

Probability and Random Variables

Course Name	Course type (credit/hours)	Elective course(3/3)			Course code	C003
	Target students Division/major/grade	Electrical and Computer Engineering/Junior			Opening semester	2021 2ND SEMESTER
	Class time and classroom	Tue B(WH317-1)Thu A(WH317-1)			English Grade	A(100%English)
Reference to this course	Prerequisite courses					
	Related basic courses					
	Recommended concurrent courses					
	Related advanced courses					
Instructor	Name (title/division)		Ran Rong(Assistant Professor, Electrical and Computer Engineering)			
	Office Room Number	종합관 603호	Office phone Number	2375	e-mail	
	Office hours			Homepage address		
Teaching Assistant	Name (title/division)					
	Office Room Number		Office phone Number		e-mail	

1. Introduction

The course focuses on reasoning with probabilistic uncertainty. In this course, we will discuss various topics in probability theory and introductory random processes such as probability, random variables, expectations, characteristic functions, random vectors, random processes, and correlation functions. A number of engineering examples are examined for students' better understanding of principles.

2. Course Objectives

Students should

- 1) Understand the definition of probability and random variables;
- 2) know how to describe a random variable via expectation and other characteristics;
- 3) Be able to apply random variables to analyze engineering problems.

3. Class types and activities

1. Lecture: Introduce basic knowledge of probability, random variables and random processes and use engineering problems to help students further understand the contents.
2. Exam: Midterm+Final term
3. Quiz, Homework

4. Teaching Method

- | | |
|--|---|
| <input checked="" type="checkbox"/> lecture | <input type="checkbox"/> discussion and debate |
| <input type="checkbox"/> team project(presentation and case studies) | <input type="checkbox"/> experiments(role-playing,etc) |
| <input type="checkbox"/> designing and production | <input type="checkbox"/> on-site learning(on-site training) |
| <input type="checkbox"/> others | |

5. Support Systems in Use

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> AjouBb | <input type="checkbox"/> automatic recording system | <input type="checkbox"/> web-based assignment |
| <input type="checkbox"/> cyber lecture | <input type="checkbox"/> online content | |
| <input type="checkbox"/> class behavior analyzing system | <input type="checkbox"/> others | |

6. Teaching Tools

- | | | |
|---|--|---|
| <input checked="" type="checkbox"/> PBL(Problem Based Learning) | <input checked="" type="checkbox"/> CBL(Case Based Learning) | <input type="checkbox"/> TBL(Team Based Learning) |
| <input type="checkbox"/> UR(Undergraduate Research) | <input type="checkbox"/> FL(Flipped Learning) | <input type="checkbox"/> DSAL(Data Science Active Learning) |
| <input type="checkbox"/> others | | |

7. Knowledge and ability required for taking this course

1. High School-level maths background is required;
2. Matlab is optional.

8. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance	16	10%	
midterm exam	1	30%	
final exam	1	30%	
quiz	2	15%	
presentation			
discussion			
homework	2-4	15%	
etc			
study hours			

9. Textbook and supplementary material

Main/Sub	Title (Web-site)	Writer	Publisher	Publication year
Main	Probability, Random variables and random signal principles	Peyton Z. Peebles, Jr. and Bertram Shi	MC Graw Hill	

10. Class system and Class shedule

1. Probability and Random Variables, including the probability model, random variables , expectation , moments and random vectors;
2. Introduction to Random Processes.

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
1	Introduction	E	Ran Rong	Lecture		
2	Probability-Set Definitions, operations	E	Ran Rong	Lecture		
3	Probability-Introducation	E	Ran Rong	Lecture	HW1	
4	Joint and Conditional probability	E	Ran Rong	Lecture	Quiz #1	

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
5	Independent Events and Bernoulli Trials	E	Ran Rong	Lecture		
6	Random variables-Concept	E	Ran Rong	Lecture	HW2	
7	Random Variables-Distribution, Density	E	Ran Rong	Lecture		
8	Midterm	E	Ran Rong			
9	Operations on one Random variable-Expectation	E	Ran Rong	Lecture		
10	Operations on one Random variable-Moments	E	Ran Rong	Lecture	HW3	
11	Multiple Random variables-Definition, joint distribution	E	Ran Rong	Lecture		
12	Multiple Random variables-Conditional distribution and Density	E	Ran Rong	Lecture	Quiz #2	
13	Operations on multiple Random variables	E	Ran Rong	Lecture		
14	Gaussian Random variables	E	Ran Rong	Lecture	HW4	
15	Sampling and some limit theorems	E	Ran Rong	Lecture		
16	Final Exam	E	Ran Rong			

11. Other items of notification