

## Course Outline

Topics will generally be selected from the following, and many counting problems in daily life settings will be studied.

1. Various forms of combinations and permutations (e.g. with/without repetition, circular, different restrictions)
2. Various formulas and techniques of counting (e.g. binomial theorem and its generalisations, inclusion-exclusion principle, generating functions, recurrence relations)
3. Famous numbers arising from counting problems (e.g. derangement numbers, Fibonacci numbers, Catalan numbers, Stirling numbers, Bell numbers, Schröder numbers)

## Learning Outcomes

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

| Course Learning Outcomes (CLO) |                                                                                             |
|--------------------------------|---------------------------------------------------------------------------------------------|
| CLO 1                          | solve various combination and permutation problems using various formulas in combinatorics; |
| CLO 2                          | apply the techniques of recurrence relations and generating functions to counting problems; |
| CLO 3                          | describe the meanings and properties of some famous numbers arising from counting problems. |

## Study Load

-- 15-20 hours: study-at-own-pace (prerecorded video lectures, additional reading materials)

-- 15-20 hours: online meeting (discussions, tutorials, assessments)

(In addition to the above, students are expected to devote time to work on problems, do revisions and carry out further explorations. An additional 50 hours is expected.)

## Assessments

-- 50% Final Examination

-- 50% Coursework (including participation, assignments, tutorials, quizzes/tests)

No supplementary examination will be offered.