MS in Business Analytics Program
Fall 2020
BAN 527 – Descriptive Analytics

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Office Hours: By appointment. Do not hesitate to email me when you have questions about the course.

Teaching
 Assistants: To be announced
 Office Hours: To be announced

Type	Time	Days	Where
Class	08:40 − 10:30	Monday	Zoom
	11:40 − 12:30	Tuesday	Zoom

Course Objective:
This course aims to provide a thorough understanding of important statistical concepts that analysts utilize to make better decisions in various business settings. In the first part of the class, we cover data visualization methods and learn how we make use of these methods in R software. In the second part of the course, we will discuss the topics on the basic concepts of probability theory that consist of axioms of probability theory, conditional probability, and Bayes' theorem. Then, we will focus on discrete and continuous random variables, respectively, as well as their probability distributions. In the third part of the course, we will discuss the general concepts in estimating the parameter of a population and a probability distribution. We will then study how a business analyst can estimate these parameters by employing methods such as the method of moments and the method of maximum likelihood. We finally discuss how we can construct a confidence interval for a single parameter.

Learning Outcomes:
Upon successful completion of the course, a student should be able to:

(1) Calculate descriptive statistics of data alongside visualization methods in R software.
(2) Define probability models, concept, and properties of random variables.
(3) Explain the general concepts of estimating the parameters of a population or a probability distribution
(4) Construct point estimators using the method of moments and the method of maximum likelihood
(5) Construct confidence intervals on the mean, the variance and standard deviation of a normal distribution
(6) Test hypotheses on the mean, the variance or standard deviation of a normal distribution

Recommended Course Material:
1) Applied Statistics and Probability for Engineers, 7th Edition by Douglas C. Montgomery, George C. Runger, Wiley.
2) Introduction to Probability Models, 10th Edition by Sheldon M. Ross.

Course Web:
I will post the slides, deadlines, assignments, cancellations, postponements, in short, everything on SUCourse+ throughout the term. **Please check it frequently to see if new material has been placed.**
Note that Sabancı University uses a very powerful web-based tool called Turnitin. Turnitin is the worldwide standard in online plagiarism prevention. It allows instructors to compare student papers against a database composed of millions of articles. Every paper you submit will be scanned by Turnitin, and results will be reflected in your grades.

Instructional Design:
The course will be delivered online and follow a synchronous format. We are going to meet on each Monday and Tuesday between 08:40-10:30, and 11:40-12:30, respectively. We will meet via Zoom, and I will provide the link on SUCourse+ at the beginning of each week. The first meetings that will take place each Monday are designated for covering and discussing each topic, as I provide in the Course Schedule. The second meeting going to be held on each Tuesday is devoted to your questions about the last topic and online in-class exercise that you will be graded individually. Therefore, after each Monday meeting, students you are expected to study the material until the beginning of the second class meeting and come to Tuesdays' meeting prepared.

Grading:

Deliverable	Due date	Grade percentage
Participation		10%
Online Assessment		45%
Final Exam	Take-Home	45%
TOTAL		100%

Requirements:
General requirements regarding the grading items listed above are as follows:

Participation: The participation grade is awarded at the discretion of the instructor at the end of the semester. Participation credit will be given for quality of non-graded work; quality of participation in class discussion and professional conduct (arriving on time, appropriate classroom behavior and relatively few or no absences).

Online Assessment: We will have in-class activities and assignments to be graded individually starting from the second or third week of the semester till week 14. On Tuesday sessions, we first discuss your questions and points regarding the material we study on the Monday session of the same week. Then, you will have a graded online assessment exercise from the topic we cover the day before Tuesday.

Final Examination: The final exam is a take-home type. It will be *cumulative*, which means that it covers everything that we have done until the end of the semester. The final examination is going to take place in the last week of the semester.

Make up policy:
There will be **no make-up** for missed class participation and online exercises. All written assignments should be submitted on SUCourse+ at the indicated hour on the scheduled due date. Late submissions will not be accepted.

Academic Honesty:
Learning is enhanced through cooperation and as such you are encouraged to work in groups, ask for and give help freely in all appropriate settings. At the same time, as a matter of personal integrity, you should only represent your own work as yours. Any work that is submitted to be evaluated in this class should be an original piece of writing, presenting your ideas in your own words. Everything you borrow from books, articles, or web sites (including those in the syllabus) should be properly cited. Although you are encouraged to discuss your ideas with others (including your friends in the class), it is

important that you do not share your writing (slides, MS Excel files, reports, etc.) with anyone. Using ideas, text and other intellectual property developed by someone else while claiming it is your original work is *plagiarism*. Copying from others or providing answers or information, written or oral, to others is *cheating*. Unauthorized help from another person or having someone else write one's paper or assignment is *collusion*. Cheating, plagiarism and collusion are serious offenses that could result in an F grade and disciplinary action. Please pay utmost attention to avoid such accusations.

Classroom Policies and Conduct:
Sabancı M.Sc. in Business Analytics program values participatory learning. Establishing the necessary social order for a participatory learning environment requires that we all:

- Come prepared to make helpful comments and ask questions that facilitate your own understanding and that of your classmates. This requires that you complete the assigned readings for each session before class starts.
- Listen to the person who has the floor.
- Come to class on time.
- If you use your laptop during class, it is only to be used for class activities such as taking notes or referring to a spread sheet. You are not to connect the laptop to the network and should not be doing any non-class activities during class time. Laptop usage may be forbidden if it is abused or if it distracts the professor or other students.

You are expected to join the class meetings on time and stay for the entire session. I will close the session to new participants after the session starts; therefore, please inform the instructor in advance if you have an excuse to miss an entire or a portion of a session. You are expected to participate in class discussions, answer and ask questions. These questions are intended to help you better understand the concepts and learn the mechanics of specific solutions approaches. Please note the importance of coming to classes prepared. Please refrain from activities that will distract other fellow students and the instructor.

Zoom Classroom Etiquette:
- Please turn your camera on at the beginning of the class hour (if, for any reason, it is not possible to do so, please inform the instructor before or during the session).
- Please turn your microphone muted while others are speaking throughout the class.
- Please try to connect online to class meetings from a quiet place.
- During the class meetings, you will see two pop-up windows on the right side of your screen.
    - Please use the "Raise Hand" icon to indicate you want to take the floor or ask a question.

o You can also use the Chat window embedded in Zoom to raise your questions or make some points. Please do not forget that the Chat is public, and everyone being present at the meeting can view your points and questions.
- We will record all Zoom class sessions, and post excerpts on SUCourse+.

Course Schedule:

Week 1	Dates:	October 05
	Topic:	*Introduction*
Session 1 (Monday)		No Class
Session 2 (Tuesday)		Introductory Meeting via Zoom
Week 2	Dates:	October 12
	Topic:	*Basics of R*
		Summarizing Statistical Data in R
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 3	Dates:	October 19
	Topic:	*Data Visualization in R*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 4	Dates:	October 26
	Topic:	*Axioms of Probability Theory*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 5	Dates:	November 02
	Topic:	*Conditional Probability, Independence, and Bayes' Theorem*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 6	Dates:	November 09
	Topic:	*Discrete Random Variables and Probability Distributions - I*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 7	Dates:	November 16
	Topic:	*Discrete Random Variables and Probability Distributions - II*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 8	Dates:	November 23
	Topic:	*Continuous Random Variables and Probability Distributions - I*

Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 9	**Dates:**	**November 30**
	Topic:	*Continuous Random Variables and Probability Distributions - II*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 10	**Dates:**	**December 07**
	Topic:	*Conditioning, Sum of Random Variables, and Joint Probability Distributions*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 11	**Dates:**	**December 14**
	Topic:	*Point Estimation of Parameters and Sampling Distributions*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 12	**Dates:**	**December 21**
	Topic:	*Point Estimation of Parameters and Sampling Distributions*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 13	**Dates:**	**December 28**
	Topic:	*Statistical Intervals and Tests of Hypotheses for a Single Sample*
Session 1 (Monday)		Lecture via Zoom
Session 2 (Tuesday)		Discussion & Online In-class Exercise
Week 14	**Dates:**	**January 04**
	Topic:	*Review and Take-Home Examination*