



**College of Information and Communication Engineering**

**Course Information and Instruction**  
(Undergraduate ICE2003 Class)

1. Course Name : **Probability and Random Processes**
2. Instructor : Prof. Kim, Joong Kyu (Rm#: 21225, 031-290-7122, jkkim@skku.edu)
3. Course Objective : To learn the basics on probability, random variables, and stochastic processes in order to apply the concepts to a wide range of electrical, electronics, and computer engineering fields.
4. Course Description : Basic concepts of probability theory. Random variables: discrete, continuous, and conditional probability distributions; averages; independence. Introduction to discrete and continuous random processes: wide sense stationarity, correlation, spectral density.
5. Prerequisite : Probability and Statistics & **MATLAB** programming
6. Textbook : ◆원서: **Elements of Engineering Probability & Statistics**: R.E.Ziemer  
◆번역서: 공학용 확률통계 및 랜덤프로세스 이론 : 김 중 규 번역
7. Reference : (1) *Probability and Random Processes* by A.Leon-Garcia  
(2) *Probability, Random Variables, and Stochastic Processes* by A.Papoulis  
(3) *Probability and Random Processes* by W.B.Davenport Jr.
8. Classnotes : For your convenience, the classnote in PS and PDF forms will be distributed via the web-site <http://dspl.skku.ac.kr/~course>. Visit and download or print the classnote of each chapter!!!
9. Grade Policy:
- |               |       |
|---------------|-------|
| Mid-term Exam | :30%  |
| Final Exam    | :40%  |
| Homework      | :20%  |
| Attendance    | :10%  |
| -----         | ----- |
| Total         | :100% |

- Note:** (1) All the exams are closed books, but you may to bring one page of A4 size **hand-written** reference sheet to each examination. (*Illegal sheets will be confiscated at the place!!!*)  
(2) Attendance will be checked every week during the semester.  
(3) No grade change will be permitted at the end of the semester. (e.g. C or D to F)  
(4) Assignments as well as occasional announcements will be distributed via Internet Web page. (<http://dspl.skku.ac.kr/~course>) or i-campus.

## 10. Topics & Schedule:

- (1) Week # 1 : Introduction of the course, objective of the class, simulation of random phenomena.
- (2) Week # 2 : Approaches to probability, probability axioms, set theory, various probability relationships.
- (3) Week # 3 : Conditional probability, and statistical independence, total probability & Bayes' theorem, counting techniques, introduction to random variable, probability distribution function.
- (4) Week # 4 : Common random variables and their distribution function's, transformation of single random variable.
- (5) Week # 5 : Mathematical expectation, characteristic function, bivariate random variables and their CDF & PDF, discrete random variable pairs.
- (6) Week # 6 : Conditional CDF & PDF, statistical independence of random variables, expectation of function of two random variables, joint Gaussian PDF.
- (7) Week # 7 : **-----Mid-term Examination -----**
- (8) Week # 8 : Function(transformation) of two random variables, central limit theorem, weak law of large numbers, multiple random variables.
- (9) Week # 9 : Elementary statistics, sample mean & variance, regression technique, statistical process control, empirical distribution function.
- (10) Week # 10 : Estimation theory, point and interval estimators, maximum likelihood(ML) technique, orthogonality principle.
- (11) Week # 11 : Decision theory, Bayes', classical and other decision strategies.
- (12) Week # 12 : Reliability, time-dependent reliability, system reliability, Weibull failure model.
- (13) Week # 13 : Introduction to random process: statistical description, autocorrelation, cross-correlation, and covariance functions, Gaussian random process.
- (14) Week # 14 : Systems with random inputs: zero-memory non-linear system, fixed linear system.
- (15) Week # 15 : White noise, narrowband random process, linear mean squared error estimation.
- (16) Week # 16 : **----- Final Examination -----**

For more informations on this course please visit the homepage of the **Digital Signal Processing Laboratory** at <http://dspl.skku.ac.kr>.