Course Code and Name: DSBE 511 -STATISTICS and DATA ANALYSIS							
Semester	**Theoretical**	**Practice**	**Laboratory**	**Total Hours**	**ECTS Credit**	**Course Language**	**Type of Course**
FALL	3	0	0	3	10	English	Elective

Prerequisites	none		
Instructor	Asst. Prof. Muhammed Sütçü	**E-mail**	muhammed.sutcu@agu.edu.tr
Teaching Assistant	Suat Mumcu	**E-mail**	suat.mumcu@agu.edu.tr
Class Hours	Friday, 5:10 pm to 8:00 pm	**Class Room**	ONLINE
Office Hours	By appointment	**Office**	B-233 / ONLINE
Content of the Course	The focus is on broad treatment of applications of statistics, concentrating on techniques used in business. This course aims to focus on how to define, collect, organize, visulize and analyze the data for a business problem by applying statistical techniques. Topics include descriptive statistics, parameter estimation, confidence intervals, hypothesis testing, analysis of variance, and simple and multiple linear regression. The course includes computer implementations using available up-to-date statistical software.		
Objectives of the Course	To understand the role of statistics in research and business practice To develop skills in data gathering and analysis To interpret statistical results To obtain sufficient background to support further studies in business applications		
Learning Outcomes of the Course	A student who succesfully completes this course will be able to **LO1:** do descriptive statistics (summarize data numerically and graphically), **LO2:** calculate point estimates for unknown parameters of distributions, **LO3:** compute confidence intervals for unknown parameters of distributions, **LO4:** perform hypothesis testing with one or two samples, **LO5:** construct and interpret linear regression models**,** **LO6:** use a statistical software (preferably MATLAB, Python, Minitab) to carry out the above, **LO7:** work in a team and share the results of a statistical analysis (written and orally) with peers in a meaningful and professional manner.		
Principle Sources	• Required textbook: Berenson, Levine, and Szabat. *Basic Business Statistics - Concepts and Applications.* Pearson,14th edition, 2019.		
Other Sources	• Lecture notes are available on CANVAS, canvas.agu.edu.tr • Recommended textbook: Montgomery, Douglas C., and Runger, George C. Applied Statistics and Probability for Engineers. John Wiley & Sons Inc, 2014. • Recommended Software: https://www.python.org • Recommended Software: https://www.mathworks.com • Recommended Software: https://www.minitab.com		

Learning Activities	**Activity**	**Number**	**Weight (%)**
	Offline Lecture	10	50
	Software practice	10	20
	Online Lecture	10	20
	Recitations	5	10
	Total		100

Assessment	**Evaluation Criteria**	**Weight (%)**
	Midterm exams (2)	25
	Final exam (1)	25
	Homework (5)	15
	Quizzes (10)	15
	Software presentations (by group)	15
	Participation	5
	Total	100

Weekly Course Schedule

The schedule is tentative and subject to change. The learning goals below should be viewed as the key concepts you should grasp after each week, and also as a study guide before each exam, and at the end of the semester. Each exam will test on the material that was taught up until one week prior to the exam (i.e. hypothesis testing will not be tested until Midterm II). The applications in the second half of the semester tend to build on the concepts in the first half of the semester though, so it is still important to at least review those concepts throughout the semester.

Week	**Topic / Content**	**Outcomes**
1	Discussion of the syllabus, descriptive statistics • Compute and interpret the sample mean, sample variance, sample standard deviation, sample median, and sample range • Explain the concepts of sample mean, sample variance, population mean, and population variance **Activity:**	LO5

2	Descriptive statistics • Construct and interpret visual data displays, including the stem-and-leaf display, the histogram, and the box plot • Explain the concept of random sampling • Construct and interpret normal probability plots • Explain how to use box plots and other data displays to visually compare two or more samples of data • Know how to construct and interpret scatter diagrams of two or more variables **Activity:** Software Practice I	LO5, LO1, LO6
3	Sampling distributions • Explain the general concepts of estimating the parameters of a population or a probability distribution • Explain the important role of the normal distribution as a sampling distribution • Understand the central limit theorem **Activity:** Quiz-1, Problem Solving Session	LO3
4	Point estimation of parameters • Explain important properties of point estimators, including bias, variance, and mean square error • Know how to construct point estimators using the method of moments and the method of maximum likelihood • Know how to compute and explain the precision with which a parameter is estimated • Know how to construct a point estimator using the Bayesian approach **Activity:** Quiz-2, Homework-1; Software Practice II	LO3, LO1, LO6
5	Statistical intervals for a single sample • Construct confidence intervals on the mean of a normal distribution, using either the normal distribution or the t distribution method • Construct confidence intervals on the variance and standard deviation of a normal distribution • Construct confidence intervals on a population proportion **Activity:** Quiz-3	LO3
6	Statistical intervals for a single sample • Use a general method for constructing an approximate confidence interval on a parameter • Construct prediction intervals for a future observation • Construct a tolerance interval for a normal population • Explain the three types of interval estimates: confidence intervals, prediction intervals, and tolerance intervals **Activity:** Quiz-4, Homework-2	LO3, LO1
7	**Spring Break - no class**	
8	**Midterm I**	LO1, LO2,LO3, LO4, LO5, LO6
9	**Lecture Free Week** •Input Analysis **Activity:** Software Practice III	LO6
10	Tests of hypotheses for a single sample • Structure engineering decision-making problems as hypothesis tests • Test hypotheses on the mean of a normal distribution using either a z-test or a t-test procedure • Test hypotheses on the variance or standard deviation of a normal distribution • Test hypotheses on a population proportion Activity: Quiz-5,Homework-3	LO6, LO1
11	Statistical inference for two samples • Structure comparative experiments involving two samples as hypothesis tests • Test hypotheses and construct confidence intervals on the difference in means of two normal distributions • Test hypotheses and construct confidence intervals on the ratio of the variances or standard deviations of two normal distributions **Activity:** Quiz-6	LO3, LO4

12	Statistical inference for two samples • Test hypotheses and construct confidence intervals on the difference in two population proportions • Use the p-value approach for making decisions in hypotheses tests • Compute power, and type II error probability, and make sample size decisions for two sample tests on means, variances, and proportions • Explain and use the relationship between confidence intervals and hypothesis tests **Activity:** Quiz-7-8; Software Practice IV, Homework-4	LO3, LO4, LO6
13	**Midterm II**	LO1, LO2,LO3, LO4, LO5, LO6
14	Simple linear regression and correlation • Use simple linear regression for building empirical models to engineering and scientific data • Understand how the method of least squares is used to estimate the parameters in a linear regression model • Analyze residuals to determine whether the regression model is an adequate fit to the data or whether any underlying assumptions are violated • Test statistical hypotheses and construct confidence intervals on regression model parameters • Use the regression model to predict a future observation and construct an appropriate prediction interval on the future observation • Apply the correlation model • Use simple transformations to achieve a linear regression model Activity: Quiz-9-10, Software Practice V, Homework-5	LO4, LO6, LO1
15	"Multiple linear regression • Use multiple regression techniques to build empirical models to engineering and scientific data • Understand how the method of least squares extends to fitting multiple regression models • Assess regression model adequacy • Use the regression model to estimate the mean response and to make predictions and to construct confidence intervals and prediction intervals • Build regression models with polynomial terms • Use stepwise regression and other model building techniques to select the appropriate set of variables for a regression model Activity: Read Section 12.6; Software Practice VIII	LO1, LO2,LO3, LO4, LO5, LO6

GRADING SCALE

To determine the letter grade, the following grading scale will be used. The instructor reserves the right to curve the scale dependent on overall class scores at the end of the semester. Any curve will only ever make it easier to obtain a certain letter grade.

Score Interval	Letter Grade
[0,45)	F
[45,50)	D
[50,55)	D+
[55,60)	C-
[60,65)	C
[65,70)	C+
[70,75)	B-
[75,80)	B
[80,85)	B+
[85,90)	A-
[90,100]	A

COURSE POLICIES

During Class

Please refrain from using computers during the class except by instructor's permission. Phones are also prohibited as they are rarely useful for anything in the course. During the lecture, you must avoid all activities that are better performed elsewhere (including sleeping). Eating and drinking are allowed in class but please refrain from it affecting the course. Try not to eat your breakfast in class as the classes are typically active.

If you come after the instructor (after the insturctors is online), you are not allowed to enter the classroom. The same rule is also valid for the breaks between two lecture hours.

Attendance Policy
An 70% attendance level is compulsory for all courses offered by the Data Science Program, including this course . Any student who fails to meet this requirement will be able to take neither the final exam nor the make-up exam and will get the letter grade NA. You are strongly urged to actively participate the course. Your class participation will affect your grade. Merely bringing your body to the classroom for the sake of meeting the attendance requirement will not help much. This notwithstanding, attendance is expected in all lecture and lab sections. Valid excuses for absence will be accepted **before** class. In extenuating circumstances, valid excuses with proof will be accepted after class.

Policies on Late Assignments and Make-Up

Late assignments will be accepted for no penalty if a valid excuse is communicated to the instructor before the deadline. The homework will not be accepted after the deadline passed.

In the case of mandatory excused absences, you are allowed to make up missed midterm(s) or the final exam. A single make-up exam will be given, if necessary, during the last week of classes, which covers the entire syllabus, and must be expected to be harder than the missed exam. There is no make-up for participation, quizzes, or the term project. If you are having problems with the course, come and discuss the situation with me as soon as possible. It is typically very difficult to find a solution in mid-March, while feasible plans of attack can be identified in mid-April. The work you hand in on your exams will be your own. I will hold a review session before each exam, which will provide an overview of the material that you will be tested on, as well as give you an opportunity to see the types of questions you can expect on the exam If the pace of the lectures is too fast or slow, let me know. I am not always aware of it, no matter how obvious it may be to you.

Academic Integrity and Honesty
Any work that you submit must be your own; in addition, any words, ideas, or data that you borrow from other people and include in your work must be properly cited. Failure to do these things is cheating and plagiarism, respectively. AGU insists that individual students act with integrity. Accordingly, the University severely penalizes plagiarism and other forms of academic dishonesty.

It is the instructor`s policy that no one should benefit from cheating. If the instructor discovers copying, plagiarism, or any other form of cheating, the instructor will do any of the following: lower the grade, give a zero on the assignment, give an "F" in the course, and/or refer the case to the Dean's Office for judicial investigation. Keep in mind that if your group partner copies (or allows someone to copy from him or her), you too are responsible. You bear responsibility for any work with your name on it.

Finding help for specific problems you are having by looking on the Internet (Google) is perfectly fine. There are numerous resources available there. But soliciting specific help that will result in some parts of the assignment being done for you is not permitted. This kind of cheating will incur a particularly severe penalty.

Reading someone else's paper and copying or paraphrasing the ideas therein, or taking a file with someone's work and revising/editing it into your own paper or homework assignment, is not acceptable. Using parts of sentences from a published source, from the Internet, or from someone else's paper, is not acceptable unless you put quotation marks around the phrase, sentence, or group of sentences you are citing and then provide a proper footnote to the source. If you have any questions about plagiarism and the mechanics of doing citations, ask the instructor. The instructor will provide you with more resources. If the instructor discover that you have plagiarized by taking chunks of text from another source without 1) using quotation marks and/or 2) indicating the source with a complete citation, any of the penalties mentioned above will be applied.

Prepared by:	Asst. Prof. Muhammed Sütçü	**Last updated on:**	6.Oct.20