ÇANKAYA UNIVERSITY
Department of Industrial Engineering
Fall, 2024
IE 227
Introduction To Probability
(3+2+4 credits, 6 ECTS)

Catalogue Description. Basic probability concepts, counting techniques, conditional probability and independence, random variable concept, types and probability distributions of random variables, special probability distributions (discrete and continuous), jointly distributed random variables, expectation, variance, conditional expectation and variance, functions of random variables and their distributions, sampling distributions of means and sums.

Course Objectives. This course aims to equip students with the knowledge and skills necessary to apply probability concepts to real-world problems and decision-making processes. By the end of this course, students will have a strong foundation in probability theory and be capable of using probabilistic methods to make informed decisions, solve engineering problems, and address uncertainties in industrial processes and systems.

Course Outline: The following topics will be covered

Weeks	Title
1	Introduction: Random experiments, sample space, events, set theory, probability axioms
2	Combinatorial Probability: Counting techniques using addition and multiplication rules, permutation, combination
3	Conditional Probability & Independence: Law of total probability, conditional probability, independence, Bayes' theorem
4	Random Variables, Their Distributions, and Characteristics: Introduction, discrete random variables, probability mass function, cumulative distribution function, expectation, and variance
5	Random Variables, Their Distributions, and Characteristics: Continuous random variables, probability density function, cumulative distribution function, expectation, and variance
6	Discrete Random Variables and Distributions: Bernoulli, Binomial, Hypergeometric, Negative Binomial, Geometric
7	Discrete Random Variables and Distributions: Poisson, Discrete Uniform
8	Continuous Random Variables and Distributions: Uniform, Exponential
9	Continuous Random Variables and Distributions: Normal, Normal Approximation to Binomial
10	Continuous Random Variables and Distributions: Gamma, Weibull, Beta, Triangular
11	Jointly Distributed Random Variables: Joint, Marginal, Conditional Distributions, Independency
12	Jointly Distributed Random Variables: Expectation, Conditional

13	Expectation, Variance, Conditional Variance
	Functions of Random Variables
14	Sampling Distribution of Means and Sums, Central Limit Theorem

	Instructor	**Teaching Assistant**
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Mode of Education:	TBA	TBA

Grading

Homeworks	20 % (2 HWs)
Attendance	10 %
Midterm	30 %
Final	40 %
Total:	**100 %**

Note that the instructor reserves the right to modify these percentages in case he finds it necessary.

Textbook:

- William Navidi (2019), Statistics for Engineers and Scientists, 5th edition, McGraw-Hill.

- Jay L. Devore (2008), Probability and Statistics for Engineering and the Sciences, 7th edition, Duxbury Pr.

Reference Books:

- D.C. Montgomery, G.C. Runger, and N. F. Hubele (2004), Engineering Statistics, 3rd eds., John Wiley & Sons, Inc: New York

- R.E. Walpole, R.H. Myers, S.L. Myers, and K.E. Ye (2015), Probability & Statistics for Engineers & Scientists, Pearson.

Policy on Home works and Exams:

Cheating on homework and exams will have serious consequences. Therefore, all work submitted should reflect your honest effort. In this course, homework assignments and project will play a crucial role in ensuring students from understanding of the material that they have learned in lectures. In doing homework, it is suggested that the students should work in **teams**. The limit for the number of members in a team will be announced later.

All examinations will be based on lectures, tutorials, and labs. To pass these exams students will need to have studied the material well in advance in order to understand the concepts, procedures, and techniques. To discourage last-minute cramming, the instructor and the assistants will not answer any questions from students on the day of an examination.

The instructor has the right to make changes to this syllabus.