

## 國立中山大學 112學年度第2學期 課程教學大綱

## National Sun Yat-sen University 112Academic 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
授課教師 Instructor	鍾思齊	系所 Dept./faculty	應用數學系
		學分 Credit	3

因應嚴重特殊傳染性肺炎(武漢肺炎)，倘若後續需實施遠距授課，授課方式調整如下：

- 同步遠距【透過網路直播技術，同時進行線上教學，得採Microsoft Teams、Adobe connect等軟體進行】
- 同步遠距含錄影【透過網路直播技術，同時進行線上教學並同時錄影，課程內容可擇日再重播，得採Microsoft Teams、Adobe connect等軟體進行】
- 非同步遠距【課堂錄影或錄製數位教材放置網路供學生可非同時進行線上學習，得採EverCam、PPT簡報錄影、錄音方式進行】
- 實作類課程，經評估無法採遠距課程教學，後續復課後密集補課

★遠距教學軟體操作說明連結

因應嚴重特殊傳染性肺炎(武漢肺炎)，倘若後續需實施遠距授課，評分方式調整如下：

- 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%

## 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

〔請遵守智慧財產權觀念，不可非法影印。教師所提供之教材供學生本人自修學習使用，不得散播及做為商業用途〕

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序號	作者	書名	出版社	出版年	出版地	ISBN#
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No.	Author	Title	Publisher	Year of publish	Publisher place	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

彈性暨自主學習規劃 Alternative learning periods

本門課程是否有規劃實施學生彈性或自主學習內容（每1學分2小時）

Is any alternative learning periods planned for this course (with each credit corresponding to two hours of activity)?

否：教師需於「每週課程內容及預計進度」填寫18週課程進度（每1學分18小時之正課內容）。

No:The instructor will include an 18-week course plan in the weekly scheduled progress (each credit corresponds to 18 hours of instruction)

是：教師需於「每週課程內容及預計進度」填寫16週課程內容（每1學分16小時之正課內容），並於下列欄位填寫每1學分2小時學生彈性或自主學習內容。

Yes:The instructor will include a 16-week course plan in the weekly scheduled progress (each credit corresponds to 16 hours of instruction);the details of the planned alternative learning periods are provided below (each credit corresponds 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):

學生彈性或自主學習活動 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	<input type="checkbox"/>	
參與課程相關作業、作品、實驗 Participation in course-related assignments, work, or experiments	<input type="checkbox"/>	
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	<input type="checkbox"/>	
課外閱讀 Extracurricular reading	<input type="checkbox"/>	
線上數位教材學習 Learning with online digital learning materials	<input type="checkbox"/>	
其他（請填寫規劃內容） Other (please provide details)	<input type="checkbox"/>	

每週課程內容及預計進度 Weekly scheduled progress

週次	日期	授課內容及主題
Week	Date	Content and topic
1	2024/02/18~2024/02/24	Introduction and review of OOP
2	2024/02/25~2024/03/02	Introduction and review of OOP
3	2024/03/03~2024/03/09	Algorithm analysis
4	2024/03/10~2024/03/16	Arrays and Linear linked structures
5	2024/03/17~2024/03/23	Stack and Queues
6	2024/03/24~2024/03/30	Stack and Queues
7	2024/03/31~2024/04/06	Recursion
8	2024/04/07~2024/04/13	期中考
9	2024/04/14~2024/04/20	Searching and Sorting
10	2024/04/21~2024/04/27	Searching and Sorting
11	2024/04/28~2024/05/04	Trees
12	2024/05/05~2024/05/11	Trees
13	2024/05/12~2024/05/18	Trees
14	2024/05/19~2024/05/25	Graphs
15	2024/05/26~2024/06/01	Graphs
16	2024/06/02~2024/06/08	期末考
17	2024/06/09~2024/06/15	彈性學習

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 department 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 to achieve.	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、作業、作品、實驗 Indivisual paper report/work or experiment. 個人書面報告、作業、作品、實驗 Indivisual	群組書面報告、作業、作品、實驗 Group paper report/work or experiment. 群組書面報告、作業、作品、實驗 Group paper rep	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. 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.
※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. Ethics 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)
- 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.