國立中山大學 114學年度第2學期 課程教學大綱

National Sun Yat-sen University 114Academic year Course syllabus

中文名稱 Course name(Chinese)	資料結構			課號 Course Code	MATH208
英文名稱 Course name(English)	DATA STRUCTURES				
課程類別 Type of the course	講授類	必選修 Required/Selected	選修	系所 Dept./faculty	應用數學系
授課教師 Instructor	鍾思齊			學分 Credit	3

課程大綱 Course syllabus

1. Introduction to Data Structures 2. Algorithm analysis 3. Arrays 3. Stack and Queue 4. Linked Lists 5. Recursion 6. Searching and sorting 7. Trees 8. Graphs

課程目標 Objectives

介紹儲存資料的各種結構，以及相關的基礎演算法。以此來訓練學生選擇與使用適當的資料結構於程式設計，進而更有效率的解決程式相關問題。

授課方式 Teaching methods

投影片為主，板書為輔。
修課注意事項:
(1)成績計算和課程進度可能會因課程進度做調整, 如有更改將於課堂上公佈。
(2)上課主要會以Python為主，C++為輔做為講解語言，作業需用Python或C++進行撰寫。
(3)本課程有建立臉書社團，請登入網路大學 https://cu.nsysu.edu.tw/mooc/index.php 查看網址。
(4)本課程有建立課程網站 https://phonchi.github.io/nsysu-math208/。

評分方式〔評分標準及比例〕Evaluation (Criteria and ratio) 等第制單科成績對照表 letter grading reference

1.平時成績(包含作業、出席率、上課表現)：60%
2.期中考：20%
3.期末考：20%

參考書/教科書/閱讀文獻 Reference book/ textbook/ documents

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No copies for intellectual property rights. Textbooks provided by the instructor used only for self-study, can not broadcast or commercial use

序號 No.	作者 Auther	書名 Title	出版社 Publisher	出版年 Year of publish	出版地 Publisher place	ISBN# ISBN#
1	Brad Miller and David Ranum	Problem Solving with Algorithms and Data Structures using Python	Runestone Academy	2023		https://runestone.academy/ns/books/published/pythonds3/index.html
2	Brad Miller, David Ranum and Jan Pearce	Problem Solving with Algorithms and Data Structures using C++	Runestone Academy	2018		https://runestone.academy/ns/books/published/cppds/index.html
3	Michael T. Goodrich, Roberto Tamassia and Michael H. Goldwasser	Data Structures and Algorithms in Python	Wiley	2013		978-1118290279
4	Michael T. Goodrich, Roberto Tamassia and David M. Mount	Data Structures and Algorithms in C++, Second Edition	Wiley	2011		978-0470383278

課程時數規劃 Course Hour Planning

本校自114學年度起實施學期16週，仍以1學分18小時為原則。教師課程時數安排得選擇「16週+自主學習規劃」或「16週+實體上課規劃」。
Starting from the 114th academic year, the university will implement a 16-week course schedule, while maintaining the standard of 18 hours of instruction per credit. Instructors can choose between "16-weeks + Alternative learning periods" or "16-weeks + In-person classes."

☑ 本門課程為「16週+自主學習規劃」：教師需於「A.每週課程內容及預計進度」欄位填寫16週課程進度，並於「B.自主學習規劃」欄位填寫每1學分2小時學生自主學習內容。
16 weeks + alternative learning periods: The instructor will include a 16-week course plan in the weekly scheduled progress section(16 hours of instruction per credit) and provide details of the learning plan (two hours of activity per credit) in the alternative learning period section.

☐ 本門課程為「16週+實體上課規劃」：教師需於「A.每週課程內容及預計進度」欄位填寫16週課程進度，並於「C.實體上課規劃」填寫2次授課內容及主題。
16 weeks + in-person classes: The instructor will include a 16-week course plan in the weekly scheduled progress section (16 hours of instruction per credit) and specify the content and topics of the 2 in-person classes in the in-person class plan section.

A.每週課程內容及預計進度 Weekly scheduled progress

全英課程之授課內容及主題應以英文或雙語呈現

For courses taught entirely in English, the content and topics should be presented in English or bilingually.

週次 Week	日期 Date	授課內容及主題 Content and topic
1	2026/02/22~2026/02/28	Introduction and review of OOP
2	2026/03/01~2026/03/07	Introduction and review of OOP
3	2026/03/08~2026/03/14	Algorithm analysis
4	2026/03/15~2026/03/21	Arrays and Linear linked structures
5	2026/03/22~2026/03/28	Stack and Queues
6	2026/03/29~2026/04/04	Stack and Queues
7	2026/04/05~2026/04/11	春假
8	2026/04/12~2026/04/18	期中考
9	2026/04/19~2026/04/25	Recursion, Searching and Sorting
10	2026/04/26~2026/05/02	Searching and Sorting
11	2026/05/03~2026/05/09	Searching and Sorting, Trees
12	2026/05/10~2026/05/16	Trees
13	2026/05/17~2026/05/23	Trees
14	2026/05/24~2026/05/30	Trees, Graphs
15	2026/05/31~2026/06/06	Graphs
16	2026/06/07~2026/06/13	期末考

B.自主學習規劃 Alternative learning periods

課程規劃學生自主學習內容（每1學分2小時）

Alternative learning periods planned for the course (with each credit corresponding to two hours of activity)

本門課程規劃學生彈性或自主學習內容（每1學分2小時）：

Alternative learning periods planned for the course (each credit corresponds to two hours of activity):

學生自主學習活動 Alternative learning periods	勾選或填寫規劃內容 Place a check in the appropriate box or provide details	時數 Number of hours
學生分組實作及討論 Group work and discussion	☐	
參與課程相關作業、作品、實驗 Participation in course-related assignments, work, or experiments	☐	
參與校內外活動（研習營、工作坊、參訪）或競賽 Participation in on- or off-campus activities (e.g., seminars, workshops, and visits) or competitions	☐	
課外閱讀 Extracurricular reading	☐	
線上數位教材學習 Learning with online digital learning materials	☑ 閱讀圖或樹相關補充教學影片 或教材	6
其他（請填寫規劃內容） Other (please provide details)	☐	

C.實體上課規劃 In-Person Class Plan

若無規劃學生自主學習，則請教師規劃2次實體上課(每1學分2小時)，上課時間由師生自行討論，得利用週三下午4-7點或其他時段進行。

If there are no alternative learning periods planned for the course, the instructor should plan 2 in-person classes (2 hours of activity per credit). Class schedules can be arranged through discussions between instructors and students, utilizing Wednesday 4:00PM-7:00PM or other suitable time slots.

＊第一次實體上課內容及主題 (Content and topic for the first In-Person class)：

＊第二次實體上課內容及主題 (Content and topic for the second In-Person class)：

課業討論時間 Office hours

時段1 Time period 1:
時間 Time：星期一16:00~18:00
地點 Office/Laboratory：理2002-4
時段2 Time period 2：
時間 Time：星期三16:00~18:00
地點 Office/Laboratory：理2002-4

系所學生專業能力/全校學生基本素養與核心能力 basic disciplines and core capabilities of the dcpartment and the university

系所學生專業能力/全校學生基本素養與核心能力 basic disciplines and core capabilities of the department and the university	課堂活動與評量方式 Class activities and evaluation										
	本課程欲培養之能力與素養 This course enables students	紙筆考試或測驗 Test.	課堂討論（含個案討論） Group discussion (case analysis).	個人書面報告、作品、實驗 Indivisual paper report/ assignment/	群組書面報告、作品、實驗 Group paper report/ assignment/	個人口頭報告 Indivisual oral presentation.	群組口頭報告 Group oral presentation.	課程規劃之校外參訪及實習 Off-campus visit and intership.	證照/檢定 License.	參與課程規劃之校內外活動及競賽 Participate in off-campus/ on-campus activities and competitions.	課外閱讀 Outside reading.

		to achieve.			work or experiment.	work or experiment.						

※系所學生專業能力 Basic disciplines and core capabilities of the department

1.數學、統計與科學計算之專業知識及運用能力。 1. Basic knowledge and proficiency in mathematics, statistics and scientific computing.	V	V		V								V
2.資訊領域之基本知識，著重在程式寫作與使用數學、統計軟體之能力。 2. Basic knowledge in the information field, focusing on the ability in programming, and applying mathematical and statistical software.	V	V		V								V
3.輔修領域之基本知識。 3. Basic knowledge in the field of minor.	V	V		V								V

※全校學生基本素養與核心能力 Basic disciplines and core capabilities of the university

1.表達與溝通能力。 1. Articulation and communication skills												
2.探究與批判思考能力。 2. Inquisitive and critical thinking abilities	V	V		V								V
3.終身學習能力。 3. Lifelong learning	V	V		V								V
4.倫理與社會責任。 4. Ethnics and social responsibility												
5.美感品味。 5. Aesthetic appreciation												
6.創造力。 6. Creativity												
7.全球視野。 7. Global perspective												
8.合作與領導能力。 8. Team work and leadership												
9.山海胸襟與自然情懷。 9. Broad-mindedness and the embrace of nature												

本課程與SDGs相關項目：The course relates to SDGs items:

- [ ] SDG1-消除貧窮(No Poverty)
- [ ] SDG2-消除飢餓 (Zero Hunger)
- [ ] SDG3-良好健康與福祉(Good Health and Well-being)
- [ ] SDG4-教育品質(Quality Education)
- [ ] SDG5-性別平等(Gender Equality)
- [ ] SDG6-乾淨水源與公共衛生(Clean Water and Sanitation)
- [ ] SDG7-可負擔乾淨能源(Affordable and Clean Energy)
- [ ] SDG8-優質工作與經濟成長(Decent Work and Economic Growth)
- [ ] SDG9-工業、創新和基礎建設(Industry,Innovation and Infrastructure)
- [ ] SDG10-減少不平等(Reduced Inequalities)
- [ ] SDG11-永續城市(Sustainable Cities and Communities)
- [ ] SDG12-責任消費與生產(Responsible Consumption and Production)
- [ ] SDG13-氣候行動(Climate Action)
- [ ] SDG14-海洋生態(Life Below Water)
- [ ] SDG15-陸域生態(Life on Land)
- [ ] SDG16-和平、正義和穩健的制度(Peace,Justice And Strong Institutions)
- [ ] SDG17-促進目標實現的全球夥伴關係(Partnership for the Goals)
- [x] 本課程和SDGS無關

本課程校外實習資訊: This course is relevant to internship:

- [ ] 本課程包含校外實習（本選項僅供統計使用，無校外實習者，得免勾記）
The course includes internship.(For statistical use only. If the course without internship, please ignore this item.)

實習定義：規劃具有學分或時數之必修或選修課程，且安排學生進行實務與理論課程實習，於實習終了取得考核證明繳回學校後，始得獲得學分；或滿足畢業條件者。(一般校內實習請勿勾選此欄位)

Internship: The required or elective courses should include credits and learning hours. Students should participate in the corporative company or institution to practice and learn the real skills. An internship certification must be handed in at the end of internship to get the credits or to fulfil the graduation requirements.

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