

TED University
Basic Sciences Unit
Math 230 – Introduction to Probability Theory
Fall 2016

Course Description

Basic topics in probability theory. Conditional probability. Random variables. Discrete, continuous probability distributions. Mathematical expectation. Moment generating functions.

Credits

(3+0+0) 3 TEDU Credits, 6.0 ECTS Credits

Pre-requisites:

Math 101 or Math 111

Course Objectives

The course aims to teach the students the fundamental concepts in probability theory and random processes. The goal is to develop skills to use conditional probability, random variables, discrete and continuous probability distributions. The course also aims to teach expectation, variance, and moment generating functions.

Learning Outcomes

Upon successful completion of this course, a student will be able to

1. Define probability, outcome space, events, and probability functions.
2. Calculate the mean and variance of a random variable and apply general properties of the expectation and variance operators.
3. Compute probabilities by modeling sample spaces and applying rules of additive and multiplicative laws, permutations, combinations, and conditional probability.
4. Apply probability axioms and rules in probability: Bayes' theorem, Central Limit Theorem, Law of Total Probability and Conditional Expectation.
5. Describe the main properties of probability distributions and random variables and apply the concepts of discrete and continuous probability distributions.
6. Identify the random variable(s) of interest in a given scenario and construct the probability distribution based on a real-world situation.

Instructors:

Section 01:

Dr. Mehmet R. Taner
e-mail: mehmet.taner@tedu.edu.tr
Office: A320
Phone: 585 0024
Office Hours: Mon. 3:00-3:50 pm
Tue. 4:00-4:50 pm

Sections 02 :

Dr. İnan Utku Türkmen
e-mail: utku.turkmen@tedu.edu.tr
Office: A421
Phone: 5850115
Office Hours: by appointment

Section 03&06:

Dr. Yıldırım Akbal
e-mail:
Office: A420
Phone:
Office Hours:

Section 04&05:

Dr. Muhiddin Uğuz
e-mail:
Office: A420
Phone:
Office Hours:

Required Text Book:

Walpole, R. E., Myers, R. H., Myers S. L., Ye, K. Probability and Statistics for Engineers and Scientists (9th edition)

Supplementary Text Books:

Ross, S. M., Introduction to Probability Models.

Montgomery, D. C., Runger, G. C., Applied Statistics and Probability for Engineers.

DeGroot, M. H., Schervish, M. J., Probability and Statistics

Course Schedule:

Section 01:

Mon. 1:00 – 2:50 pm (A231)

Tue. 11:00 – 11:50 am (A231)

Course Management System:

Moodle (<http://moodle.tedu.edu.tr/>). All announcements and course related materials will be posted on the Moodle course page.

Planned Learning Activities and Teaching Methods

Telling / Explaining

Questioning

Reading

Problem Solving

Collaborative Learning

Grading:

Active Learning Exercise: 12%

Quiz: 8%

Exam I and II: 2x25%

Final Exam: 30%

Active Learning Exercises and Quizzes

Throughout the semester you will have a number of (unannounced) active learning exercises in-class. These exercises will help you learn the course material in an active and collaborative manner. All attendees contributing to the collaborative learning environment will receive at least one point; and the students who complete their work satisfactorily will receive an additional point. In about four of such occasions, we will give an in-class or a take-home quiz and ask similar questions to the active learning exercises.

Homework Assignments:

We will assign study questions as homework; however they will not be graded.

Attendance

Attendance is recommended but not mandatory in this course.

Estimated Student Workload

Lectures	42 hrs
Readings	14 hrs
Quizzes / Homework	54 hrs
Exam I	12 hrs
Exam II	12 hrs
Final Exam	18 hrs
Total estimated workload is 152 hours.	

Learning Outcomes

Having successfully completed this course, students will be able to:

1. Define probability, outcome space, events, and probability functions. [B1]
2. Apply basic concepts of probability: conditional probability, independence, expectation and variability. [B3]
3. Compute probabilities by modeling sample spaces and applying rules of additive and multiplicative laws, permutations, combinations, and conditional probability. [B3]
4. Apply probability axioms and rules in probability: Bayes' theorem, Central Limit Theorem, Law of Total Probability and Conditional Expectation. [B3]
5. Apply the concepts of discrete and continuous probability distributions. [B3]
6. Analyze sources of uncertainty in real-life problems. [B4]

Make-up Policy

In order to be eligible to take a make-up for the Exam I and/or Exam II, you should report your acceptable excuse to the course instructor and receive a formal permission no later than one week after the exam date. Make-up exams will be given at or after the end of the semester. No make-ups will be given for active learning exercises or quizzes.

Misconduct in class and exams

All cell phones must be brought to silent mode in class. You can use your cell phones only during active learning exercises for browsing or making calculations.

"All of the following are considered plagiarism: turning in someone else's work as your own, copying words or ideas from someone else without giving credit, failing to put a quotation in quotation marks, giving incorrect information about the source of a quotation, changing words but copying the sentence structure of a source without giving credit, copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not" (www.plagiarism.org)
Plagiarism is a very serious offense and will be penalized accordingly by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for the help of other resources.

Cheating has a very broad description which can be summarized as "acting dishonestly". Some of the things that can be considered as cheating are the following: copying answers on exams, quizzes and assignments, using prohibited material on exams, lying to gain any type of advantage in class, providing false, modified or forged data in a report, plagiarizing, modifying graded material to be re-graded, causing harm to colleagues by distributing false information about an exam, homework or lab. Cheating is a very serious offense and will be penalized accordingly by the university disciplinary committee.

Tentative Course Outline

A tentative course outline is given below. Any changes and updates will be announced on the Moodle web page for the course.

Week	Topic	Chapter
1	Introduction. Sample space.	2
2	Events. Counting sample points. Probability of an event. Additive Rules.	2
3	Conditional probability.	2
4	Independence. Product rule. Bayes' rule.	2
5	Random variables. Discrete probability distributions.	3
5	Exam I (Oct. 27)	
6	Continuous probability distributions. Conditional distribution.	3
7	Joint probability distributions. Mathematical expectation. Mean of a random variable.	4
8	Variance and covariance. Means and variances of linear combinations of random variables.	4
9	Binomial and multinomial distributions. Hypergeometric distribution.	5
10	Negative binomial and geometric distributions.	5
10	Exam II (Nov. 29)	
11	Poisson distribution and Poisson process. Continuous uniform distributions. Normal distribution. Areas under the normal curve.	5, 6
12	Applications of the normal distribution. Exponential distribution.	6
13	Chi-squared distribution. Lognormal distribution. Functions of random variables.	6, 7
14	Random sampling. Some important statistics. Sampling distributions. Course evaluations.	8
15	Central limit theorem. Fundamental sampling distributions.	8