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## EE 315000 Electromagnetic Waves

國立清華大學電機工程科學系  
Fall, 2018

Prof. 黃衍介

Class location: Delta 208  
Class schedule: M3M4W2

Office hours @ Delta 856: 10:10 am - noon, Wednesday.

Teaching Assistants (TAs): 劉子齊 [kingmax29@gmail.com](mailto:kingmax29@gmail.com) , 林彥洲  
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### General Information

This course is to study electromagnetic waves. We will build up the framework of the theory by first modifying the static Maxwell Equations and deriving the wave equation for electromagnetics. We will then pick up the most useful solution, the plane-wave solution, of the wave equation to illustrate the basic physics of an electromagnetic wave. Once we learn about the reflection and transmission of an electromagnetic wave at boundaries, we will be ready for the discussion of transmission line. To efficient transmit and store electromagnetic energy, waveguide and cavity are important topics to learn after the transmission line. Antenna and radiation system is the last chapter of this course.

The textbook chosen for this course is Field and Wave Electromagnetics by D. K. Cheng. As electromagnetics is a well-established knowledge, most other textbooks also serve well for the purpose of this course.

This course will be lectured mostly in English and slightly in Chinese for clarity.

### Textbook

David K. Cheng, Field and Wave Electromagnetics 2nd Ed., Addison Wesley, 1989.

### Reference book

Fawwaz T. Ulaby, Fundamentals of Applied Electromagnetics 6<sup>th</sup> Ed., PEARSON Prentice Hall, 2007. (新月圖書，東華書局代理)

Ramo, Whinnery, and van Duzer, Fields and Waves in Communication Electronics, 2<sup>nd</sup> Ed., John Wiley & Sons, 1984.

### Grading Policy:

Homework (pre- and post-class homework) accepted)	10% x 2 (late homework not
Weekly quiz (open books/notes)	20%
Two midterm exams	20% x 2
One final exam	20%

\* In each Monday class, each student has to submit a pre-class homework. Please select 3 questions of your choice and answer them from the review questions listed in the end of each chapter of the textbook by D. K. Cheng. The questions have to be those **to be lectured** and can't be those already lectured.

\* weekly quiz includes those lectured, **to be lectured**, or assigned in homework.

\* In case we need to adjust scores in the end of the semester, your performance in quiz, question asking/answering in the class, and pre-class homework will become the weighting factor for the adjustment.

**Course Handouts:** Bound copies will be available at 利捷影印店 on the 2<sup>nd</sup> floor of 水木餐廳. Updates can be found on [www.hope.nthu.edu.tw](http://www.hope.nthu.edu.tw) (passcode: to be announced) .

### Course Contents

Week 1 (Sep. 10, 12): time-varying field & Maxwell's equations

Week 2 (Sep. 17, 19) : time-varying field & Maxwell's equations

Week 3 (Sep. 26): plane electromagnetic waves

Week 4 (Oct. 1, 3): plane electromagnetic waves

Week 5 (Oct. 8): EM waves at boundaries

Week 6 (Oct. 15, 17): EM waves at boundaries

Week 7 (Oct. 22, 24): Midterm Exam #1

Week 8 (Oct. 29, 31): transmission line

Week 9 (Nov. 5, 7): transmission line

Week 10 (Nov. 12): transmission line

Week 11 (Nov. 19, 21): waveguide and cavity

Week 12 (Nov. 26, 28): waveguide and cavity

Week 13 (Dec. 3, 5): waveguide and cavity

Week 14 (Dec. 10, 12): Midterm Exam #2

Week 15 (Dec. 17, 19): antenna and radiation system

Week 16 (Dec. 24, 26): antenna and radiation system

Week 17 (Jan. 2): antenna and radiation system

Week 18 (Jan. 7) – Final Exam