School of Engineering and Natural Sciences / Industrial Engineering (English)

2022 - 2023 Academic Year

PROBABILITY and RANDOM VARIABLES

Syllabus

Course Description					
Name	**Code**	**Semester**	**T+A Hour**	**Credit**	**ECTS**
PROBABILITY and RANDOM VARIABLES	IND2149080	Fall Semester	3+0	3	6

Prerequisites Courses	MATEMATİK II
Recommended Elective Courses	
Language of Instruction	English
Course Level	First Cycle (Bachelor's Degree)
Course Type	Required
Course Coordinator	Prof.Dr. Afgan ASLAN
Name of Lecturer(s)	Assoc.Prof. Yasin GÖÇGÜN
Assistant(s)	
Aim	This is a second year undergraduate course (third year for CoE) on introduction to probability and random variables. The course introduces fundamental differences between statistics and probability and then introduces basic topics of probability. Probability axioms, probability density functions, joint pdfs, and random variables with related topics are covered throughout the course.
Course Content	This course contains; Class Info, Introduction to Statistics and Probability,Basic probability,Conditional probability,Discrete random variables,Discrete distributions and their statistics. ,Continuous Random Variables and their statistics,Continuous Random Variables (Cont.),Midterm,Continuous Distributions,Multiple Discrete Random Variables,Multiple Continuous Random Variables,Conditional Probability Mass Functions,Conditional Probability Density Functions,Conditional Probability Density Functions.

Course Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1 Model simple probabilistic phenomena mathematically.	1, 15, 2, 9	A, C
2 Calculate probabilities of events in a known event space, expected values, variances of random variables, and conditional probability.	1, 15, 2, 9	A, C
3 The use of mathematical tools for discrete and continuous random variables	1, 15, 2, 9	A, C
4 The ability to understand the common probability distributions and the understanding of where to use them.	1, 15, 2, 9	A, C
5 Ability to work with multiple random variables, their joint distributions, their conditional distributions, and their one and two dimensional transformations.	1, 15, 2, 9	A, C

Teaching Methods	1: Lecture, 15: Problem solving, 2: Question - Answer, 9: Simulation
Assessment Methods	A: Written Exam, C: Homework

Lecture Schedule

Sequence	**Topics**	**Preliminary Preparation**
1	Class Info, Introduction to Statistics and Probability	Syllabus, Text 1-Chap. 1, Text 2-Chap. 1 &2
2	Basic probability	Text 1-Chap. 2, Text 2-Chap 3
3	Conditional probability	Text 1-Chap. 2, Text 2-Chap 4
4	Discrete random variables	Text 1-Chap. 3, Text 2-Chap 5
5	Discrete distributions and their statistics.	Text 1-Chap. 3, Text 2-Chap 6
6	Continuous Random Variables and their statistics	Text 1-Chap. 4, Text 2-Chap 10
7	Continuous Random Variables (Cont.)	Text 1-Chap. 4, Text 2-Chap 10
8	Midterm	All Lectures till Week 8
9	Continuous Distributions	Text 1-Chap. 4, Text 2-Chap 11
10	Multiple Discrete Random Variables	Text 1-Chap. 5, Text 2-Chap 7
11	Multiple Continuous Random Variables	Text 1-Chap. 5, Text 2-Chap 12
12	Conditional Probability Mass Functions	Text 1-Chap. 5, Text 2-Chap 8
13	Conditional Probability Density Functions	Text 1-Chap. 5, Text 2-Chap 13
14	Conditional Probability Density Functions	Text 1-Chap. 5, Text 2-Chap 13

Evaluation Methods	**Weight(%)**
Midterm Exam	30
General Exam	70

Resources

1. Applied Statistics and Probability for Engineers, Sixth Edition, Douglas C. Montgomery and George C. Runger, ISBN : 13 9781118539712

2. Intuitive Probability and Random Processes Using MatLab - Steven M. Kay, 2016, ISBN-13: 978-0-387-24157-91) A. Papoulis, Probability, Random Variables, and Stochastic Processes, Mc Graw Hill, 1984.

2) Alberto Leon-Garcia, Probability, Statistics, and Random Processes For Electrical Engineering, Prentice Hall, Third Edition, 2008.

3) A. Papoulis, Probability, Random Variables and Stochastic Processes, McGraw-Hill , Third Edition,1991