

Fall 2023

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Software Security Lab.  
Dept. Management Information  
Systems,  
National Chengchi University

# Data Structures

## Lecture 0



# Data structure

*To design objects in digital worlds*



# Syllabus



# Course Information

- Instructor: 郁方 (Yu, Fang)
  - yuf@nccu.edu.tw
  - Office: 261113, 11F College of Commerce (商院261113)
- Lecture Time and Location:
  - Weekly sessions
  - Mandarin Session: Thursday 234 (9:10-12:00am, 商院260313)
  - English Session: Thursday D56 (1:10-4:00pm, 商院260311)
- You can find/download most of the course materials from the course web site: <http://soslab.nccu.edu.tw/Courses.html>  
Lab: <https://github.com/ray-880917/2023fallDS.git>



# Text book

- Data Structures and Algorithms in Java 6<sup>th</sup> edition, by Michael T. Goodrich and Roberto Tamassia, John Wiley & Sons, Inc.
- Online resources:  
<https://github.com/rysharprules/Data-Structures-and-Algorithms-in-Java-6th-Edition>
- 代理商: 新月圖書公司/東華書局, 台北市重慶南路一段143號三樓 TEL: 02-23317856



# Lab Information

- Weekly meeting
- TAs:
  - 蔣其叡, Ray, [111356024@nccu.edu.tw](mailto:111356024@nccu.edu.tw)
  - 陳卉縈, Mia, [112356043@nccu.edu.tw](mailto:112356043@nccu.edu.tw)
  - Monday 12:10-2:00pm
  - The first lab is scheduled on **Sep. 18 (next Monday)**.
  - Lab materials: <https://github.com/ray-880917/2023fallDS.git>
  - Location: 逸仙樓 5F 資管系PC 教室
  - You are encouraged to bring your own laptop

# Course Objective

- A next (and important) step on programming

You will learn

- the main concept, implementation, and applications of fundamental data structures and algorithms

You will also learn

- how to develop Java applications using eclipse and java class library



# At the end of this course,



You should

- understand common data structures and algorithms
- be able to develop new data abstractions and use existing library components
- feel comfortable programming in Java
- be a better programmer



# Course Requirements

- Homework and Labs: 40%
  - You will have weekly homework to write some small programs
  - TAs will guide you in the lab
  - You need to upload your code using WM5 before the due date.
  - Late submission is accepted with penalty
  - Code practice and prescreen (in early November)
- One Late-Midterm Exam (a closed book exam): 30%
  - Most likely, it will be in the end of November
  - You are allowed to bring an A4 size note.



# Course Requirements

- The Term Project: 30%
  - Topic: Lets Beat Google!
  - 3-5 students as a team (Send the list to your TAs)
  - Develop your application using Eclipse with Github
    - You will get extra points for updating your code constantly
  - Each team needs to
    1. Get your code running (Upload source codes)
    2. Write the proposal and the final report
    3. Give a Demo at the end of this semester



# To be successful

You need to work hard, and work step by step.

- Attend labs and lectures
- Write your own code
- Visit the course website frequently
- Submit HWs/Reports on time
- Share your experience with your classmates
- Discuss with TAs and senior students

## **NO NO:**

- No direct copies of others' codes (We can figure it out!)
- At least re-type/compile/test the codes on your own!



# Road map.



## *September - Get ready to do programming!*

- Topics:
  - A brief overview of Java and eclipse
  - Object-oriented design and abstract data type
  - Text/Pattern matching
  - Class project announcement
- Text book: Ch1, Ch2, and Ch12

In the following three weeks, please make sure that you

- can write and execute a small java code using Eclipse  
(TAs will teach how to install/use Eclipse with debugger in the first lab (on 9/19))
- have a team and start to think about the project

# Road map..



*October – Introduce basic data structures and their implementations*

- Topics:
  - Linked Lists
  - Queues
  - Stacks
  - Trees
  - Heaps
  
- Text Book: Ch3, Ch5, Ch6, Ch7, Ch8

# Road map...



*November – Introduce fundamental algorithms and their analyses*

- Topics:
  - Coding practice and prescreen (Nov. 2)
  - Analysis of Algorithms
  - Divide and Conquer
  - Dynamic Programming
  - Sorting and Searching
  - Midterm (Nov. 30)
- Text Book: Ch4, Ch10, Ch11, Ch12

# Road map.....



*December – Step on advanced data structures*

- Topics:
  - Hash tables
  - Skip lists
  - Dictionaries and Maps
  - Graphics and Topologies
- Text book: Ch9, Ch10, Ch13, Ch15

# Road map.....

*January – It's show time. Lets beat Google!*

- Topics:
  - Project demo
  - Final code and report due.
  - Makeup exam (if needed)





# Take Away

- Data structure is about to design objects in digital worlds
- This is an advanced java programming course
- You will have to do a lot of coding practice (HWs, Prescreen, Project)
- Coding counts the major of your performance evaluation (70%)
- Make sure that you are ready to take this adventure before signing up



# Sign Up?



- You should ask yourself the following questions:
  - Do you have interests in programming but no experiences ?
    - Take courses on Introduction of programming
  - Do you want to do Machine Learning/Data Analytics?
    - Take courses on Python or R
- If you decide to take this course, email me:
  - your name, student id, and course id:
  - 306013001(Thursday 234)
    - MIS major, Big Data Program (with conflicts on D56)
  - 306013011 (Thursday D56)
    - MIS major, Big Data Program, Crazy for programming, etc.