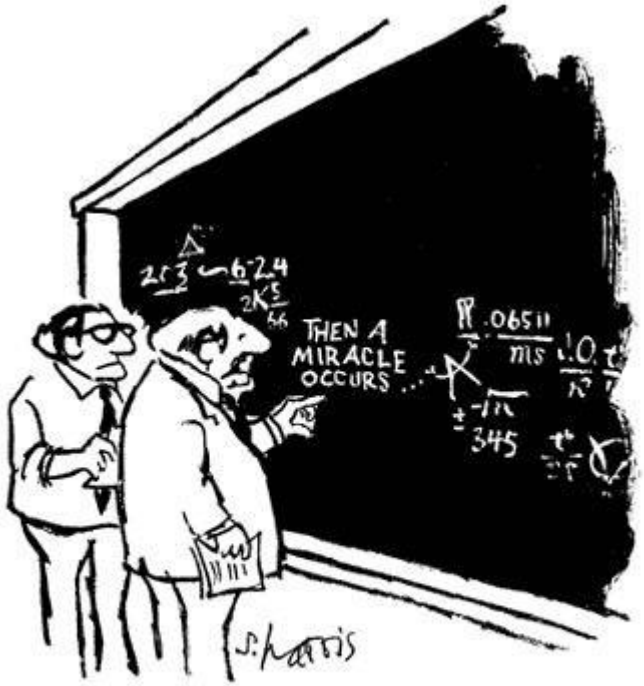
$$\cos A + \cos B = 2 \cos\left(\frac{A+B}{2}\right) \cos\left(\frac{A-B}{2}\right)$$



Focus of Pre-stage Level

Although we will have a lot of **computations** during this course, we will also emphasize on the followings:

1. Logical **Thinking** and **Deduction**
2. The **appreciation of mathematics** in our daily lives
3. The way of presenting proper **mathematical proofs** and **explanations**



"I think you should be more explicit here in step two."

Screening Test (applicable for both Pre-stage and Level 1)

Online Screening Test (via Zoom)

Date: **8 October 2022 (Sat)**

Time: **11 am – 12 noon** (Student must enter prescribed Zoom meeting at 10:30 am)

Targets:

- All applicants of Math Pre-stage
- Applicants of Math Level 1 who have **NOT** obtained Grade B or above in Math Pre-stage Level

Closed book test, with **NO** calculators and textbooks etc. allowed.

More details are provided in the Section of "**Selection**" in the following link:

https://cdgt.hkust.edu.hk/eng/Program/Dual_Program/nomination.php

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Wish you ALL a fruitful learning journey at HKUST!