CS3230 Overview (Fall 2014)

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 (Fall 2014): Staff



- ☐ Design and Analysis of Algorithms
 - * Check out CS3230 on IVLE
- **□** Instructors:
 - **❖ Leong Hon Wai, COM1 03-17**

[L1-6]

* Rahul Jain, COM2, 02-02

[L7-13]

- **□** Teaching Assistants:
 - * Zhang JiangWei
 - **❖** (two more coming)



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CS3230 Overview (Fall 2014)

☐ Pre-requisite:

- **CS2010** or CS2020 Data Structures and Algorithms
- **CS1231 or MA1100**

☐ Textbook and Reference Material:

- **❖** [CLRS09] *Introduction to Algorithms*, (3nd edition) by Cormen, Leiserson, Rivest, Stein, 2009. (available in Forum-Coop [10 copies, more otw])
- **❖** [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 (Fall 2014): Grading

□ Course Grading:

- **❖** 10% Lecture-Ouizzes and Tutorial-Presentations
- **❖ 10%** Homework Assignments
- *** 20%** Programming Assignments
- **❖ 20%** Mid-Term Test (OPEN BOOK) [20-Sep, Sat, W6]
- ♦ 40% Final Exam (OPEN BOOK) [25-Nov, AM]

☐ Homework Assignments: (10%)

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

□ Programming Assignments: (20%)

- * 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 – (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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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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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.





School of Computing

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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** (anywhere & everywhere) just learn how to look out for them
- □CS3230 helps you get jobs in top companies

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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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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.

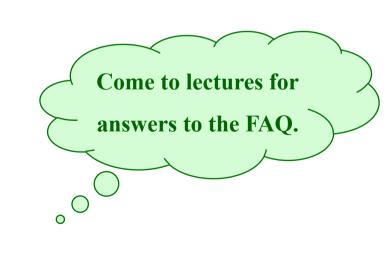
But, it is IMPORTANT

Fast algorithms drives many important innovations; They makes new apps possible;

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