TOROS ÜNİVERSİTESİ

Faculty Of Engıneerıng
Industrıal Engıneerıng (Englısh)

Course Information

PROBABILITY THEORY					
Code	**Semester**	**Theoretical**	**Practice**	**National Credit**	**ECTS Credit**
		Hour / Week			
MAT202	Spring	3	0	3	4

Prerequisites and co-requisites	
Language of instruction	English
Type	Required
Level of Course	Bachelor's
Lecturer	Türker Ertem
Mode of Delivery	Face to Face
Suggested Subject	None
Professional practise (internship)	None
Objectives of the Course	For students seeking an introduction to probability theory and applications without any prerequisites, this course is designed to develop their intuition and model building skills. They will develop ways of thinking formal reasoning (intuitively understand a number of fundamental probabilistic reasoning concepts based on a mathematical foundation). They also learn how to solve real-world problems under uncertainty by structuring them, building models, and analyzing those models.
Contents of the Course	Events and probability. Combinatorial problems. Independence and conditional probability. A theoretical approach to probability. Random variables and distribution functions. Marginal distributions and conditional distributions. Moments and characteristic functions. Convergence of random variables. Law of large numbers.

Learning Outcomes of Course

#	Learning Outcomes
1	Students will be able to define the relevant random events of a random experiment and to compute the probabilities of simple and composition of events
2	Students will be able to check the independence of events, to compute the conditional probabilities, and to use Bayes' Theorem.
3	Students will be able to compute probabilities related to a random variable, expected value and variance of a random variable using probability mass function, probability density function, cumulative distribution function.
4	Students will know and use properties of some well-known discrete and continuous probability distributions.
5	Students will be able to use joint distributions to compute probabilities of events in more than one random variable, to compute marginal distributions, and to compute the distributions of functions of two random variables.
6	Students will know properties of random samples and the distributions of the sample mean and sample variance.

Course Syllabus

#	Subjects	Teaching Methods and Technics
1	I. Combinatorial Analysis 1.1 Introduction 1.2 The Basic Principle of Counting 1.3 Permutations	Lecturing, discussing, problem solving
2	1.4 Combinations 1.5 Multinomial Coefficients 1.6 The Number of Integer Solutions of Equations	Lecturing, discussing, problem solving
3	II. Axioms of Probability 2.1 Introduction 2.2 Sample Space and Events 2.3 Axioms of Probability	Lecturing, discussing,

		problem solving
4	2.4 Some Simple Propositions 2.5 Sample Spaces Having Equally Likely Outcomes 2.6 Probability as a Continuous Set Function	Lecturing, discussing, problem solving
5	2.7 Probability as a Measure of Belief III. Conditional Probability and Independence 3.1 Introduction 3.2 Conditional Probabilities	Lecturing, discussing, problem solving
6	3.3 Bayes's Formula 3.4 Independent Events 3.5 P(·|F) Is a Probability	Lecturing, discussing, problem solving
7	IV. Random Variables 4.1 Random Variables 4.2 Discrete Random Variables 4.3 Expected Value	Lecturing, discussing, problem solving
8	4.4 Expectation of a Function of a Random Variable 4.5 Variance 4.6 The Bernoulli and Binomial Random Variables	Lecturing, discussing, problem solving
9	4.7 The Poisson Random Variable 4.8 Other Discrete Probability Distributions 4.9 Expected Value of Sums of Random Variables	Lecturing, discussing, problem solving
10	4.10 Properties of the Cumulative Distribution Function V. Continuous Random Variables 5.1 Introduction 5.2 Expectation and Variance of Continuous Random Variables	Lecturing, discussing, problem solving
11	5.3 The Uniform Random Variable 5.4 Normal Random Variables 5.5 Exponential Random Variables	Lecturing, discussing, problem solving
12	5.5.1 Hazard Rate Functions 5.6 Other Continuous Distributions 5.7 The Distribution of a Function of a Random Variable	Lecturing, discussing, problem solving
13	VI. Jointly Distributed Random Variables 6.1 Joint Distribution Functions 6.2 Independent Random Variables 6.3 Sums of Independent Random Variables	Lecturing, discussing, problem solving
14	VIII Limit Theorems 8.1 Introduction 8.2 Chebyshev's Inequality and the Weak Law of Large Numbers 8.3 The Central Limit Theorem 8.4 The Strong Law of Large Numbers	Lecturing, discussing, problem solving
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16	Final Exam	

Course Syllabus

#	Material / Resources	Information About Resources	Reference / Recommended Resources
1	Ross, Sheldon M. A first course in probability, 8th Edition	Pearson Prentice Hall	
2	Scheaffer L. R., Young L. J. Introduction to Probability and Its Applications	Brooks/Cole, Cengage Learning	
3	Hogg R. V., Tanis E. A., Zimmerman D. L. Probability and Statistical Inference	Pearson Education, Inc.	

Method of Assessment

#	Weight	Work Type	Work Title
1	30%	Mid-Term Exam	Mid-Term Exam
2	70%	Final Exam	Final Exam

Relationship between Learning Outcomes of Course and Program Outcomes

#	Learning Outcomes	Program Outcomes	Method of Assessment
1	Students will be able to define the relevant random events of a random experiment and to compute the probabilities of simple and composition of events	1,7	1,2
2	Students will be able to check the independence of events, to compute the conditional probabilities, and to use Bayes' Theorem.	1,7	1,2
3	Students will be able to compute probabilities related to a random variable, expected value and variance of a random variable using probability mass function, probability density function, cumulative distribution function.	1,7	1,2
4	Students will know and use properties of some well-known discrete and continuous probability distributions.	1,7	1,2
5	Students will be able to use joint distributions to compute probabilities of events in more than one random	1,7	1,2

	variable, to compute marginal distributions, and to compute the distributions of functions of two random variables.		
6	Students will know properties of random samples and the distributions of the sample mean and sample variance.	1,7	1,2

PS. The numbers, which are shown in the column Method of Assessment, presents the methods shown in the previous table, titled as Method of Assessment.

Work Load Details

#	Type of Work	Quantity	Time (Hour)	Work Load
1	Course Duration	14	3	42
2	Course Duration Except Class (Preliminary Study, Enhancement)	14	5	70
3	Presentation and Seminar Preparation	0	0	0
4	Web Research, Library and Archival Work	0	0	0
5	Document/Information Listing	0	0	0
6	Workshop	0	0	0
7	Preparation for Midterm Exam	1	6	6
8	Midterm Exam	1	2	2
9	Quiz	0	0	0
10	Homework	0	0	0
11	Midterm Project	0	0	0
12	Midterm Exercise	0	0	0
13	Final Project	0	0	0
14	Final Exercise	0	0	0
15	Preparation for Final Exam	1	12	12
16	Final Exam	1	2	2
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