大學部課程綱要表

Undergraduate degree - Course Syllabus

課程名稱：資料結構 Course Title：Data Structure				開課學系 Department	Department of Communications Engineering
				課程代碼 Course Code	4152201_01
授課教師（Professor）：賴傳淇 Chuan-Chi Lai					
學分數 Credits	3	必/選修 Req/Elec	選修 Elec	開課年級 Grade	大二
課程屬性/類別 Course type	□人文關懷課程 □專題導向課程 □實習		□競賽專題課程 □總整課程 ■其他	□問題導向課程 □實作課程	
先修科目或先備能力（Prerequisite）：計算機概論、程式設計					
課程概述（Course Overview）：This course introduces the data representation and problem solving methods required by electrical, communication, and computer engineering. The abstract data type concept is used in realizing such techniques, and algorithm design and complexity analysis are exercised throughout the course. Development of software systems is another important focus in the course for introducing the importance of analysis and design before implementation.					
學習目標（Learning Objective）： 1. To understand different data structures, their characteristics, and applications 2. To learn problem solving methods. 3. To practice through software system development					
教科書[1] Textbooks[1]	1. Fundamentals of Data Structures in C, 2/e (Paperback), Ellis Horowitz,Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008 ISBN :0929306406 2. Data Structures : A Pseudocode Approach with C, 2/e (Paperback), Richard F. Gilberg and Behrouz A. Forouzan, Course Technology, 2005. ISBN :0534390803				

課程綱要（Syllabus）		對應之學生核心能力 Student Competencies	備註 Comments
單元主題 Topic	內容綱要 Content Summary		
Basic concept in data structures and software development	● Introduction to data structures ● Abstract datatypes ● Algorithm efficiency ● Introduction to basic software engineering concept ● Introduction to analysis and design	核心能力 1.1 核心能力 1.2 核心能力 2.1 核心能力 2.2 核心能力 4.3	

Reviews on programming skills in C	● Recursion Pointers and structures ● Linked lists Pointers to functions	核心能力 1.1 核心能力 1.2 核心能力 2.1 核心能力 2.2 核心能力 4.3	
Fundamental data structures and techniques	● Searching ● Stacks and Queues ● Hash	核心能力 1.1 核心能力 1.2 核心能力 2.1 核心能力 2.2 核心能力 4.3	
Tree and related representation	● Basic tree representation ● Tree traversals ● Expression Trees ● Binary search trees ● AVL trees ● Heaps	核心能力 1.1 核心能力 1.2 核心能力 2.1 核心能力 2.2 核心能力 4.3	
Sorting techniques	● Internal sorting techniques ● External sorting techniques ● O(n) sorting techniques	核心能力 1.1 核心能力 1.2 核心能力 2.1 核心能力 2.2 核心能力 4.3	
Graph representations	● Adjacency matrix and list ● Spanning trees ● Shortest path problem	核心能力 1.1 核心能力 1.2 核心能力 2.1 核心能力 2.2 核心能力 4.3	
Advanced tree representation	● Multiway trees ● B-Trees	核心能力 1.1 核心能力 1.2 核心能力 2.1 核心能力 2.2 核心能力 4.3	
Examinations	● Onsite exams ● Paper exam	核心能力 1.1 核心能力 1.2 核心能力 2.1 核心能力 2.2 核心能力 4.3	

教學要點概述[2]（Grading Standards）[2]：

教材編選(Textbooks)：

■自編教材(Own teaching material)　□教科書作者提供(Authored Textbooks)

教學方法(Teaching Method)：

■投影片講述(PPT)　□板書講述(Blackboard) □實例示範(Demonstration by examples)
□操作練習(Activities)

評量方法(Grading Method)：
□上課點名(Final Presentation)（%） □小考(Quiz)（%）■作業(Homework)（20%）
■程式實作(Program implementation)（40%） □實習報告(Internship report)（%）
□專案(Project)（%） ■期中考(Mid-term exam)（20%） ■期末考(Final exam)（20%）
□期末報告(Final report)（%） □其它(Other)（%）

教學資源(Teaching Resources)：
■課程網站(Course Website) ■教材電子檔供下載(Teaching Material Downloads)
□其他(Other) _____

教學相關配合事項(Other matters related)：

核心能力(Core Capabilities)

●1.1 ●1.2 ○1.3 ●2.1 ●2.2 ○3.1 ○3.2○4.1 ○4.2 ●4.3 ○4.4

1.1 瞭解電機／通訊工程基礎知識 (Understanding of fundamental knowledges in EE/COMM.)

為何有關(Why is the course capable of cultivating this ability?) ：The course helps the students understand how they can solve problems in the electrical engineering and communication engineering field such as memory organization in computers, scheduling problems in operating systems, queuing concept in network communications, minimal spanning trees in circuits, etc.

達成指標(Indicators to be reached) ：Obtaining the knowledge

評量方法(Assessment methods) ：Quizzes and final exam

1.2 培養電機／通訊工程實作能力 (Ability to practice EE/COMM.)

為何有關(Why is the course capable of cultivating this ability?) ：Many of the concepts and the problem solving methods will be realized in software. The students will also learn how to analyze and design a software system before implementing the system in C.

達成指標(Indicators to be reached) ：Programming skills

評量方法(Assessment methods) ：Programming exercises, onsite programming exams

1.3 訓練技術報告寫作與簡報的能力 (Ability to write technical reports and make effective presentations.)

為何有關(Why is the course capable of cultivating this ability?) ：

達成指標(Indicators to be reached) ：

評量方法(Assessment methods) ：

2.1 培養分析問題的能力 (Ability to analyze engineering problems.)

為何有關(Why is the course capable of cultivating this ability?) ：The importance of analysis and design is stressed in the course by introducing basic software engineering concepts. The students will not only enhance their ability in programming, but also practice analysis and design of a software system with an incremental and iterative approach. After such training, the students will have the ability to build simple simulation systems.

達成指標(Indicators to be reached) ：Able to analyze and design a system

評量方法(Assessment methods) ：Final Project

2.2 培養善用資源以解決問題的能力 (Ability to apply resource in problem solving.)

為何有關(Why is the course capable of cultivating this ability?) ：The problem solving methods taught in the course have many applications. The students are assigned projects to implement such applications by developing software systems. The topics of the projects are designed to incorporate the concepts learned in the course with practical applications, so that students can use their solutions to experiment with the application of these concepts.

達成指標(Indicators to be reached) ：Constructing a software system

評量方法(Assessment methods) ：Final Project

3.1 培養溝通與表達的能力 (Ability to communicate and express effectively.)

為何有關(Why is the course capable of cultivating this ability?) ：

達成指標(Indicators to be reached) ：
評量方法(Assessment methods) ：

3.2 訓練運用個人專長，與他人合作完成專案計畫 (Ability to contribute effectively as an individual, and as a member or leader in team works.)
為何有關(Why is the course capable of cultivating this ability?) ：
達成指標(Indicators to be reached) ：
評量方法(Assessment methods) ：

4.1 瞭解國內外相關產業及永續發展概況與需求 (Understanding of the trends **and sustainable development in both** domestic and global industries)
為何有關(Why is the course capable of cultivating this ability?) ：
達成指標(Indicators to be reached) ：
評量方法(Assessment methods) ：

4.2 理解工程暨資訊倫理及社會責任 (Understanding of engineering **and information ethics including** social responsibilities)
為何有關(Why is the course capable of cultivating this ability?) ：
達成指標(Indicators to be reached) ：
評量方法(Assessment methods) ：

4.3 培養良好的資訊能力 (Proficiency in information processing.)
為何有關(Why is the course capable of cultivating this ability?) ：All assignments are conducted in writing programs in C.
達成指標(Indicators to be reached) ：Writing programs
評量方法(Assessment methods) ：Onsite exams

4.4 培養基本科技英文能力 (Proficiency in technical English.)
為何有關(Why is the course capable of cultivating this ability?) ：
達成指標(Indicators to be reached) ：
評量方法(Assessment methods) ：

註(Note)：

1. 教科書請註明書名、作者、出版社、出版年等資訊。(Please specify the title, author, publisher, publication year and other information with the textbook information.)
2. 教學要點概述請填寫教材編選、教學方法、評量方法、教學資源、教學相關配合事項等。(At the teaching overview section, please fill out the textbooks, teaching methods, grading methods, teaching resources, and other matters related.)
3. 學系所有開設之課程皆須填寫此表格或提供原有格式之課程綱要表。若能蒐集校際所開設課程，如共同必修科目、通識課程等之課程綱要表，亦可提供。(All courses of graduate institutes must complete this form or provide syllabuses table in original format.)