IERG2060/ESTR2304
Basic Analog and Digital Circuits

Course Outline

Course Staff

- **Instructor**
  - Dr Marco HO (SHB 708)
    (mho@ie.cuhk.edu.hk)
- **Course Tutors**
  - *WU Tong (wt017@ie.cuhk.edu.hk)
  - SHAO Qi (sq017@ie.cuhk.edu.hk)
  - ZOU Zijing (zz020@ie.cuhk.edu.hk)

* Tutor-in-charge

Course Information

- **Lectures**
  - Mondays (12:30–14:15) – Lecture
 - Tuesdays (11:30–13:15) – Lecture + Tutorial
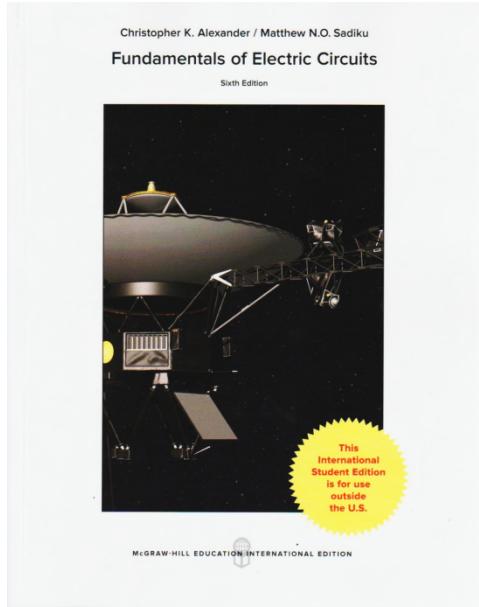
  ESTR2304 Extra session:
  - Fridays (15:30-16:15)

- **Online Platform**
  - Blackboard (https://blackboard.cuhk.edu.hk)
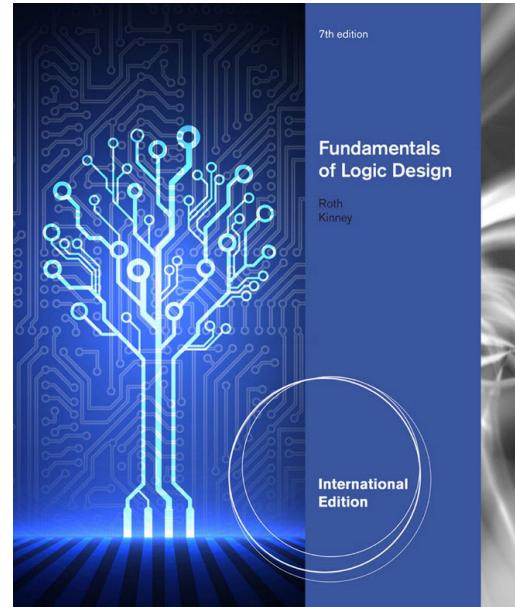
Textbooks

Fundamentals of Electric Circuits, International Edition (6th Edition)

Charles K. Alexander & Matthew N.O. Sadiku

McGraw-Hill Higher Education ©2017

Fundamentals of Logic Design, International Edition (7th Edition)

Charles H. Roth, Jr. & Larry L. Kinney

Cengage Learning ©2014

Course Syllabus (officially…)

- This course introduces the basic analysis of analog and digital electronic circuits, as well as the basic principles of communication circuits.

- The analog circuit analysis includes: basic circuit laws and theorems; mesh and nodal analysis; resonant circuits, steady-state and small signal analyses; electrical amplifiers.

- The digital logic circuit analysis includes Boolean algebra; logic gates; combinational logic circuit and sequential logic circuit design; synchronous and asynchronous sequential machine design.

- Examples of common electronic circuits will be discussed as case studies.

Why do I need to circuit and logic?

What is Information Engineering?

- **Let's look at the five streams of specialization**
  - Big Data
  - Communications
  - Cyber Security
  - Internet Engineering
  - Enrichment

They have electronic devices…?!

- **Communications/Enrichment**
  - How is information represented physically? How is signal transmitted and received? How can we encode and decode the information from physical phenomenon?

- **Big Data/Internet Engineering**
  - Where are the data stored? How they can be accessed? How information are transferred and received?

- **Cyber Security**
  - How can individual data be manipulated? How can malicious signal or data be injected into the system?

Information Engineering is Engineering

- You may NOT have to **design** a lot of circuits, but you definitely need to have a basic idea of **what** a circuit does and **how** it works.

- Just like if you are building a bridge: you may not have to pour **concrete** and work with **rebar** yourself, but you have to understand how they work.

Course Topics (Tentative)

- **Basic Analog Circuit Theory**
  - (I-1) Basic Measurements
  - (I-2) Basic Circuit Laws
  - (I-3) Nodal & Mesh Analyses
  - (I-4) Circuit Theorems
  - (I-5) Capacitors and Inductors
  - (I-6) First-Order Circuits: RL & RC
  - (I-7) Second-Order Circuits: RLC
  - (I-8) Sinusoidal Signals
  - (I-9) Operational Amplifiers
- **Basic Digital Logic Design**
  - (II-1) Digital Fundamentals
  - (II-2) Boolean Algebra and Combinational Logic
  - (II-3) Sequential Logic and Finite State Machine Design

Course Assessment

	IERG2060	ESTR2304
Assignment	30%	30%
Test 1	15%	15%
Test 2	15%	15%
Report		10%
Final Exam	40%	30%
Total	**100%**	**100%**

(Tentative) In-class

- Test 1: **Week 7 (Oct 19 – Oct 22)**
- Test 2: **Week 11 (Nov 16 – Nov 20)**

Attendance and Mark Appeal

- If you need to apply for a delay of assignment submission or a leave for test, send email with **supporting document** to me **beforehand**.

- If you are ill, obtain a **medical note** and email it to me as soon as possible and **no later than a week after your absence**.

- Students are responsible to keep track on their marks.

- Any objection to the course marks should be made to the TA by email **within one week of mark announcement**. No change will be made afterwards.

Course Schedule

Week	Lecture		Remark
	Monday (12:30-14:15)	**Tuesday (11:30-13:15)**	
1	Sep 7	Sep 8	
2	Sep 14	Sep 15	
3	Sep 21	Sep 22	
4	Sep 28	Sep 29	
5	Oct 5	Oct 6	
6	Oct 12	Oct 13	
7	Oct 19	Oct 20	**Test 1**
8	**Oct 26 (Holiday)**	Oct 27	
9	Nov 2	Nov 3	
10	Nov 9	Nov 10	
11	Nov 16	Nov 17	**Test 2**
12	Nov 23	Nov 24	
13	Nov 30	Dec 1	

Important Note

- **Be punctual to class**
  - The earlier we cover the material, the earlier I can let you go.

- **Ask whenever you have questions**
  - During lecture, feel free to ask in the chat or raise hand
  - After class, you can email me or the tutors. Please include calculations and steps for us to trouble-shoot. (Include "IERG2060" in email subject.)
  - There is no stupid question, only stupid answers (so the burden is on us).

- **Try and practice**
  - This is a physics and mathematics course. You will need a lot of practice.
  - Even you know how to run, you cannot finish a marathon tomorrow.
  - Try, and try, and try again!

Plagiarism

Zero tolerance. Quickest way to fail this course and be kicked out of university.

Academic Honesty

- **Tests and Exam have multiple versions**
  - Differences are very difficult to be noticed. Even if you notice, you will need to recalculate the answer.
  - There will not be enough time to play photo hunt then think about how to adjust the answers.
  - If you can, you can already solve the questions in the first place.
- **Do your own assignment and practice problems**
  - They are **exercises** for your brain, just as running is an exercise for your body.
  - I cannot force you to exercise, but you will have a **brain marathon** (aka the exam) in December. I suggest you keep practicing.
- **University Policy to Academic Honesty**
  - http://www.cuhk.edu.hk/policy/academichonesty/