



# Introduction To Computer Science 計算機概論

**Chia-Chun Tsai**  
**Professor**

**Dept. of Computer Science and Information  
Engineering**

**Nanhua University**

**E-mail: [chun@mail.nhu.edu.tw](mailto:chun@mail.nhu.edu.tw)**

**<http://www.nhu.edu.tw/~chun>**



**Fall 2019**



## Course Description 課程概述

This course presents an introductory survey of computer science. It follows a bottom-up arrangement of subjects that progresses from the concrete to the abstract and makes all the applications for information technologies. These covered topics are as follows. **Introduction to computer science, Number systems, Data encoding and storage, Computer architecture, Networking and protocol, Operating systems, Algorithms, Programming languages, Software engineering, Data structure, Abstract data types, File structures, Databases, Data compression, Information security, and Artificial Intelligence.**



P.2

## **Course Description 課程概述**

本課程針對計算機科學作全面性的概括介紹；以 Bottom-Up 的方式，介紹電腦軟硬體系統的各项基本要素及電腦在資工專業領域的廣泛應用。這些知識主題包含**計算機起源、二進制系統、資料記錄與儲存、電腦結構、電腦網路與協定、作業系統、演算法、電腦語言、軟體工程、資料結構、抽象資料型態、檔案結構、資料庫、資料壓縮及資訊安全、人工智慧**等基本概論。

## **Textbook 教科書**

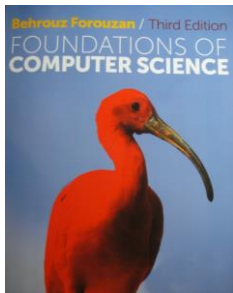
### **Foundations of Computer Science**

**Fourth Edition, 2018**

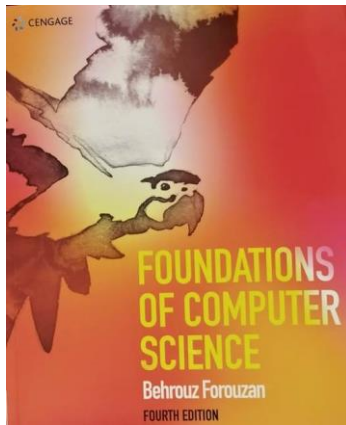
**By Behrouz A. Forouzan**

*©Cengage Learning*

## Textbook Cover 教科書封面



3e, 2014



4e, 2018



© 2018 Cengage 版權所有，課本著作之延伸教材，受著作權法之規範保護，僅作為授課教學使用，禁止列印、影印、未經授權重製和公開散佈

P.5

## Course Time and Office Hours 課程時間與辦公室時間

- **Course Time & Place:**
  - CS-1: 09:10 ~ 12:00, **Monday**, C219
  - CS-2: 09:10 ~ 12:00, **Thursday**, C219
- **Office Hours & Place:**
  - 13:10 ~ 15:00, **Monday**, C309
  - 14:10 ~ 16:00, **Thursday**, C309
- **TA Hours & Place:**
  - 18:00 ~ 20:00, **Thursday**, S326
  - CSIE-2B 葉芷彤



P.6

## Prepare your materials 準備素材

- **Concentration 專心 and Passion 熱衷**
- **Textbook in English or Chinese 英文或中文教科書**
- **Install Quiz\_SendAnswerByGmail.apk  
Android 手機-下載與裝置 小考專用app**
- **Propose questions anytime 隨時提問**
- **Quiz at last 10 minutes each 3-period teaching 每次三節課之最後10分鐘 小考兩小題 (open book) , 以照相答案後傳送**

## Grading 評量

- **Attendance 出席占分 : -5 % ~ 5 %**
- **Homework 平時占分 : 35 %**
- **Midterm Test 期中考占分 : 30 %**
- **Final Test 期末考占分 : 35 %**

## Attendance 出席 -5~5 %

- Roll-call 點名 each class  
-0.5 each since 2nd arrival late
- Signature 簽名 each class  
-1 for 1<sup>st</sup> absence, -2 each for 2<sup>nd</sup> and 3<sup>rd</sup> absences, -1 each since 4<sup>th</sup> absence

### Exception 例外 :

- ◆ Final test will be rejected if the number of absences is up to six because your learning has not been recognized to complete this course.

## Homework 35 %

- Quizzes 小考: Grading for sum of righted answers in total problems
- Paper-based assignments 紙本作業: Grading for sum of righted answers in total problems
- Video-based assignments 影片作業
- Deliver your paper/video assignments on time: The score will be reduced due to overdue
- Don't cheat for your any homeworks 作業不抄襲 或 被抄襲  
The score would be **zero** once one is verified

**Mid-term Test 30 %**  
**Final Test 35 %**

- **4-page Problems in English/Chinese 四頁中英文:** Closed book and 100 points are maximally graded from **110~125-point** problems
- **Don't cheat in any tests 考試不作弊**  
 The score would be **zero** once one is verified.
- **Open for all the gradings 公開評量 (You can check your scores about homework and tests anytime)**
- **No 58~59.9 points in term score 期末成績排除58~59.9分**

## Teaching Web 教學網頁

<http://www.nhu.edu.tw/~chun>

[English-Vesion](#) ● [頁頁\(CC\\_Tai\)](#) ● [簡介\(Biography\)](#) ● [教學課程\(Teaching\\_Courses\)](#) ● [教學績效\(Teaching\\_Awards\)](#) ● [輔導績效\(Counseling\\_Awards\)](#) ● [成績公報\(Grade\\_Report\)](#)  
[研究\(Research\)](#) ● [著作\(Publication\)](#) ● [學術服務\(Academic\\_Service\)](#) ● [行政服務\(Admin\\_Service\)](#) ● [社會服務\(Social\\_Service\)](#) ● [校務諮詢委員建言\(Advisory\\_Service\)](#)  
[傑出經驗分享\(Distinguished\\_Sharing\)](#) ● [藍山\(Impression\)](#) ● [藝術人生\(Life\\_Review\)](#) ● [永豐國小恩師傅錦堂 傅宇國小56級六甲同學會](#) ● [HotLinks](#)

Monday, August 12, 2019

蔡加春(Chia-Chun Tsai)

E-mail:[chun@nhu.edu.tw](mailto:chun@nhu.edu.tw)/[tworchun@mail.nhu.edu.tw](mailto:tworchun@mail.nhu.edu.tw)

Since June 1998



蘭潭, Chiayi



Hokkaido, Japan, July 2019



Puerto Vallarta, Mexico, Feb 2018

# Video-based Web: 歷年影片作業

<http://qnew.nhu.edu.tw>

南華大學 QNEW 課程諮詢影音系統

Podcast 分類:

- 精選總覽
- 數學類
- 資訊科技類
- 生物科學類
- 管理類
- 經濟類
- 會計類
- 藝術類
- 程式設計類
- 綜合類
- 社科類
- 人文類
- 通識類
- 教育類
- 語文類
- 傳播類
- 宗教類
- 旅遊類
- 財經類
- 音樂類

QR Code:

最新節目列表 | 播放次數節目列表

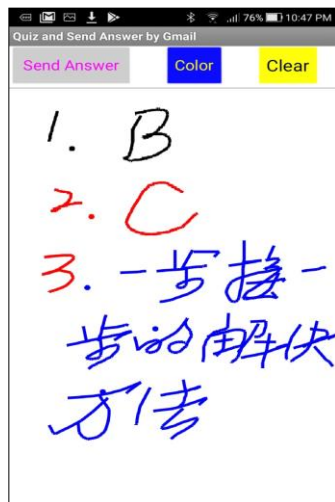
上一頁 1 2 3 4 5 6 7 下一頁

MATLAB-三維網格圖、三維曲 面圖 預覽次數: 3,827	程式類-MATLAB-直方圖 預覽次數: 1,560	MATLAB-高階練習 預覽次數: 754	CD光碟畫電機步驟範範範 預覽次數: 608
微積分-由微分導出的不定積 分公式三角函數 預覽次數: 540	GHOST畫畫步驟 預覽次數: 633	數學類-微積分-基斯函數 預覽次數: 528	資料結構-Binary Search 預覽次數: 497
		$\lim_{x \rightarrow \infty} f(x)$	

P.13

# Quiz\_SendAnswerByGmail.apk

## 小考專用於互動的APP



P.14

## Contents 目錄/課程內容 for Introduction To Computer Science

### Ch1. Introduction 簡介

- Turing model, Von Neumann model, Computer components, History.

### Ch1. Introduction-Extension 簡介-補充資料

- Moore's Law, nano-meter process.

### Ch2. Number Systems 數字系統

- Binary, Octal, Decimal, and Hexadecimal systems.

### Ch3. Data Storage 資料儲存

- Data types, Storing numbers, Storing text, Storing audio, Storing images, and Storing video.

### Ch4. Operations on Data 資料運算

- Logic operations, Shift operations, and Arithmetic operations.



C-C Tsai

P.15

## Contents 目錄/課程內容 for Introduction to Computer Science

### Ch5. Computer Organization 電腦組織

- Central processing unit, Main memory, I/O subsystem, Subsystem interconnection, Program execution, Different architectures, and A simple computer.

### Ch6. Computer Networks and Internet 電腦網路

- Introduction, TCP/IP protocol suite, Layers, and Internet applications.

### Ch7. Operating Systems 作業系統

- Introduction, Evolution, Computers, and survey of operating systems.

### Midterm Test 期中考



C-C Tsai

P.16



## Contents 目錄/課程內容 for Introduction To Computer Science

### Ch8. Algorithms 演算法

- Concept, Algorithm representation, A formal definition, Basic algorithms, Sub-algorithms, and Recursion.

### Ch9. Programming Languages 程式語言

- Evolution, Translation, Programming paradigms, and Common concepts.

### Ch11. Data Structure 資料結構

- Arrays, Records, and Linked lists.

### Ch12. Abstract Data Types 抽象資料型態

- Stacks, Queues, General linear lists, Trees, Binary trees, Binary search trees, and Graphs.



C-C Tsai

P.17



## Contents 目錄/課程內容 for Introduction To Computer Science

### Ch13. File Structure 檔案結構

- Access methods, Sequential files, Indexed files, Hashed files, Directories, and Text versus binary.

### Ch14. Databases 資料庫

- Database management systems, Database architecture, Database models, Relational database model, Operations on relations, and Database design.

### Ch15. Data Compression 資料壓縮

- Lossless compression and Lossy compression methods.

### Ch18. Artificial Intelligence 人工智慧

- Searching.

### Final Test 期末考



C-C Tsai

P.18

## The Structure of Each Chapter

**Objectives** 目標

...

...

**End-Chapter Materials** 章末教材

Recommended Reading

Key Terms

Summary

**Practice Set** 練習集

Quizzes

Review questions

Problems



C-C Tsai

P.19

## Scheduling for CS-1

9/9(Mon, 2-4 新生成長營 No Class), 9/16, 9/23,

9/30, 10/7 (No Class, 11/8晚上期中考代替補課)

10/14, 10/21, 10/28, 11/4,

11/8(Fri, 6:00PM~ at C322, Midtem Test)

11/11, 11/18, 11/25, 11/28補課(四)晚上6:00~

12/2 (No class, 11/28(四)晚上6:00~8:50補課, W100)

12/9 (No class, 1/7晚上期末考代替補課)公出武夷

12/16, 12/23, 12/30, 1/6,

1/7(Tue, 6:00PM~ at C322, Final Test)



C-C Tsai

P.20

# Scheduling for CS-2

9/12(Thu,2-4), 9/19, 9/26, 10/3

**10/10(No Class) 10/17, 10/24, 10/31, 11/7**

**11/8(Fri,6:00PM~ at C322, Midtem Test)**

**11/14, 11/21, 11/29補課(五)晚上6:00~8:50**

**11/28 (No Class, 11/8晚上期中考代替補課)公出,**

**12/ 5 (No class, 11/29(五)晚上6:00~8:50補課,C219)**

**12/12 (No class, 1/7晚上期末考代替補課)公出武東**

**12/19, 12/26, 1/2, 1/9**

**1/7(Tue, 6:00PM~ at C322, Final Test)**



C-C Tsai

P.21

## Remind for Answering Any Tests

提醒：作答時，答案與計算勿混淆

12. Given the internal resistance of a voltage meter,  $R_v = 1\text{M}\Omega$ , please show their reading value and loading effect of circuits (a) and (b).

Handwritten calculations for problem 12:

(a)  $18 \times \frac{2}{3} = 12$   
 $18 \times \frac{10}{12+10} = 8$   
 $\frac{12-8}{12} = 0.33 = 33\%$

(b)  $18 \times \frac{2}{3} = 12$   
 $18 \times \frac{0.5}{12+0.5} = 0.92$   
 $12 - 0.92 = 0.94 = 94\%$

17. Given a transmission data as below and the Huffman encoding is used for optimal compression, please calculate the compressed rate.

Character	a	d	f	g	m	u	y
Frequency	90	500	120	110	330	680	70

Handwritten calculations for problem 17:

Tree construction steps:  
 $1900 \rightarrow 160, 740$   
 $160 \rightarrow 40, 120$   
 $740 \rightarrow 110, 630$   
 $630 \rightarrow 330, 300$   
 $300 \rightarrow 500, 70$

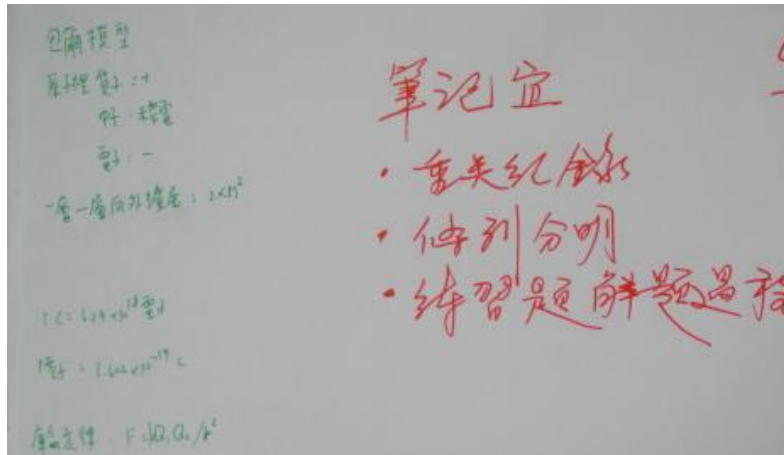
Final compressed rate:  $80\%$



P.22

## Hints for Making Your Classnotes

提示：自行作筆記 條列分明



P.23