## TED University Department of Industrial Engineering IE 547 – Modelling and Analysis of Uncertainty Fall 2016

## Course Description

Probability and fundamental theorems of probability. Conditional probability. Random variables. Discrete and continuous distributions. Expected value. Hypothesis tests. Variance analysis. Simple and multiple regression. Correlation analysis.

## Credits

(3+0+0) 3 TEDU Credits, 7.5 ECTS Credits

#### **Pre-requisites**

None.

## **Course Objectives**

The goal of this course is to teach the fundamentals of analysis and modeling under uncertainty. The course introduces the nature of uncertainty and basic concepts of probability including distributions and expectations. Another goal is to develop statistical analysis skills that help understanding and modeling uncertain events in practice. The course also aims to teach students how to use spreadsheet software for various data analysis.

## Learning Outcomes

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

- 1. Calculate the mean and variance of a random variable and apply general properties of the expectation and variance operators.
- 2. Describe the main properties of probability distributions and random variables and apply the concepts of discrete and continuous probability distributions.
- 3. Identify the random variable(s) of interest in a given scenario and construct the probability distribution based on a real-world situation.
- 4. Perform hypothesis tests to statistically prove or disprove claims involving one or more populations.
- 5. Construct simple and multiple regression models.
- 6. Draw conclusions based on statistical models.

#### Instructor

Dr. Diclehan Tezcaner Öztürk e-mail: diclehan.ozturk@tedu.edu.tr Office: A322 Phone: 585 0023

## Required Text Book

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

## Course Schedule

Tuesday (A226/A316L) 6:00 – 9:00 pm

## Course Management System

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

Planned Learning Activities and Teaching Methods

Telling / Explaining Discussion / Debate Questioning Reading Problem Solving Inquiry Case Study / Scenario Analysis

## Computer Usage

We will use spreadsheet software (such as Excel or Calc) for spreadsheet applications throughout the semester.

## Grading

Homework Assignments:	20%
Term Project:	25%
Midterm Exam:	25%
Final Exam:	30%

## Late Submission and Make-up Policy

If you miss the midterm exam due to an acceptable excuse, you are entitled to receive a make-up exam; however you must contact the instructor and receive a formal permission as soon as possible and no later than one week after the exam. For homework assignments and term project, late submissions are not allowed.

#### Estimated Student Workload

Lectures	42 hrs
Readings	50 hrs
Homework	20 hrs
Term Project	40 hrs
Midterm Exam	16 hrs
Final Exam	20 hrs
Total estimated wo	rkload is 188 hours.

## Misconduct in class and exams

All cell phones must be brought to silent mode in class.

"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 regraded, 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 course web page.

Week	Торіс	Chapter
1	Introduction to Statistics and Data Analysis	1
2	Probability, Conditional Probability, Bayes' Rule	2
3	Probability Distributions	3
4	Mathematical Expectation	4
5	Generic Discrete Probability Distributions	5
6	Generic Continuous Probability Distributions	6
7	Midterm Exam (November 8, during lecture hours)	
8	Sampling Distributions and Data Descriptions	8
9	One and Two Sample Estimation Problems	9
10	One and Two Sample Tests of Hypotheses	10
11	One and Two Sample Tests of Hypotheses	10
12	Simple Linear Regression	11
13	Multiple Linear Regression	12
14	Multiple Linear Regression	12