



## 課 綱 Course Outline

理工學院大數據科學國際學士班學士班

中文課程名稱 Course Name in Chinese	資料結構				
英文課程名稱 Course Name in English	Data Structures				
科目代碼 Course Code	DS__10090	班 別 Degree	學士班 Bachelor' s		
修別 Type	學程 Program	學分數 Credit(s)	3.0	時 數 Hour(s)	3.0
先修課程 Prerequisite					
課程目標 Course Objectives					
<p>A data structure is a way of organizing and storing data so that it can be processed efficiently by a computer program. The objectives of this course can be summarized as follows.</p> <p>●Understand the concept of abstract data types(ADT) for data modeling. ●Study different types of data structures and the algorithms that operate on them. ●Learn how to choose appropriate data structures and algorithms for problem solving. ●Learn to evaluate the benefits, costs and effectiveness of different data structures on a program. ●Learn how to design new data structures and algorithms if necessary. This is a lecture-oriented course with associated lab course. It is strongly recommended that you take both courses at the same time.</p> <p>The sample code will be presented in C++. It is therefore a prerequisite of this class to be familiar with the C++ programming language.</p>					
系教育目標 Dept.'s Education Objectives					
1	訓練嚴謹思考與推理能力。 to provide a solid training in rigorous thinking and reasoning,				
2	奠定資料科學理論與應用數學的基礎知識。 to establish well-founded background knowledge in data science and applied mathematics,				
3	具備跨領域學習能力。 to prepare the students for interdisciplinary study in the future.				

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	具備基本資料科學知識及邏輯推理能力。 have well-founded background in data science and logical reasoning,	●
B	具備機率、統計、資料科學及相關領域的知識與應用能力。 have the knowledge of probability , statistics , data science and the related fields, and their applications,	●
C	具備資料科學應用技能與團隊合作，解決問題能力。 be able to utilize data scientific skills for problem solving through cooperation and teamworking.	
圖示說明Illustration : ● 高度相關 Highly correlated ○ 中度相關 Moderately correlated		
課程大綱 Course Outline		
<p>The topics to be discussed include (**: will be covered if time allows):</p> <ol style="list-style-type: none"> <li>1.Data structures and abstract data types (ADTs)</li> <li>2.C++ review</li> <li>3.Algorithms and complexity</li> <li>4.Arrays and strings</li> <li>5.Stacks and queues</li> <li>6.Linked lists (singly and doubly linked)</li> <li>7.Trees (basic concepts, binary trees, search, heap)</li> <li>8.Graphs (basic concepts, representations, search, shortest paths, spanning trees)</li> <li>9.Internal sorting (insertion sort, quick sort, merge sort, heap sort, radix sort)</li> <li>10.External sorting</li> <li>11.Hashing</li> <li>12.Priority queues**</li> <li>13.Efficient search structures**</li> <li>14.Advanced data structures**</li> </ol> <p>Visit the class web page for detail information about the lecture schedule.</p>		
<p>資源需求評估（師資專長之聘任、儀器設備的配合．．．等） Resources Required (e.g. qualifications and expertise, instrument and equipment, etc.)</p>		
Need computer lab for the lab part of the course.		
課程要求和教學方式之建議 Course Requirements and Suggested Teaching Methods		
Each unit should be accompanied by homework and programming exercises.		
其他 Miscellaneous		
1130306訂定		