

## Probability and Random Variables

Course Name	Course section (credit/hours)		Elective course(3/3)		course code	C046
	course item				course component	
	Target students Division/major/grade				opening semester	2021 1ST SEMESTER
	Class time and classroom		Wed B(WH317-1)Fri B(WH317-1)		English Grade	A(100%English)
Reference to this course	Credit compositon		Theory(3) + Design(0) + Practice(0)			
	Prerequisite courses					
	Related basic courses					
	Recommanded concurrent courses					
	Related advanced course					
Instructor	Name (title/division)		Ran Rong(Assistant Professor, Electrical and Computer Engineering)			
	Office Room Number	종합관 603호	Extension Number	2375	e-mail	sunnyran@ajou.ac.kr
	Office hour			Homepage address		
Teaching Assistant	Name (title/division)					
	Office Room Number		Office phone Number		e-mail	

### 1. Course 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, correlation functions, and power spectrum. A number of engineering examples are examined for students' better understanding of principles.

### 2. Course Objectives & course outcome

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

### 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

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|--|---|---|
| <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 Sciencd Active Learning) |
| <input type="checkbox"/> others                                 |  |   |

### 7. Evaluation method of course outcome

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance	16	10%	
midterm exam	1	30%	
final exam	1	30%	
quiz	2	15%	

## 7. Evaluation method of course outcome

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
presentation			
discussion			
homework	2-4	15%	
etc			
study hours			

## 8. Textbook and Reference material

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

## 9. Class system and Class shedule

<p>1. Probability and Random Variables, including the probability model, random variables , expectation , moments and random vectors;</p> <p>2. Introduction to Random Processes.</p>
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### < Schedule >

\* language : K-korean, E-English

Weeks	Title of lecture	language	time distribution(minutes)			Teaching Method	evaluation method
			theory	design	experiment practice		
1	Introduction	E	3			Lecture	
2	Probability-Set Definitions, operations	E	3			Lecture	
3	Probability-Introducation	E	3			Lecture	HW1
4	Joint and Conditional probability	E	3			Lecture	Quiz #1
5	Independent Events and Bernoulli Trials	E	3			Lecture	
6	Random variables-Concept	E	3			Lecture	HW2

### < Schedule >

\* language : K-korean, E-English

Weeks	Title of lecture	language	time distribution(minutes)			Teaching Method	evaluation method
			theory	design	experiment practice		
7	Random Variables–Distribution, Density	E	3			Lecture	
8	Midterm	E	3				
9	Operations on one Random variable–Expectation	E	3			Lecture	
10	Operations on one Random variable–Moments	E	3			Lecture	HW3
11	Multiple Random variables–Definition, joint distribution	E	3			Lecture	
12	Multiple Random variables–Conditional distribution and Density	E	3			Lecture	Quiz #2
13	Operations on multiple Random variables	E	3			Lecture	
14	Gaussian Random variables	E	3			Lecture	HW4
15	Sampling and some limit theorems	E	3			Lecture	
16	Final Exam	E	3				

#### 10. Contribution index of the course for attaining ABEEK program outcomes

course outcome	contribution scale
No Data	

#### 11. Analysis of improved matters for the previous semester

13. Reference items

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