TOROS ÜNİVERSİTESİ

Faculty Of Engıneerıng
Computer And Software Engıneerıng

Course Information

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

Prerequisites and co-requisites	MAT103
Language of instruction	English
Type	Elective
Level of Course	Bachelor's
Lecturer	Prof. Dr. Adnan Mazmanoğlu
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 in 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. Measure 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	Lecture, discussion, presentation
2	1.4 Combinations 1.5 Multinomial Coefficients 1.6 The Number of Integer Solutions of Equations	Lecture, discussion, presentation
3	II. Axioms of Probability 2.1 Introduction 2.2 Sample Space and Events 2.3 Axioms of Probability	Lecture, discussion,

		presentation
4	2.4 Some Simple Propositions 2.5 Sample Spaces Having Equally Likely Outcomes	Lecture, discussion, presentation
5	2.6 Probability as a Continuous Set Function 2.7 Probability as a Measure of Belief	Lecture, discussion, presentation
6	III. Conditional Probability and Independence 3.1 Introduction 3.2 Conditional Probabilities 3.3 Bayes's Formula	Lecture, discussion, presentation
7	3.4 Independent Events 3.5 P(·|F) Is a Probability	Lecture, discussion, presentation
8	Midterm Exam	Exam
9	IV. Random Variables 4.1 Random Variables 4.2 Discrete Random Variables 4.3 Expected Value	Lecture, discussion, presentation
10	4.4 Expectation of a Function of a Random Variable 4.5 Variance 4.6 The Bernoulli and Binomial Random Variables	Lecture, discussion, presentation
11	4.7 The Poisson Random Variable 4.8 Other Discrete Probability Distributions 4.9 Expected Value of Sums of Random Variables 4.10 Properties of the Cumulative Distribution Function	Lecture, discussion, presentation
12	V. Continuous Random Variables 5.1 Introduction 5.2 Expectation and Variance of Continuous Random Variables 5.3 The Uniform Random Variable 5.4 Normal Random Variables	Lecture, discussion, presentation
13	5.5 Exponential Random Variables 5.5.1 Hazard Rate Functions 5.6 Other Continuous Distributions 5.7 The Distribution of a Function of a Random Variable	Lecture, discussion, presentation
14	VI. Jointly Distributed Random Variables 6.1 JointDistributionFunctions 6.2 Independent Random Variables 6.3 Sums of Independent Random Variables 6.4 Conditional Distributions: Discrete Case	Lecture, discussion, presentation
15	6.5 Conditional Distributions: Continuous Case 6.6 Order Statistics 6.7 Joint Probability Distribution of Functions of Random Variables 6.8 Exchangeable Random Variables	Lecture, discussion, presentation
16	Final Exam	Exam

Course Syllabus

#	Material / Resources	Information About Resources	Reference / Recommended Resources
1	Ross, Sheldon M. A first course in probability, 8th Edition		
2	Girimmet, Stirzaker, Probability and Random Processes, Oxford University Press, (2001)		

Method of Assessment

#	Weight	Work Type	Work Title
1	40%	Mid-Term Exam	Mid-Term Exam
2	60%	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 variable, to compute marginal distributions, and to compute the distributions of functions of two random variables.	1,7	1,2

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	2	28
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	4	4
8	Midterm Exam	1	2	2
9	Quiz	0	0	0
10	Homework	1	10	10
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
				100