430.523: Random Signal Theory

CONTACT INFORMATION

Lecturer) Prof. Byonghyo Shim (bshim@snu.ac.kr, 880-4144, #509 Bldg. 301)

TA) Luong Nguyen and Sangtae Kim ({ltnguyen,stkim}@islab.snu.ac.kr, #1117 Bldg. 301)

Class time and location) Tuesday and Thursday, 14:00 ∼ 15:15pm in #302 Bldg. 301

Office hour) After class or by email appointment

TEXTS
<u>There is NO main text.</u>
Reference:
Stark and Woods *Probability, Random Processes, and Estimation Theory*, 2nd ed., Prentice Hall.
S. M. Ross, *Probability Models*, 7th ed., Harcourt Academic Press.

GRADING POLICY
There will be **two midterms** and **one final exam**. Exam is closed book but you can bring one A4 page of cheating sheet. You can use both sides of the paper to paste photo reduced copies of your favorite formulae, definitions, homework solutions on the sheets. However, such tactics usually time-wasting and not so helpful.

- Homework and Quiz [20%] : Bi-weekly homework and quiz (you would have at least one unnotified quiz)

- Two mid-terms [20% each] (In class at April and May, TBD)

- Final exam [40%] (In class at June, TBD)

OVERVIEW OF THE COURSE

- Random variable and signals [∼ 5 weeks]

    - Brief review on set theory, measure theory, and probability

    - Conditional prob. independence, discrete and continuous random variables

    - Jointly distributed random variables

    - Expectation, entropy, inequalities

    - Random vectors

- Applications of random signal theory [∼ 4 weeks]

    - Estimation and detection theory

    - MMSE, MAP, ML estimation

    - Basics of random matrices and concentration inequalities

- Random sequences and Random processes [∼ 5 weeks]

    - Stationary and wide sense stationary (WSS) random process

    - Bernoulli, Gaussian, and Poisson process

    - Markov process and Martingale

    - Power spectral density