

Community Discovery in Big Data with Algorithms & Computational Thinking



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(15-May, & 12-28 July 2021)

*Experience the fun of
algorithmic community discovery*

□ Course Objectives

- ❖ Community Detection (CD) in Graphs
 - ❖ Experience CD & Visualization with Big Data
 - ❖ Learn Algorithm Design & Analysis
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- ❖ **PROJECT:** Applying Community Detection to Big Data Analytics

References

- [CLRS09] *Introduction to Algorithms*, (3nd edition)
by Cormen, Leiserson, Rivest, Stein, 2009, MIT Press.
(some chapters on basic and graph algorithms)

- [F10] Santo Fortunato, “*Community detection in Graphs*”,
Physics Reports, Vol. 486, No. 3-5, (2010), 75-174.

- [TL2010] “*Community Detection and Mining in Social Media*”, by Lei Tang, Huan Liu, *Morgan and Claypool Publishing*, 2010. <http://dmml.asu.edu/cdm/>

Coding background assumed

□ Programming Fundamentals

- ❖ Done several different programming paradigms!
- ❖ Good debugging knowledge, STRATEGIES
- ❖ Careful use of Libraries...

□ Data Structures (with analyses)

- ❖ Arrays, Linked Lists, Sets, Dictionary
- ❖ Stacks, Queues, Trees & Binary Search Trees
- ❖ Graphs, Simple Graph Algorithms, MST

Algorithm background assumed

- Simple Algorithm Design (with Analysis)
 - ❖ Standard algorithms with arrays and lists
 - ❖ Searching and sorting algorithms
 - ❖ Maybe: Graph algorithms, DFS, BFS, MST, SP

- Simple Analysis of Algorithms
 - ❖ Knows how to use Big-*O* notations
 - ❖ Has done Algorithm Analysis:
Bubblesort, Selection Sort, Searching, Binary Search

The Teaching Staff (2021)

Tan Wei Yang
(CS Major, Year 2)

Leong Hon Wai
NUS, SOC
(梁汉槐)

Kal Ng Yew Kaow*
Malaysia

About Wei Yang (2021)

Wei Yang has recently graduated with a degree in Computer Science.

He enjoys choral singing but COVID-19 has put a stop to that ☹



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About Dr. Kal Ng Yen Kaow (2021)

Kal reads Twitter everyday and is overwhelmed by the number of papers he has to read these days to just stay informed of progress in learning theory. He is currently stranded in Malaysia because of the pandemic.

Please help upvote his answers in Quora. m(_ _)m



About Hon Wai (梁汉槐)

Hon Wai enjoys teaching and research in Algorithms, Computational Thinking, Creative Problem Solving, and MatheMAGIC,

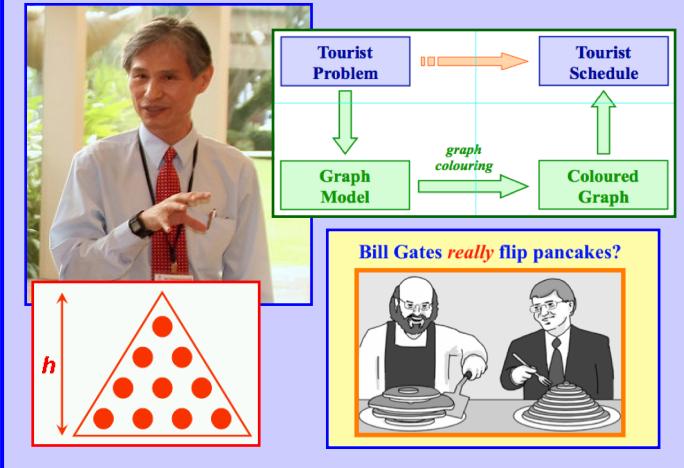
He likes to work with and develop young talent.

*Fun and Creative
Problem Solving
in Computing*

Prof Leong Hon Wai

NUS-SOC

leonghw@comp.nus.edu.sg
(Email, FB)



How the Course is run...

Lectures:

- ❖ Introduces the *What* and the *Why*,
- ❖ Get the *key ideas*
- ❖ Learn the *How*

Team Project:

- ❖ Apply them in solving problems...
- ❖ Apply them to *develop programs / software*

Assessment (2021, draft)

- Quiz + HomeWork** 20%
- Class Participation** 10%
- Project** 70%

M1 Proj Proposal	5%
M2 Interim Poster	15%
M3 Presentation	50%

Course Schedule (2021)

Phase-1:

- ❖ 15 May: Course Introduction & Lab
(Quiz, HomeWork)

Phase-2:

- ❖ 12-24 July: Lectures (project consultations)
- ❖ ??-July: Project presentation (online)
- ❖ 28-July: Poster Showcase Day (online)

Project:

- ❖ Apply CD to *data analytics*

Project Milestones (2021)

Team Project: (Milestones)

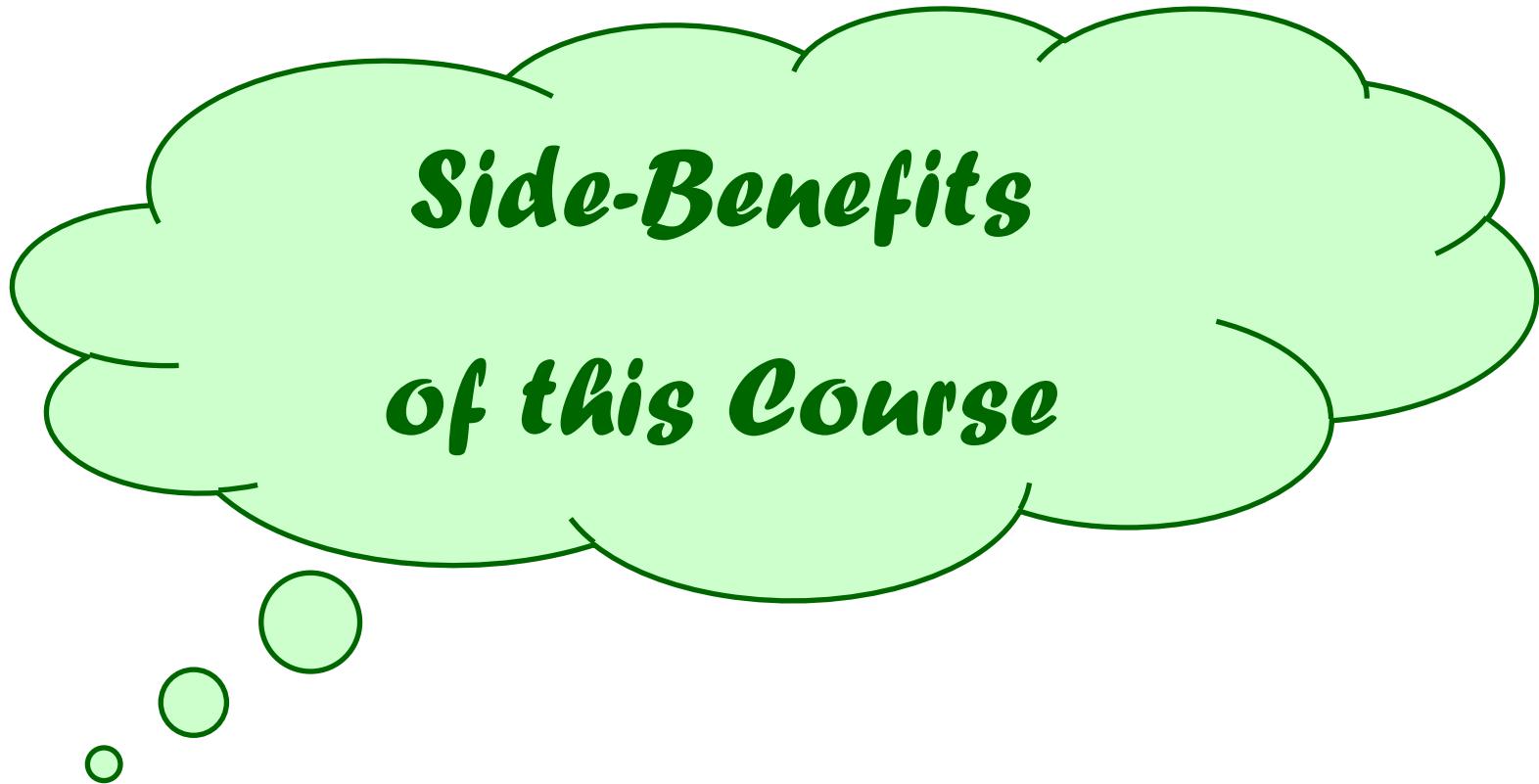
M0: Team formation (*we do it for you*)

M1: Project proposal

M2: Interim Poster Report

M3: Project Presentation

Poster Showcase



MindSet and Learning Attitude

Computational Thinking & Creative PS

- ❖ Important for *all* areas/domains
- ❖ Can be *mastered* with practice

Healthy Learning Attitude:

- ❖ “*Cattywampus*”
- ❖ Positive Learning Attitude,
- ❖ Questioning Attitude,
- ❖ Being independent, taking initiative
- ❖ Good Sense of Humor

Why is SWS3001 FUN?

FUN Activity:
Find out who all
these celebrities are.

- “Meet” many CS celebrities



(1972)



(1974)



(1978)



(1980)



(1986)



(1986)



(2000)



(2002)

Why is SWS3001 FUN?

□ Who? What is the relationship?



FUN Activity:
Find out who all
these people are.



(1975)



(1985)



(1990)

Thank you!

If you want to contact me,
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Or

Google “Leong Hon Wai”

