國立東華大學

教學計劃表　Syllabus

課程名稱(中文) Course Name in Chinese	資料結構			學年/學期 Academic Year/Semester	114/2
課程名稱(英文) Course Name in English	Data Structures				
科目代碼 Course Code	ACIM20040	系級 Department & Year	學二	開課單位 Course-Offering Department	會計與資訊管理國際學士班
修別 Type	學程 Program	學分數/時間 Credit(s)/Hour(s)	3.0/3.0		
授課教師 Instructor	/張烜瀚				
先修課程 Prerequisite					

課程描述　Course Description

A data structure is a way of organizing and storing data so that it can be processed efficiently by a computer program. Therefore, the Data Structures course focuses on the organization, storage, and effective processing of data in computer programs.The objectives of this course can be summarized as follows:(1)Understand the concept of Abstract Data Types (ADTs) for data modeling.(2)Study different types of data structures and the algorithms that operate on them.(3)Learn how to choose appropriate data structures and algorithms for problem solving.(4)Learn how to evaluate the cost/performance trade-offs of data structures and algorithms.(5)Learn how to design new data structures and algorithms when necessary.Sample code will be presented in Python. We will use the free Google Colab platform for in-class demonstrations, but students may use any Python environment or IDE of their choice.The topics covered in the lectures include the following.(**: topics may be covered depending on time and progress)(1)Python review and algorithms.(2)Data structures and abstract data types.(3)Arrays and strings.(4)Stacks and queues.(5)Linked lists (singly and doubly linked).(6)Trees(basic concepts, binary trees, searching, heap).(7)Graphs(basic concepts, representations, shortest paths, spanning trees).(8)Internal sorting (insertion sort, quicksort, mergesort, heapsort, radix sort).(9)External sorting.(10)Hashing and maps (dictionary structures).(11)**Priority queues.(12)**Efficient search structures.(13)**Advanced data structures.

課程目標　Course Objectives

介紹各種資料結構及其應用，包括陣列、堆疊、鏈結、佇列、串列、樹狀結構、排列、蒐尋、圖 形、hashing及各類問題的演算法，目的在使學生能設計出有效率的程式

	系專業能力 Basic Learning Outcomes	課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.'s Education Objectives
A	兼具會計資訊理論與實務操作及專業知識，具備跨領域解決問題能力	●
B	具有良好之會計資訊理論基礎與分析能力，具備相關領域升學或就業之知識與能力	○
C	具備以資訊技術協助企業運作與商業管理之知識與應用能力	●
D	具有會計資訊、風險控管、電腦審計與稅務整合能力	○
E	具備超然獨立並嚴格遵守會計資訊專業倫理的道德勇氣	○
F	具備團隊合作、國際視野、創造性思考及良好的外語能力	○

圖示說明Illustration ：● 高度相關 Highly correlated ○中度相關 Moderately correlated

授 課 進 度 表 Teaching Schedule & Content		
週次Week	內容 Subject/Topics	備註Remarks
1	Course Introduction: (1) Course description (2) Regular topics (3) Special topics (4) Syllabus (5) Textbook and references	
2	Python Review	
3	(1)Python Review-Object-Oriented (2)Basic Concepts and Abstract Data Types	
4	Stacks and Queues: (1) Stack ADT (2) Queue ADT	
5	Linked lists: (1) Singly linked lists (2) Circular lists (3) Doubly linked lists (4) Lists applications	
6	Tree I: (1) Tree ADT (2) Binary Tree (3) Binary search tree	
7	Tree II: (1) Binary Search Tree (2) Selection trees (3) Heaps	
8	Graphs I: (1) Graph ADT (2) Graph Operations (3) Graph Representation (4) Graph Implementation-DFS and BFS	
9	Midterm Exam Week	期中考試週
10	Graphs II: (1) Minimum Cost Spanning Trees (2) Shortest Paths and Transitive Closure (3) Graph Search	
11	Search and Internal Sorting I: (1) Linear Search and Binary Search (1) Internal Sorting Concept (2) Insertion Sort (3) Quick Sort (4) Merge Sort	
12	Internal Sorting II: (1) Heap Sort (2) Counting Sort (3) Radix Sort (4) How fast can we sort? (5) Applying sorting algorithms (Which algorithm to use? Use multiple algorithms?)	
13	External Sorting: (1) External Sorting Concept (2) External Sort-merge Algorithm (3) External Sorting Application	
14	Hashing: (1) Associative arrays (2) Hash functions (3) Hash tables and dictionaries	

15	Advanced topics: ** (1) Priority queues (2) AVL trees (3) Red-black trees	
16	Advanced topics: ** (1) B-trees, B+-trees (2) Digital search structures (3) Data structures for advanced applications: spatiotemporal, big data, streaming, social network analysis, ..	
17	Final Exam Week	期末考試週
18	Student Self-Directed Learning	

教 學 策 略 Teaching Strategies

☑ 課堂講授 Lecture ☐ 分組討論Group Discussion ☐ 參觀實習 Field Trip

☐ 其他Miscellaneous:

教 學 創 新 自 評 Teaching Self-Evaluation

創新教學(Innovative Teaching)

☑ 問題導向學習(PBL) ☐ 團體合作學習(TBL) ☐ 解決導向學習(SBL)

☐ 翻轉教室 Flipped Classroom ☐ 磨課師 Moocs

社會責任(Social Responsibility)

☐ 在地實踐Community Practice ☐ 產學合作 Industy-Academia Cooperation

跨域合作(Transdisciplinary Projects)

☐ 跨界教學Transdisciplinary Teaching ☐ 跨院系教學Inter-collegiate Teaching

☐ 業師合授 Courses Co-taught with Industry Practitioners

其它 other:

學期成績計算及多元評量方式 Grading & Assessments									
配分項目 Items	配分比例 Percentage	多元評量方式 Assessments							
		測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定	其他
平時成績(含出缺席) General Performance (Attendance Record)	10%								
期中考成績 Midterm Exam	30%	✓	✓						
期末考成績 Final Exam	30%	✓	✓		✓				
作業成績 Homework and/or Assignments	30%		✓						
其他 Miscellaneous (_____)									

評量方式補充說明
Grading & Assessments Supplemental instructions

教科書與參考書目（書名、作者、書局、代理商、說明）
Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

Introduction to Python® Programming and Data Structures, Third edition, Y. Daniel Liang, Pearson

課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址)
Teaching Aids & Teacher's Website(Including online teaching information.
Personal website can be listed here.)

其他補充說明 (Supplemental instructions)