



# Communication Electronic Technology Training 通訊電子工藝實訓

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

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

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

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

**Spring 2019**



## Description for Communication Electronic Technology Training

本實訓課程主要介紹通訊電子基本元件及其相關的電氣特性，瞭解這些基本元件的實際使用方法，並解析這些基本元件組成的各種通訊電子電路，藉由這些各種通訊電子電路的工藝實驗，且進一步整合這些通訊電子電路的工藝實驗而成為一部實用的通訊電子接收機，做為日後設計進階通訊電子之根基。

**實訓課程內容包括：**通訊電子基本儀器之認識與操作、基本元件的認識與量測、基本焊接技術、基本串級放大器實驗、接收機前級放大器組裝與測試、功率放大器實驗、接收機後級放大器組裝與測試、揚聲器與耳機組裝與測試、射頻放大器實驗、接收機射頻放大器組裝與測試、振盪電路實驗、接收機振盪器組裝與測試、天線電路組裝與測試、**接收機整體的組裝與測試等。**



## Technology Material 工藝素材

### 易興電子型號 KI-1507-高敏度 AM-7晶體收音機套件



 C-C Tsai

3

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

- **Course Time & Place:**
  - 08:10 ~ 9:00, Wednesday, W100
- **Office Hours & Place:**
  - 13:10 ~ 16:00, Tuesday, C309
  - 13:10 ~ 16:00, Thursday, C309

 C-C Tsai

C-C Tsai

P.4

## Grading (評量)

- Attendance (出席) : -5 % ~ 5 %
- Assignments 指定工作: 30 %
- Midterm Test (期中考): 30 %
- Finished Product (期末成品): 40 %

## Attendance 出席 -5~5 %

- Roll-call(點名) each class  
-0.5 each since 2nd time arrival late
- Signature(簽名) each class  
-1 for 1st absence,  
-2 each since 2nd time 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.

## Assignments 30 %

- Practices 實作, Quizzes 小考 and Paper-based homework 紙上作業: Grading for sum of righted answers in total problems
- **Deliver your paper/assignments on time:**  
準時交實作、小考及作業  
The score will be reduced due to overdue
- **Don't cheat (勿欺騙) for your any homeworks**  
The score would be **zero** once one is verified 一旦確認欺騙，該項0分

## Mid-term Test 30 %

- **Two- or three-page Problems in English / Chinese 2至3頁中英文**: Closed book and 100 points are maximally graded from 115-point problems
- **Don't cheat in any tests 對任何考試勿欺騙**  
The score would be **zero** once one is verified.  
一旦被確認欺騙，該項0分
- **Open for all the gradings 公開評量** (You can check your grading anytime)
- **No 58~59.9 points in term score 期末成績排除 58~59.9分**

## Finished Product 40 %

- **Check your finished radio** that all the functions work 功能正常 or partial work 部分正常.
- **Check your finished radio** that all the assembly of parts 零件裝配 are matched the assembly requirements.
- **Check your finished radio** that all the welding points 焊接點 are matched the welding requirements.

## Prepare your materials (準備素材)

- **Concentration and Passion** 專心與熱衷
- **Make classnotes by yourself** 自行作筆記
- **Understand Multisim** 電路分析專業軟體
- **Circuit Drawing/Analysis** 電路繪製實作 and quiz 小考
- **Propose your questions anytime** 隨時提問

# Teaching Web 教學網頁

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

English-Version ● 首頁(CC Tsai) ● 簡介(Biography) ● 教學課程(Teaching Courses) ● 教學績效(Teaching Awards) ● 輔導績效(Counseling Awards) ● 成績公告(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) ● 感賞(Impression) ● 領導人堂(Life Review) ● 全國國小學務總聯會/僑平國小56級六丙同學會 ● HotLinks



蘭潭, Chiayi



Puerto Vallarta, Mexico, Feb 2018



C-C Tsai

C-C Tsai

P.11

## Contents 課程內容 for Communication Electronic Technology Training

- 1 課程簡介與實驗室安全規則
- 2 通訊電子基本儀器之認識與操作
- 3 基本元件的認識與量測
- 4 基本焊接技術
- 5 基本串級放大器實驗
- 6 接收機前級放大器組裝與測試
- 7 功率放大器實驗
- 8 接收機後級放大器組裝與測試
- 9 期中考(筆試)



C-C Tsai

12

## Contents 課程內容(續) for Communication Electronic Technology Training

- 10 揚聲器與耳機組裝實驗
- 11 射頻放大器實驗
- 12 接收機射頻放大器組裝與測試
- 13 振盪電路實驗
- 14 接收機振盪器組裝與測試
- 15 天線電路組裝與測試
- 16 接收機整體的組裝與測試
- 17 接收機整體的組裝與測試 驗收報告一
- 18 接收機整體的組裝與測試 驗收報告二

## Scheduling

2/20 (2/22第1節補課),  
2/27(Wednesday), 3/6, 3/13, 3/20,  
3/27, 4/3, 4/10,  
4/17(Wed, Mid-Test)

4/24, 5/1, 5/8, 5/15, 5/22, 5/29, 6/5  
6/12, 6/19(Finished Product Checking)

## Remind for Answering to Any Tests

提醒：作答時，答案與計算勿混淆

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

Handwritten calculations for circuit (a):

$$18 \times \frac{2}{12+10} = 1.8$$

$$18 \times \frac{10}{12+10} = 16.2$$

Handwritten calculations for circuit (b):

$$18 \times \frac{2}{12+0.5} = 0.92$$

$$18 \times \frac{0.5}{12+0.5} = 0.72$$

Final calculation for (b):

$$\frac{12 - 0.72}{12} = 0.94 = 94\%$$

Handwritten notes: "這是做答" (This is the answer), "還是計算草稿?" (Is it still calculation draft?).

## Hints for Making Your Classnotes

提示：自行作筆記 條列分明

正確模型

原理解：+

符：-

一層一層向外推展： $i \times r^2$

$r = 1.2 \times 10^3 \text{ m}$

符： $1.6 \times 10^{-19} \text{ C}$

原點條件：F,  $\rho, \sigma, \epsilon_0$

筆記宜

- 重失紀錄
- 條列分明
- 練習題解題過程