COM 5110 Random Processes for Communications
(通訊之隨機程序)
Spring Semester 2018

Instructor: 祁忠勇 (Chong-Yung Chi), Office: Room 966, Delta Building
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This is a fundamental course of random processes including discrete-time random sequences and continuous-time random processes and applications in *Communications,* and S*ignal Processing* which are **_essential_** to analyze and design communications systems and signal processing algorithms. This course is suitable for senior undergraduate and first-year graduate students who would like to *pursue communications, signal processing and machine learning related researches.*

Units: 3
Lectures: M3, M4, R3, R4,
Classroom: Delta 202
Prerequisites**:** Probability Theory, Signals and Systems
Office hours: 13:30-15:30, Thursday
Course website: http://www1.ee.nthu.edu.tw/cychi/teaching/courses.php

Outline:

1. *Review on probability, random variables and statistics:* Probability; Discrete random variables; Continuous random variables; Functions of random variables and their distributions; Distributions derived from the normal distribution *(Chapters 2-5,7)*

2. *Transform methods, bounds, and limits:* Moment-generating function and characteristic function; Generating functions and Laplace transform; Inequalities, bounds, and large deviation approximation; Convergence of a sequence of random variables and the limit theorems. *(Chapters 8-11)*

3. *Random processes:* Random processes; Spectral representation of random processes and time series. *(Chapters 12,13 and some materials from reference [2])*

4. *Statistical inference:* Estimation and decision theory; Estimation algorithms. *(Chapter 18,19)*

5. *Advanced topics in random processes:* Probability models in machine learning. *(Chapter 21)*

Textbook:

[1] Hisashi Kobayashi, Brian L. Mark, and William Turin, *Probability, Random Processes, and Statistical Analysis*, Cambridge University Press, 2012. (科大文化事業股份有限公司 (02) 2697-1353)

References:

[1] Scott Miller and Donald Childers, *Probability and Random Processes: With Applications to Signal Processing and Communications,* 2/e, Academic Press, 2012. (新月圖書 (02) 2311-4027 分機 308)

[2] Henry Stark and John W. Woods, *Probability, Statistics, and Random Processes for Engineers*, Pearson, 2012. (高立圖書 02-2290-0318 分機 222)

Grading:

Homework: 20%, Midterm Examination: 40% and Final Examination: 40%

Midterm Examination: **May 3 (Thursday)**

Final Examination: **June 21 (Thursday)**

Office Hours: Monday: 13:30-15:30, Thursday: 13:30-15:30

Teaching Assistants:

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