



MATH208

Data Structure

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Lectures

- Class hours: Mon. (9:10-12:00)
 - Classroom: 理 SC 2004
- Lecture: Szu-Chi Chung (鍾思齊)
 - Office: 理 SC 2002-4
 - Office hours: Mon. 16:00~18:00 and Wed. 16:00~18:00
- T.A.: 黃冠欽, 陳佩涵
 - Office: 理SC 1011-1 and 理SC 1015-2
 - TA hour: Thur. 15:00~16:00 (at 理SC 1011-1) and Mon. 16:00~17:00 (at 理SC 1015-2)

Textbook and requirement

- The assignment and related material will be available on the course webpage.
Course website and Facebook group
 - <https://phonchi.github.io/nsysu-math208/materials/>
 - <https://www.facebook.com/groups/1582349499475537>
- Textbook: *Problem Solving with Algorithms and Data Structures using Python, 3rd Edition*
 - Authors: Brad Miller and David Ranum
- *Problem Solving with Algorithms and Data Structures using C++*
 - Authors: Brad Miller, David Ranum and Jan Pearce
- For the basic data structure code checkout
 - <https://github.com/phonchi/pythonds3>

Grading policy

- Grading
 - Homework 50% (5 assignments, mainly coding parts (Python/C++))
 - Participants: 5% (participates at least 10 times can get the full score)
 - Take-home Quiz: 5% (2 times, conceptual, single choice and short answer questions)
 - Midterm exam 20% (conceptual, single choice and short answer questions)
 - Final exam 20% (conceptual, single choice and short answer questions)
- Midterm (conceptual)
 - It will be held on 2026/04/13 at 理 SC 00012
- Final (conceptual):
 - It will be held on 2026/06/08 at 理 SC 00012
- You need to use Python/C++ in this course

Resources

- Python/C++ basics
 - [Python](https://ocw.aca.ntu.edu.tw/ntu-ocw/ocw/cou/111S107) or <https://ocw.aca.ntu.edu.tw/ntu-ocw/ocw/cou/111S107>
- Object-oriented
 - <https://openhome.cc/zh-tw/python/> or <https://openhome.cc/Gossip/CppGossip/>
- Practicing
 - [Hackerrank](https://leetcode.com/)
 - <https://neetcode.io/practice>
- Visualization
 - [Python/C++ Tutor](https://visualgo.net/en)
 - <https://visualgo.net/en>
 - <https://opensa-server.cs.vt.edu/OpenDSA/Books/Everything/html/index.html>
 - <https://cmps-people.ok.ubc.ca/ylucet/DS/Algorithms.html>

What we are going to study in this semester

- Python/C++ Object oriented fundamentals
 - Flow Control
 - Functions
 - Variables and containers
 - Encapsulation polymorphism and inheritance (Classes)
- Algorithm analysis
 - Big O
 - Timing benchmark
- Linear structure
 - Array/Linked list
 - Stack/Queue
- Recursion and dynamic programming
- Searching and Sorting
- Nonlinear data structure
 - Hash tables
 - Graphs
 - Trees
 - Binary search tree
 - AVL tree
- Not covered
 - Advanced graph and dynamic programming
 - Divide and conquer and Greedy algorithm
 - Network flow
 - NP and computational intractability

Relate to other courses

- Related Courses

- Algorithms
- Python and machine learning algorithms

- Other courses

- Advance programming
- Web programming
- Network programming
- Software engineering
- Data science/Machine learning/Artificial intelligence

Some notes on using AI

- The Shift from Determinism to Non-determinism
 - AI models work based on probabilities, meaning the same prompt might yield different results. AI can provide code that works in one scenario but fails in another
- The Role of AI in Development
 - AI reduces the manual labor of typing syntax, allowing developers to focus more on high-level logic and problem-solving
 - AI should be treated as a fast but sometimes unreliable intern, so human verification is mandatory
 - Use AI for explaining complex code, generating unit tests, or suggesting alternative solutions where understanding context is key
- Impact on Learning: Foundations Still Matter
 - If beginners jump straight to "Vibe Coding" without understanding logic, they risk becoming "Prompt Engineers" who cannot fix systems when AI fails