

EE3110 Analogue Electronic Circuits



Course Information

Course lecturers:

Dr. Andy Chan (Week 1-7)

Dr. Gai Xin (Week 8-13)



In this digital age, why is there a need for analogue electronics?

- Imagine Hi-Fi without analogue
- Imagine Concerts without analogue

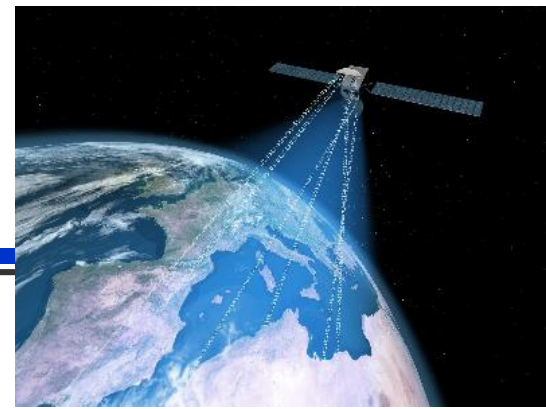


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That's because there's no amplifier

- Imagine Radios without analogue
- Imagine Televisions without analogue
- Imagine GPS without analogue



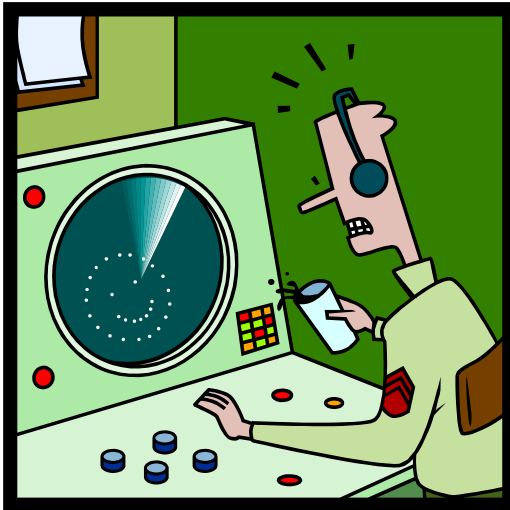
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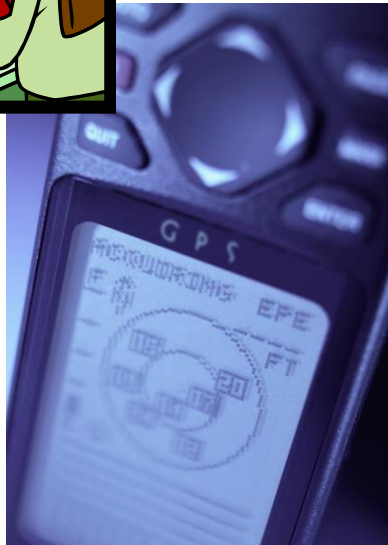
That's because there's no receiver



- Imagine airports without analogue
 - Imagine mobile radio without analogue
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That's because there's no transmitter

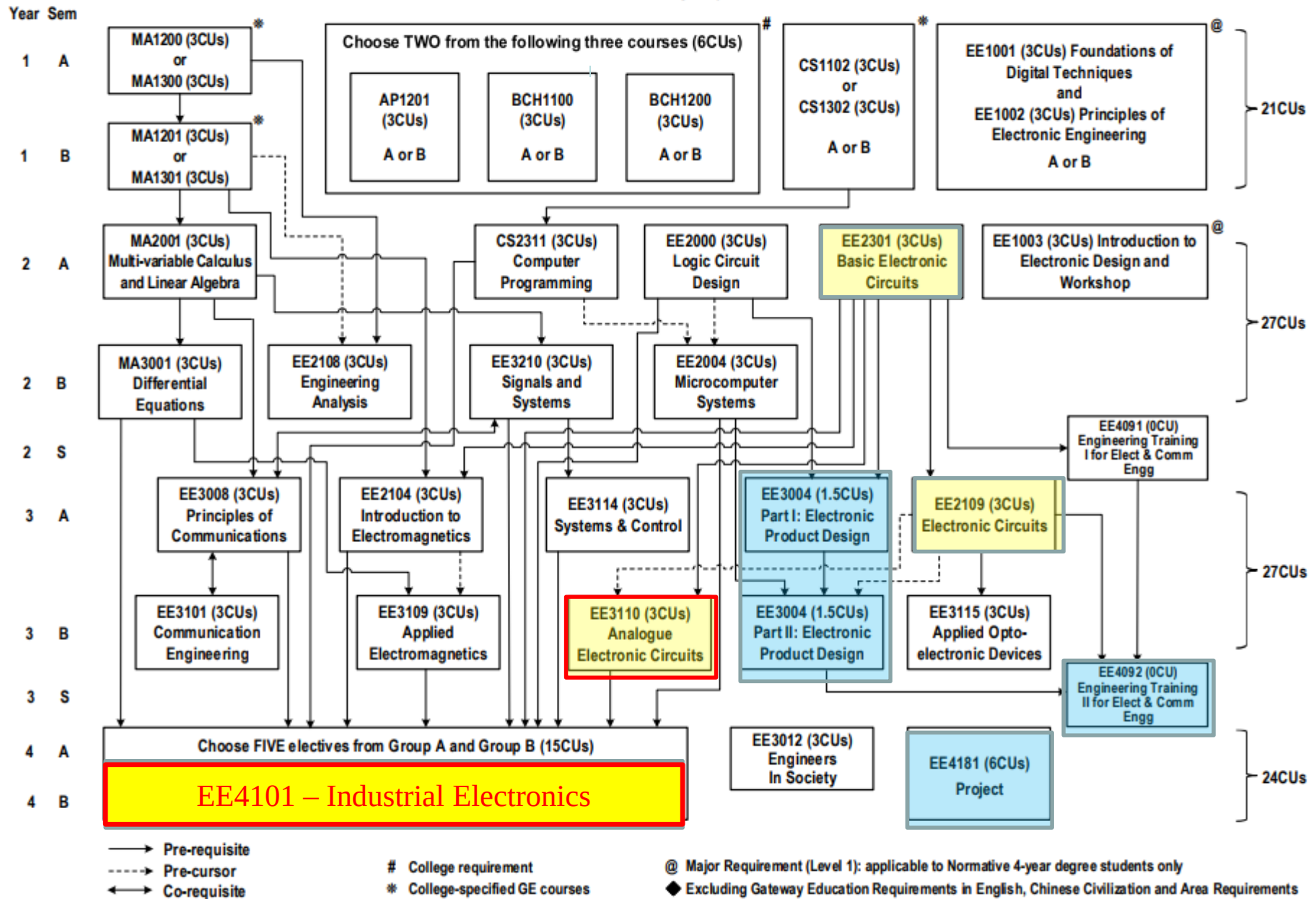
Some examples of where you will find analogue electronic circuits



How important this course in the programme?

Structure and Flowchart for BEng in Electronic and Communication Engineering 2017/18 Entering Major ♦

Last updated 22 May 2017

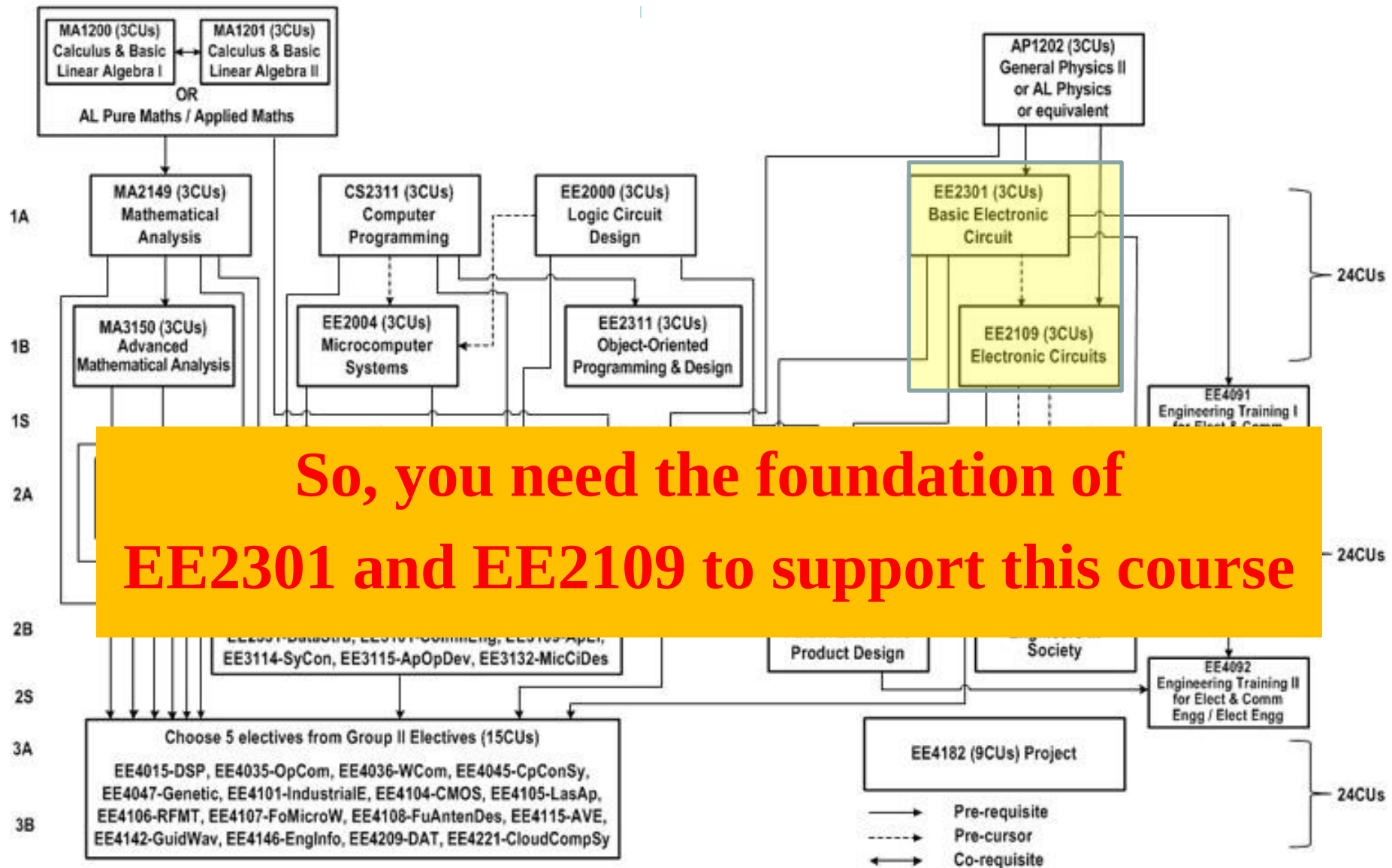


What to learn in this course?

Basic Course Content

1. **Revision on Transistor Circuits Modelling**
 - Modelling of BJT and FET's construction
 - Analysis of small signal ac equivalent circuits
 - Frequency Responses of Amplifier
2. **Feedback Amplifiers**
 - Ideal feedback amplifier and characteristics
 - Practical feedback amplifier and configurations
3. **Oscillators**
 - Oscillation conditions
 - Various types of configurations
4. **Monolithic Circuit Techniques**

(Programme Major: 72 CUs, GE(Area Requirements)+English+Chinese Civilization: 21 CUs, Total: 93 CUs)



So, you need the foundation of EE2301 and EE2109 to support this course

Basic Course Content of EE2301

- **DC circuits**
 - > Unit 1: Laws, terms, sources, resistive networks
 - > Unit 2: Methods of analysis
 - > Unit 3: One-port and two-port networks
- **AC circuits**
 - > Unit 1: Sinusoids, phasors, impedance
 - > Unit 2: Solving AC circuits, frequency response
- **Semiconductor devices**
 - > Unit 1: Diodes
 - > Unit 2: MOSFET
 - > Unit 3: BJT
- **Operational amplifiers**
 - > Amplifier model, ideal operational amplifier (op amp)
 - > Op amp circuits

Basic Course Content (EE2109)

1. Operational Amplifiers

- Practical issues
- Applications
 - ❖ Active Filters

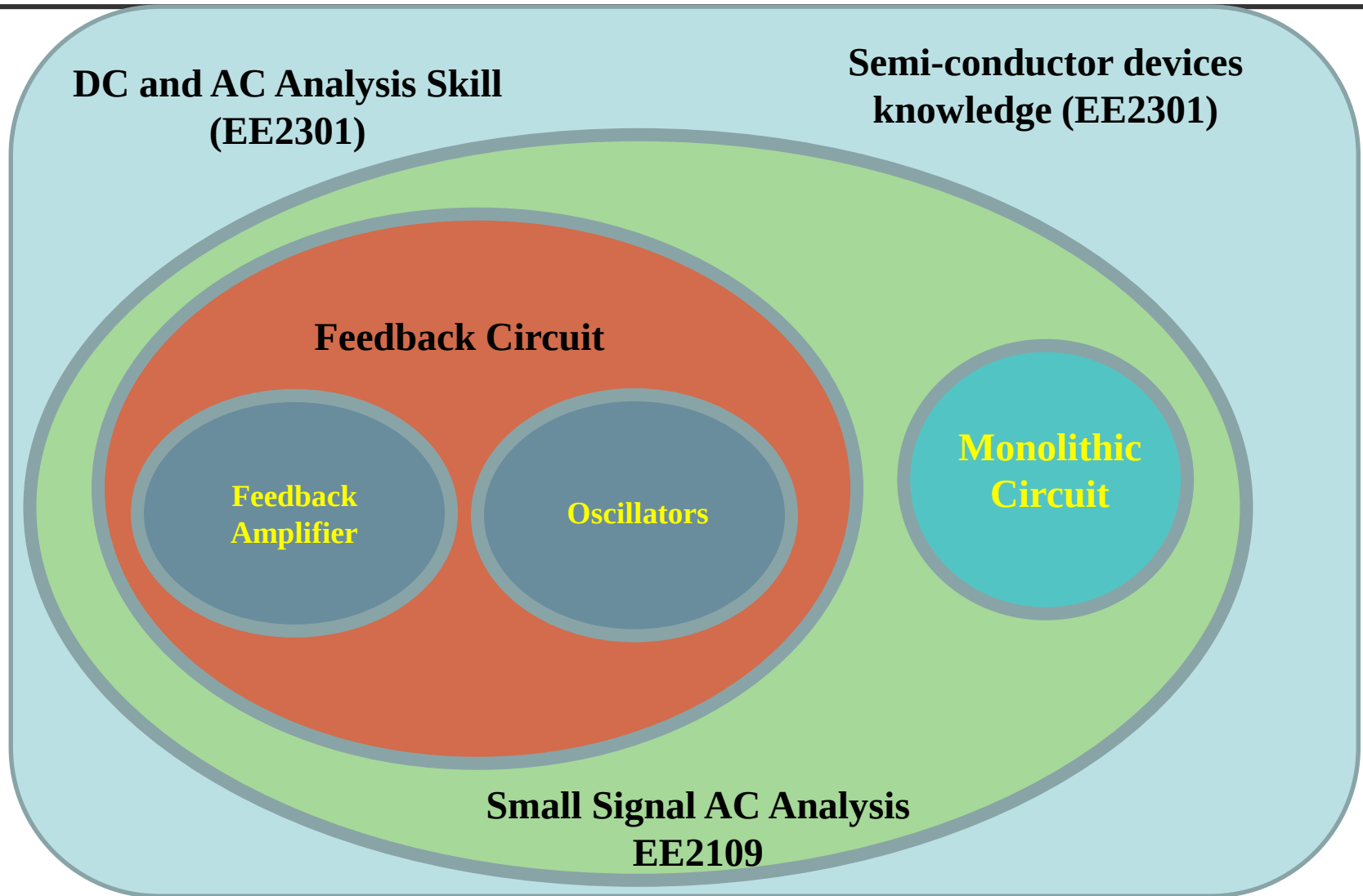
2. Small-Signal Analysis of Amplifier Circuits

- Two-Port Networks
- Frequency Response of Amplifying Circuits

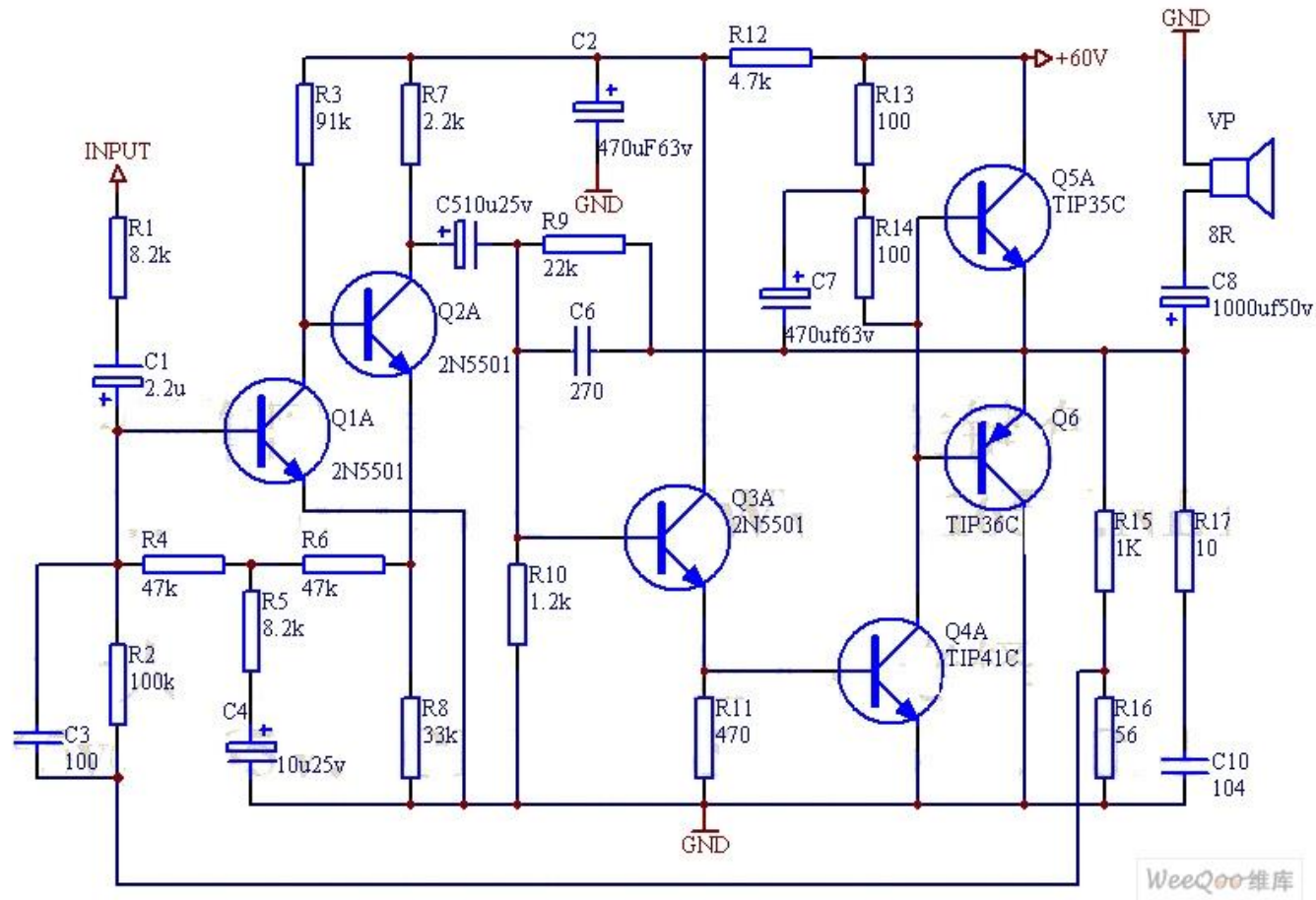
3. Power (Voltage) Regulator

- Zener diode

Three Main Focuses



Circuit Example: 50W Hi-fi Power amplifier



http://www.seekic.com/circuit_diagram/Amplifier_Circuit/The_self_made_independent_element_50W_hi-fi_power_amplifier_circuit.html

RF Transmitter Circuit

POCKET FM RECEIVER

5V

4.7nF

18k

68pF

L1

3.4V

1.8k

10k

18k

0.2V

4.7pF

220

18k

4.7nF

0.66V

1k

100pF

1.2V

22k

680nF

BC560C

5.6k

33k

BC550C

0.73V

47k

4.7uF

AF

1.2k

0

L1 = 10 turn / 0.5 mm SWG25 d = 3mm
 L2 = 12 turn / 0.5mm SWG25 d = 5mm
 L3 = 4 turn / 1.2mm SWG18 d = 5mm

BF324

BF324

L3

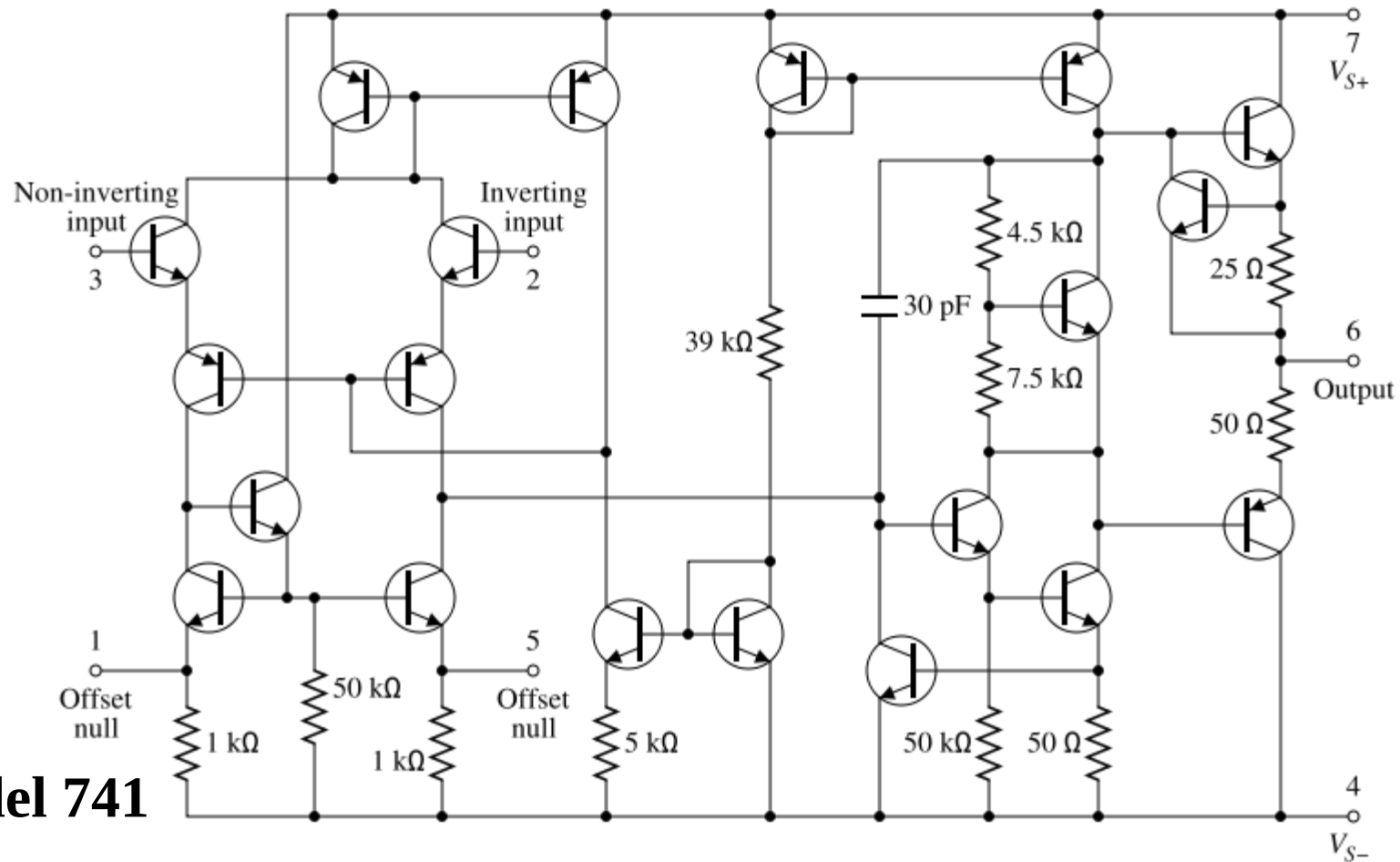
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L1 = 10 turn / 0.5 mm SWG25 d = 3mm
L2 = 12 turn / 0.5mm SWG25 d = 5mm
L3 = 4 turn / 1.2mm SWG18 d = 5mm



An example of Monolithic Circuit

Made up of many transistors and circuits...

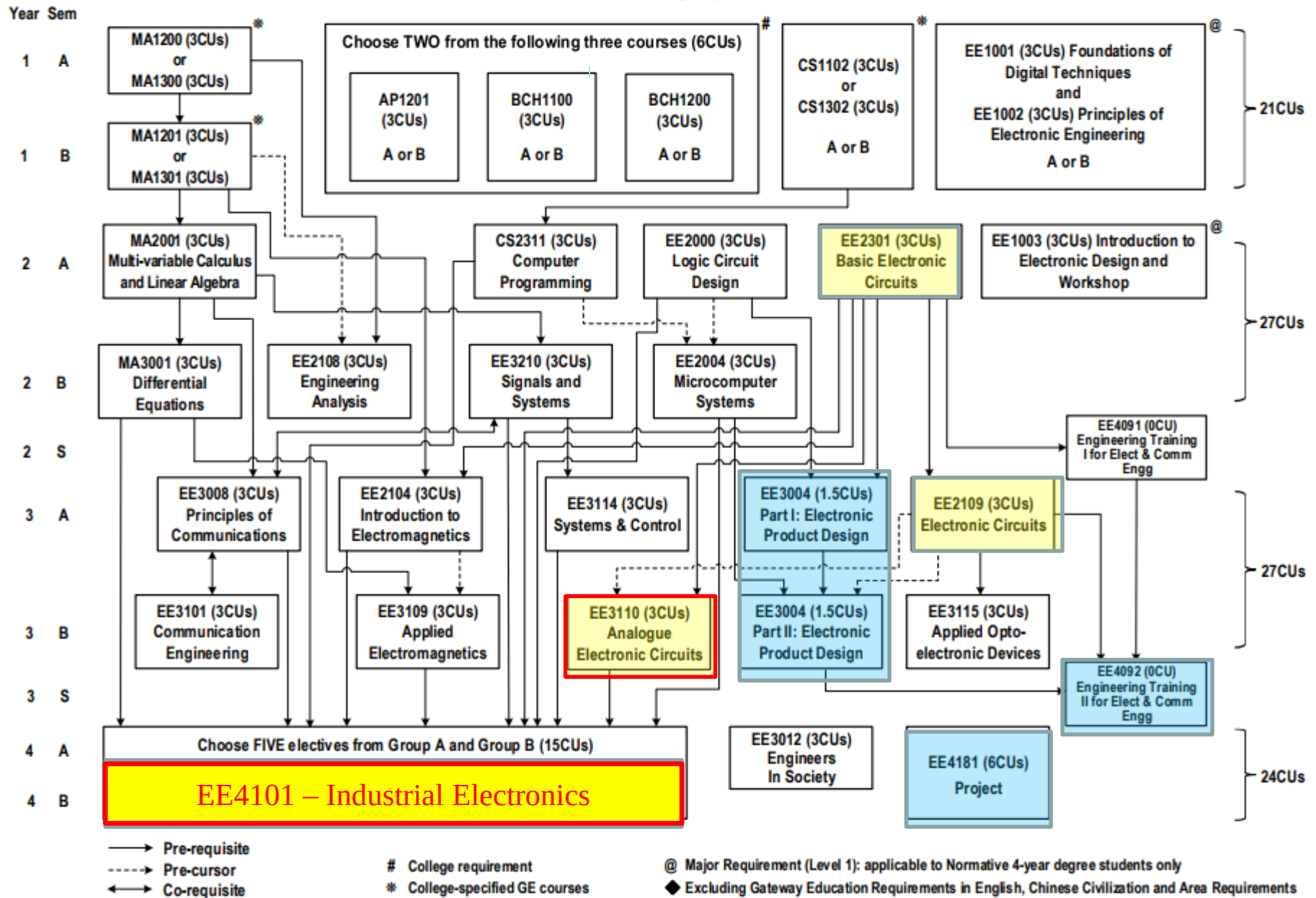


Model 741

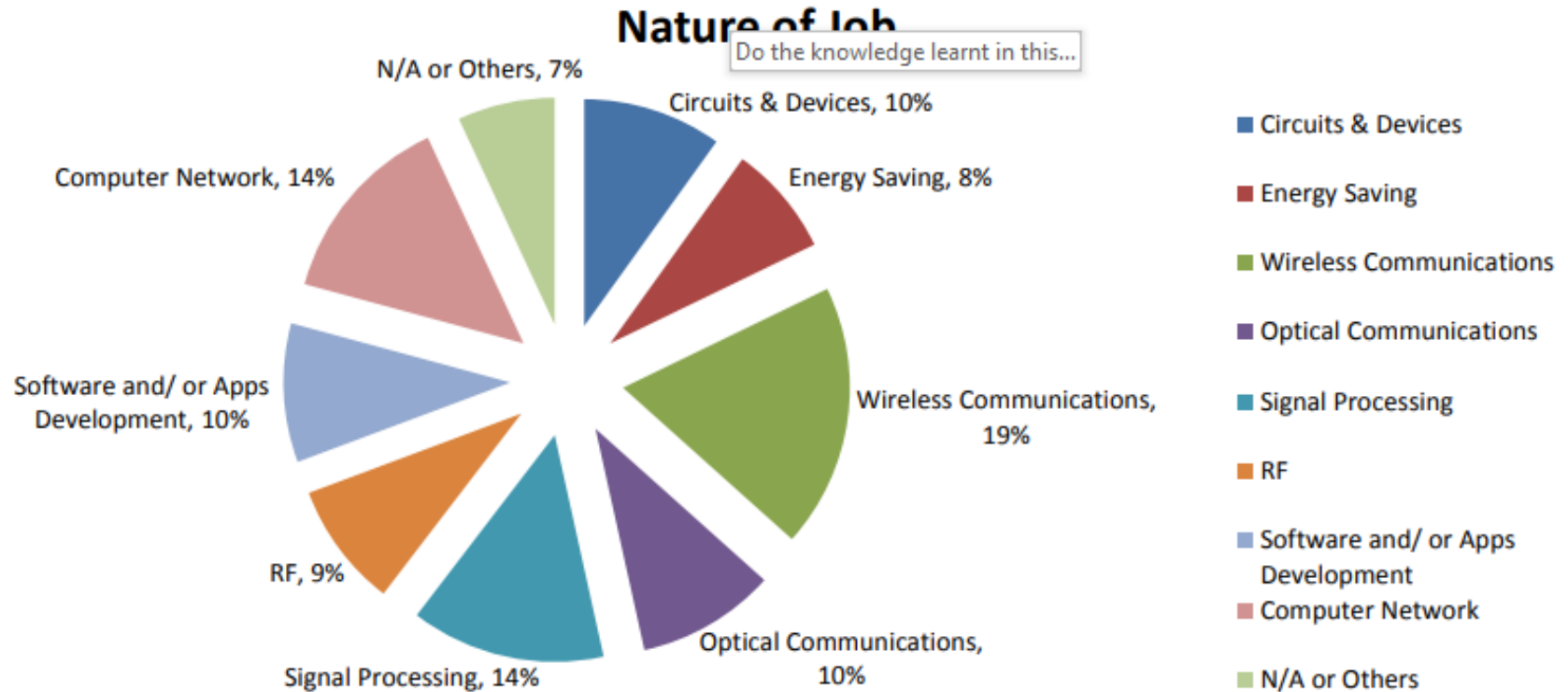
**Do the knowledge learnt in this
course useful for my future job?**

Structure and Flowchart for BEng in Electronic and Communication Engineering 2017/18 Entering Major ♦

Last updated 22 May 2017



Graduate Employment Statistics of BEngECE 2017 Graduates



Remark: The statistics are extracted from Employment Survey of EE 2017 Graduates conducted by the Department of Electronic Engineering in November 2017.

http://www.ee.cityu.edu.hk/home/doc/programme/ECE_Nature_2017.pdf

Smart System for Battery Monitoring Proved to be Time and Energy Saving



<http://newscentre.cityu.edu.hk/media/news/2017/11/22/cityus-smart-system-battery-monitoring-can-significantly-save-time-and-energy>

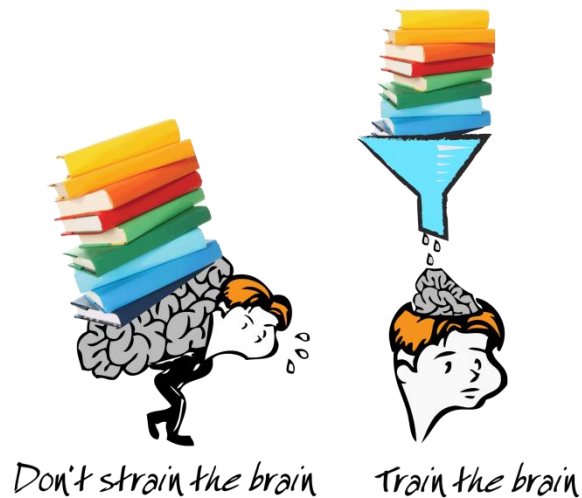
Launch of Energy-saving Invention "Smart Thermostat"



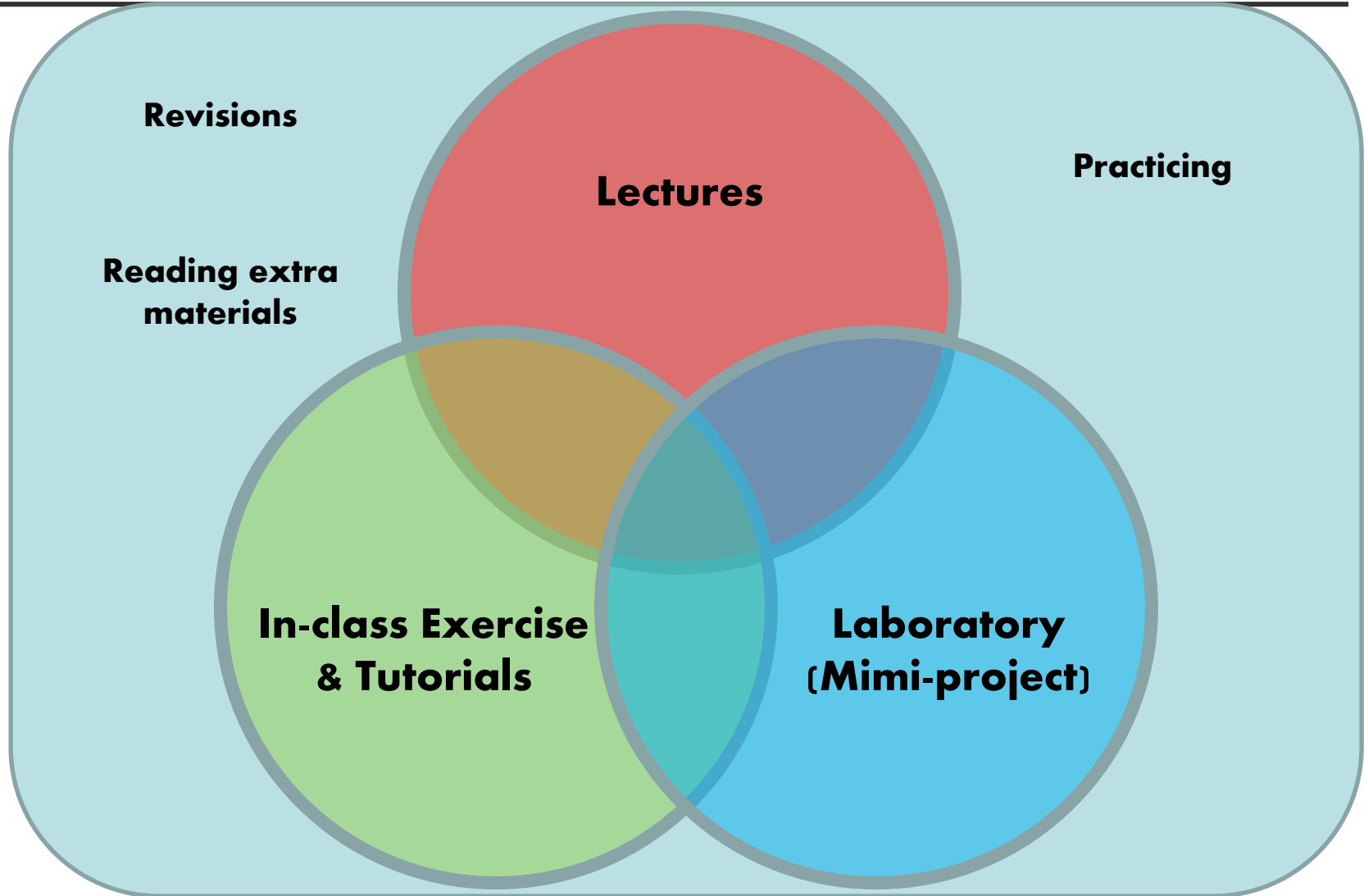
<http://wikisites.cityu.edu.hk/sites/newscentre/en/Pages/201710171350.aspx>



The learning model of this course?



Learning Model



How to assess?

Course Intended Learning Outcomes (CILOs)

- ❖ **CILO1:** Identify, differentiate and analyze the frequency effects of amplifiers.
- ❖ **CILO2:** Identify, differentiate and construct the equivalent model/circuit of feedback amplifiers.
- ❖ **CILO3:** Analyze using circuit/feedback theory the performance of feedback amplifiers.
- ❖ **CILO4:** Assess and apply feedback/circuit analysis to oscillators, and power amplifiers.
- ❖ **CILO5:** Evaluate and apply feedback to amplifiers, oscillators, and power amplifiers.
- ❖ **CILO6:** Identify different techniques used in monolithic circuits.

Assessment Weighting and Schedule

1. Course Work (40%)

➤ 2 Assignments and 2 Quizzes (20%)

- ❖ Week 5-7*

- ❖ Week 9-11*

➤ Laboratory/Mini-Project (15%)

- ❖ Week 4*, 6, 7, 9, 11,13 (Monday 9:00-11:50, 15:00-17:50)
(Tentative)

➤ In-class works and participations (5%)

2. Examination (60%)

> Two hours written paper, closed book

*schedule may be slightly adjusted according to the actual progress in teaching

Tentative Lecture Schedule*

Topics	Weeks
Revision	1.5
Frequency Response	1.5
Feedback Amplifier	4
Oscillator	3
Monolithic Circuit	2
Backup / Revision	1

*the number of weeks spent in each topics may be varied depending on the actual learning progress of the students.



LISTENING VERSUS DOING

You won't have any benefit by just listening
=> You must start doing it.



Let's start do some revisions first