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*

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.

CS3230 (Fall 2014): 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]
  - Rahul Jain, COM2, 02-02 [L7-13]

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

CS3230 (Fall 2014) : Grading

- **Course Grading:**
  - 10% Lecture-Quizzes 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)

CS3230: Topics (Tentative)

Check out the Schedule on IVLE

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"

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!**

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**

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

Thank you.

Q & A

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Why is CS3230

so FUN ?

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)

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**

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;

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?