



Sensing Technology

傳感器技術

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Fall 2019



Course Description 課程概述

This course mainly focuses on introducing various sensors and its front-end circuit. In addition, we also discuss the application cases from the view of system specification. All sensors and circuits mentioned in this course would be modularized first and then be further applied to a real case for live.

本課程主要的重點在於各種感測器與前端電路，並以系統規格的角度來探討實際應用情況。針對課程上所提到的電路進行模組化，並且應用於生活中。



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Course Time and Office Hours

課程時間與辦公室時間

- **Course Time & Place:**
 - **3C: 09:10 ~ 12:00,**
Tuesday, at W100
- **Office Hours & Place:**
 - 13:10 ~ 15:00, Monday, at C309
 - 14:10 ~ 16:00, Thursday, at C309

Grading 評量考核

- **Attendance (出席占分) : -5 % ~ 5 %**
- **Homework (平時占分) : 40 %**
- **Midterm Test (期中考占分) : 30 %**
- **Final Project (期末專題占分) : 30 %**

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 1st absence, -2 each for 2nd and 3rd absences, -1 each since 4th 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 作業 40 %

- **Quizzes(小考):** Grading for sum of righted answers in total problems
- **Paper-based assignments(紙上作業):** 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 期中考 30 %

Final Project 期末專題 30 %

- **3~4-page Problems in English/Chinese** 三至四頁中英文: Closed book and 100 points are maximally graded from **100~120-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



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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\(Distinguished_Sharing\)](#) ● [版言\(Impression\)](#) ● [藝術人生\(Life_Review\)](#) ● [水雲閣小說館\(網路文學\)](#) ● [傑出經驗分享](#) ● [HotLinks](#)

Monday, August 12, 2019

蔡加春(Chia-Chun Tsai)

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Since June 1998



蘭潭, Chiayi



Hokkaido, Japan, July 2019



Puerto Vallarta, Mexico, Feb 2018



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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：

- Podcast 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
- 傳導類
- 宗教類
- 旅遊類
- 財經類
- 音樂類

QR Code :

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數位學習平台: Materials課程教材下載

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

Login登入畫面

南華大學

108 南華大學 數位學習平臺

Welcome to Moodle Learning System

您尚未登入 (登入)

最新消息 | 校園資源 | 資訊系統 | 課程資源 | 使用說明 | Languages

聯絡資訊

服務信箱：
peishan0503@nhu.edu.tw

來信主旨請註明「數位教學平臺」

服務電話：
05-2721001

ext.1962

相關資訊：

最新公告

公告內容 時間

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數位學習平台: Materials課程教材下載

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

After Login 登入後畫面



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Text Material Resources

Various website sources

本編輯教材參考網站可查詢之各種資源，任何延伸教材僅作為授課教學使用，限本課程修課學生教育學習用途，禁止私下傳播複製重製或公開散佈等。

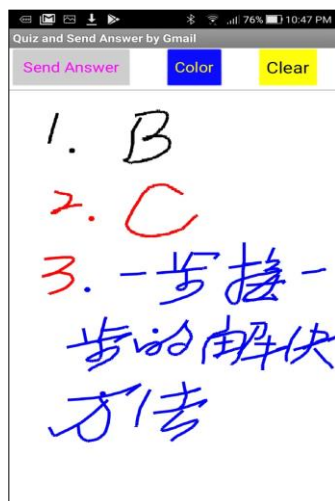
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Prepare your materials 準備素材

- **Concentration and Passion** 專心與熱衷
- **Notebook** 筆記本
- **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 or Exercise if a teaching class is needed** 假使該次教學需要，將小考或練習 (open book)，以照相答案後傳送

Quiz_SendAnswerByGmail.apk 小考專用於互動的APP





Contents 目錄/課程內容 for Sensing Technology 傳感器技術

- Unit00. Course Overview** 課程概述
- Unit01. Introduction of Sensors and Sensing System** 感測器及感測系統簡介
- Unit02. Physical Quantity Changes are Converted into R, I, or V** 物理量變化轉換為電阻、電流與電壓
- Unit03. Electrical Level Conversion Circuit and Analysis** 電性準位轉換電路及分析
- Unit04. Front-end Sensing Circuit Techniques for Sensing System** 感測系統之前端感測電路技術



Contents 目錄/課程內容 for Sensing Technology 傳感器技術

- Unit05. Rear-end Conversion Circuit Techniques for Sensing System** 感測系統之後端轉換電路技術 (如ADC, DAC)
- Unit06. Power Output Drivers for Sensing System** 感測系統之功率輸出驅動器
- Unit07. Temperature Sensors: Principle, Application and Circuit Analysis** 溫度感測器之原理、應用及電路分析
- Midterm Test** 期中考



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- Unit08. Ultrasonic and Proximity Sensors:
Principle, Application and Circuit Analysis**
超聲波與近接感測器之原理、應用及電路分析
- Unit09. Photoelectric and Pressure Sensors:
Principle, Application and Circuit Analysis**
光電與壓力感測器之原理、應用及電路分析
- Unit10. Displacement and Flow Sensors:
Principle, Application and Circuit Analysis**
位移與流量感測器之原理、應用及電路分析
- Unit11. Sensor Planning Term-Project 感測器
期末專題之計畫書規劃**



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- Unit12. Sensor Case Study & Discussion (I)**
感測器專題案例研討(一)
- Unit13. Sensor Case Study & Discussion (II)**
感測器專題案例研討(二)
- Unit14. Sensor's Term-Project
Comprehensive Report (I) 感測器期末專題
計畫書綜合報告(一)**
- Unit15. Sensor's Term-Project
Comprehensive Report (II) 感測器期末專題
計畫書綜合報告(二)**

Contents 目錄/課程內容 for Sensing Technology 傳感器技術

Term-Project Assessment and Comprehensive Commentary 期末專題考核綜合講評



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Scheduling for CSIE-3C

9/10(二 2~4), 9/17, 9/24, 10/1,
10/8 (No Class, 11/7晚上期中考代替補課)
10/15, 10/22, 10/29, 11/5,
11/7(四, 6:00PM~ at C322, Midtem Test)
11/12, 11/19, 11/21補課(四6~8 C219), 11/26,
12/ 3 (No class, 11/21補課(四6~8 C219))
12/10 (No class, 12/19補課(四6~8 C219))
12/17, 12/19補課(四6~8 C219), 12/24, 12/31,
1/7(Tue, 9:10AM~ at W100, Final Evaluation)



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

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

Red handwritten notes: "這是做答" (This is the answer), "還是計算算樣?" (Is it still calculation style?).

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 notes: "計算未解答案" (Calculation not solved), "混在一起" (Mixed together).

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Hints for Making Your Classnotes

提示：自行作筆記 條列分明

巴爾模型
 原理：+
 符：-
 一層一層向外增長： 2^n

1. $2^n = 2^{n-1} + 2^{n-2} + \dots + 1$
 2. $2^n = 2^{n-1} + 2^{n-2} + \dots + 1$
 3. $2^n = 2^{n-1} + 2^{n-2} + \dots + 1$

筆記宜

- 重失紀錄
- 條列分明
- 練習題解題過程

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