# Introduction to Random Variables and Random Processes

Course number: 430.314 (003)
Time: M/W 9:30-10:45 AM
Location: Building 301 Room 201

Instructor: Prof. Songhwai Oh (오성회)
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Office Hours: Wed. 10:45-11:30 AM or by appointment
(Building 301 Room 702)

Course description: This course introduces the fundamentals of probability and random processes useful in many areas of electrical engineering. The objective is to equip students with the basic tools in probability required to build and analyze probabilistic models in both discrete and continuous spaces. Topics include sample space, events, probability law, conditional probability, independence, random variables, distribution, density functions, law of large numbers, central limit theorem, random vectors, and random processes. Lectures will be in English.

Textbooks: [Required] John A. Gubner. Probability and Random Processes for Electrical and Computer Engineers. Cambridge University Press, 2006.
[Reference] Leon-Garcia, Probability and Random Processes for Electrical Engineering, Addison Wesley, 2008 (Third Edition).

Grading: Homework and class participation (25%), two midterms (40%), and final (35%). Note that the percentages are approximate and the actual weights used to compute the final grades may be different.

Prerequisites: Engineering Mathematics 1 and 2.

Academic honesty: Same as the academic integrity policy of the university and the school.

Weekly plan (subject to change):

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| Week 1 | Introduction to probability (sample space, events, and axioms of probability) |
| Week 2 | Discrete random variables |
| Week 3 | Conditional probability |
| Week 4 | Continuous random variables |
| Week 5 | Moment generating functions, Expectation |
| Week 6 | Midterm 1, Cumulative distribution functions |
| Week 7 | Laws of large numbers, Central limit theorem |
| Week 8 | Bivariate random variables, Conditional expectation |
| Week 9 | Bivariate Gaussian distribution |
| Week 10 | Random vectors, Minimum mean squared error estimator |
| Week 11 | Midterm 2 |
| Week 12 | Multivariate Gaussian distribution |
| Week 13 | Random processes |
| Week 14 | Stationary processes, Power spectral densities |
| Week 15 | Markov chains |