CS3230 Overview (Spring 2015)

CS3230: Design and Analysis Algorithms

Objectives:

Teach tools for design and analysis of algorithms

- ***Mathematical tools***
- ***Data Structures***
- ***Algorithm Design Paradigms***

Learning Outcomes: Students will be able to

- ***analyze algorithmic problems from different areas***
- ***design and implement algorithms for those problems***
- ***analyze the running times of their algorithms***

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CS3230 Overview (Spring 2015)

Pre-requisites:

(CS2010 or CS2020 (or equivalent)) AND

(CS1231 or MA1100)

Textbook and Reference Material:

- [CLRS09] *Introduction to Algorithms*, (3rd edition)
  by Cormen, Leiserson, Rivest, Stein, 2009.
  (available in Forum-Coop)
- [HH13] *Competitive Programming*, (3rd edition)
  by Steven Halim and Felix Halim, 2013.
- [KT06] *Algorithm Design*, by Kleinberg & Tardos
  by Addison-Wesley, 2006.

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CS3230 (Spring 2015): Staff

NUS National University of Singapore
School of Computing

- **Design and Analysis of Algorithms**
  - Check out CS3230 on IVLE

- **Instructors:**
  - Leong Hon Wai COM1 03-17 [L1-6]
  - Ken Sung Wing Kin COM2 02-06 [L7-13]

- **Teaching Assistants:**
  - Nguyen Nam Ninh
  - Ou ShunHao

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CS3230 (Spring 2015) : Grading

❑ Course Grading:

- ❖ 5% Class and Tutorial Participation/Presentation
- ❖ 20% Homework Assignments
- ❖ 15% Programming Assignments
- ❖ 20% Mid-Term Test (OPEN BOOK) [07-Mar, Sat, W7]
- ❖ 40% Final Exam (OPEN BOOK) [25-Nov, Sat, AM]

❑ Homework Assignments: (20%)

- ❖ Some Graded HW
- ❖ *VIP* (*Very important part*) of the course

❑ Programming Assignments: (15%)

- ❖ 2 Programming Assignment
  - ◆ Several parts (of varying difficulty levels)

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CS3230: Topics (Tentative)

Check out the Schedule on IVLE

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About CS3230 Homework

- **RSA Problem**
  - Routine Problems -- easy practice problems
  - Standard Problems -- *to be submitted for grading*
  - Advanced Problems -- for challenge, fun. *Optional*
- **Your Homework Answers:**
  - **Concise & Precise Answers**
  - **Appropriate Level of Detail (see samples)**

READ "Remarks on Homeworks"

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About CS3230 Homework – (2)

- **Academic Policy (on Plagiarism)**
  - **Do homework YOURSELF.**
  - **If you are REALLY stuck,**
    - ***Approach teaching staff for help***
  - **If you want to discuss with fellow students**
    - ***Discuss general approach (not detailed answers)***
    - ***You MUST write up YOUR OWN answers.***
    - ***You must write down names of collaborators***
  - **Do NOT copy/compare answers!**

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Background assumed (by topics)

YOU MUST ALREADY KNOW THESE:

- **Programming Fundamentals**
  - **Software decomposition, modularity**
  - **Classes, Template classes?**
  - **Recursion and recursive structures**
- **Data Structures (with analyses)**
  - **Arrays, Stacks, Queues, Lists, Dynamic structures**
  - **Binary search trees, balanced BST,**
  - **Heaps and priority queues**

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Background assumed (by topics)

YOU MUST ALREADY KNOW THESE:

- **Algorithm Design Paradigms (with Analysis)**
  - **Standard sorting and searching algorithms**
  - **Graph algorithms: DFS, BFS, Shortest Path, MST**
- **Analysis of Algorithms**
  - **Exposure to Big-O, Θ, Ω notations**
  - **Summation of simple series**
  - **Simple Algorithm Analysis:**

    Bubblesort, Heapsort, Quicksort,
    DFS, BFS, Shortest Path & MST algorithms

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Thank you.

Q & A

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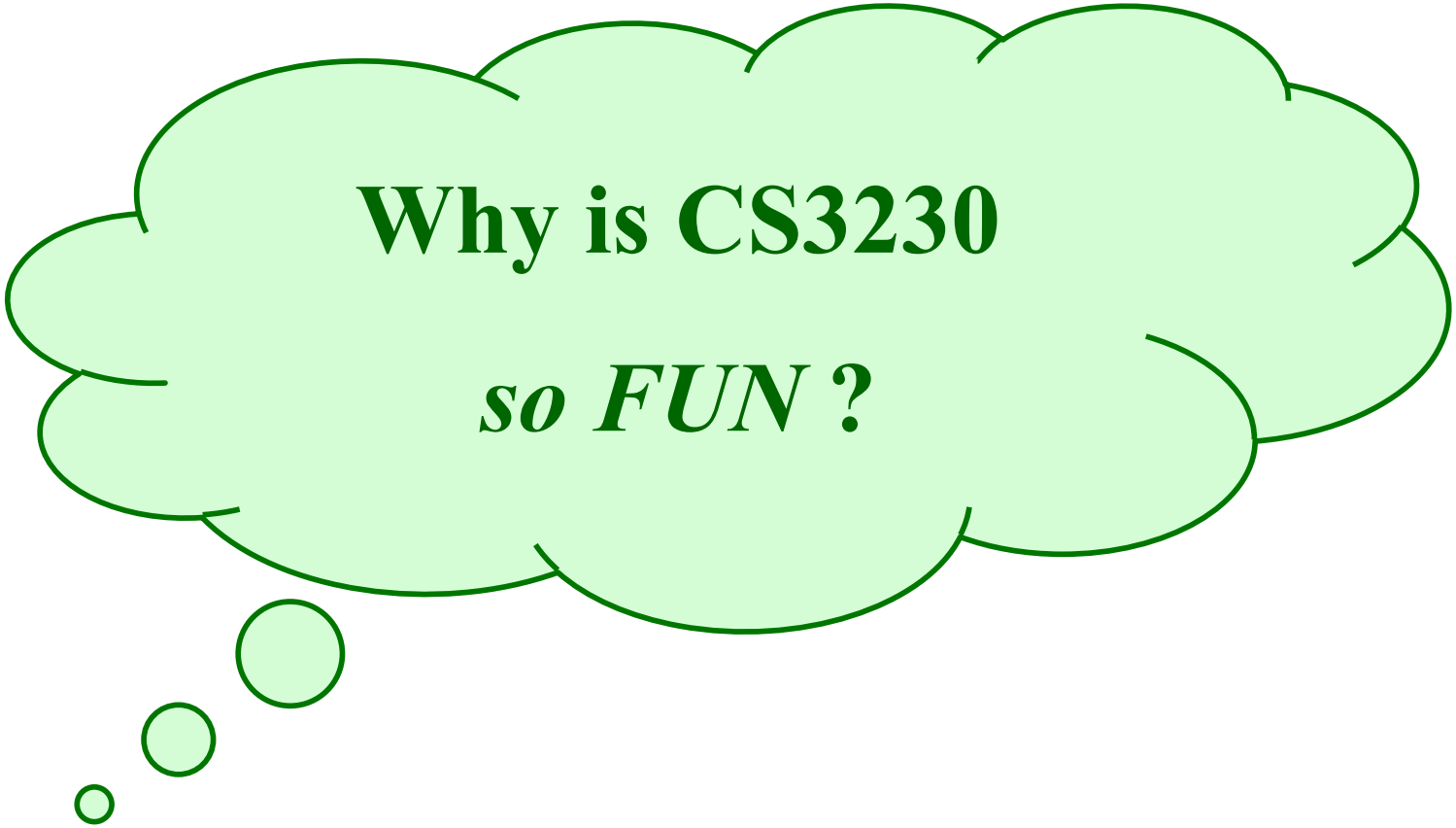

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Why is CS3230 FUN?

HW0:
Find out who all these celebrities are.

❑ "Meet" many CS celebrities


(1972)


(1974)


(1978)


(1980)


(1982)


(1985)


(1986)


(1986)


(1995)


(2002)

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Why is CS3230 FUN?

- **More CS celebrities (hiding as *economists*)**

(2012)

(2012)

- **Algorithms is A&E** (*any*where & *every*where)

  just learn how to look out for them

- **CS3230 helps you get jobs in top companies**

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Not easy, but IMPORTANT

CS3230 is NOT an easy course.

After all, we are *designing algorithms*,

we are *analyzing algorithms*,

we seek *better and faster algorithms*,

we want to make them the *fastest* possible.

But, it is IMPORTANT

Fast algorithms drives many important innovations;

They makes new apps possible;

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CS3230 FAQ ?

- If I *ace* this course,
  will the big-five come looking for me?
- Is CS3230 a hard course?
- My math is bad, am I doomed in CS3230?
- My programming is bad, am I doomed?

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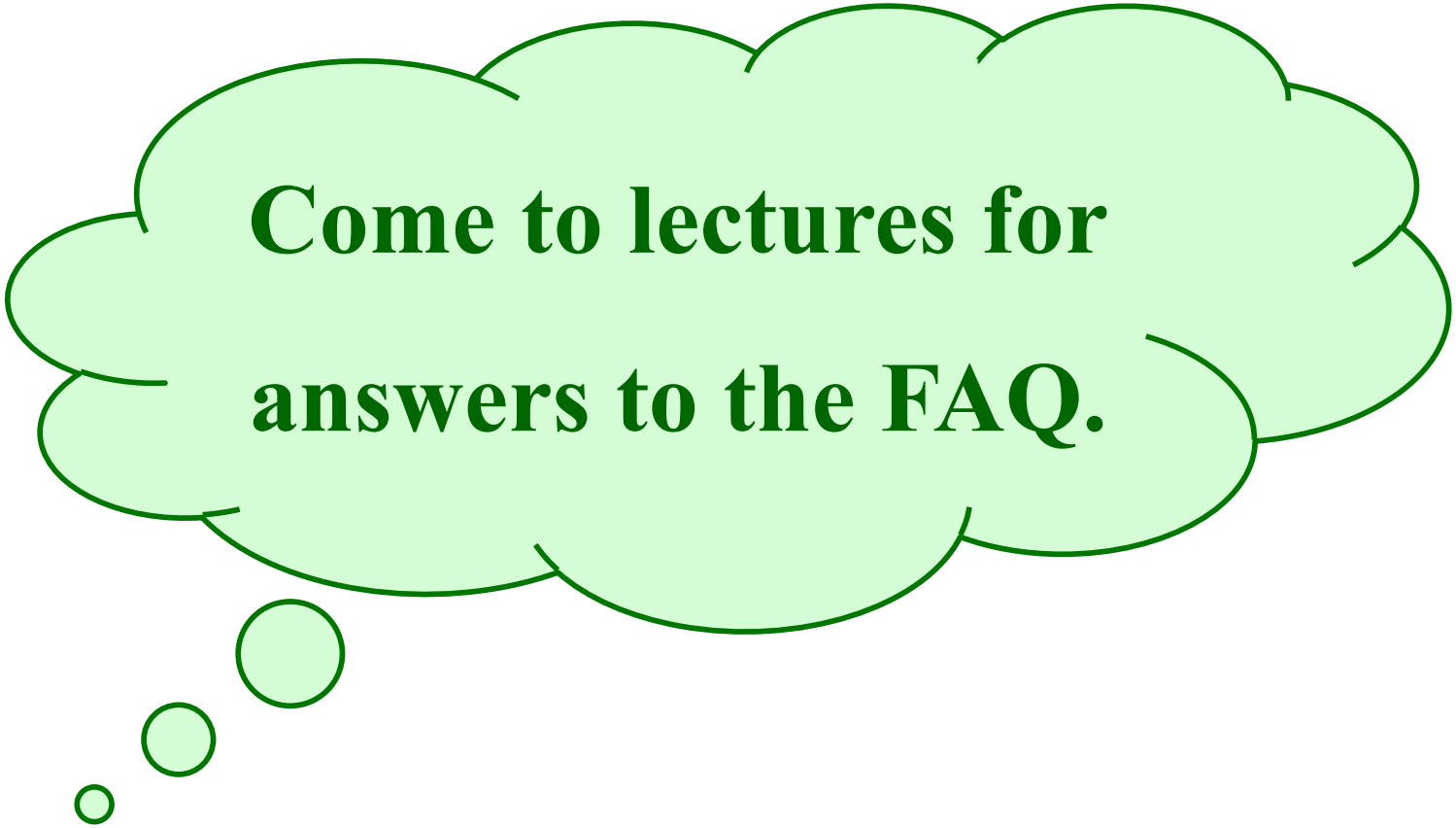

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