GEORGE WASHINGTON UNIVERSITY
DEPARTMENT OF STATISTICS

Course Information

STAT1053.12 -- Introduction to Statistics for Social Sciences – Fall 2022
CRN: 70456

Lectures: Tuesday & Thursday, 6:10–7:25pm
                 Classroom: FNGR 207

Lab/Discussion: Recitation Section Stat1053-35 -- TBA
Lab/Discussion: Recitation Section Stat1053-36 -- TBA

Instructor (SBA): Saeid B. Amini, Ph.D., MBA, JD, LL.M.
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Phone: (202) 965-8887
Office Hours: Tuesday 4:35-5:35pm, Rome Hall, 7th Floor (Stat. Dept., Rm.764)
                 Or **via Zoom (this is already setup)**
TA: TBA
TA E-mail: TBA
TA Office Hours: TBA

Bulletin Course Description

STAT 1053. Introduction to Statistics in Social Science. 3 Credits. Lecture (3 hours) + laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, regression and correlation, with applications to social sciences.

The course will cover the basics of probability, research design, descriptive statistics, and inferential statistics. Examples will be used throughout and drawn from a variety of fields, including the social sciences.

Prerequisites

No calculus prerequisite or assumption of prior courses in statistics or experience with computing.

Note: Statistics 1051, 1053, 1091, 1104, 1111, and 1127 are similar courses and credit for only one of these courses can be given. Please contact me for further details.

TEXT/Software

Authors	Title	Edition
James McClave & Terry Sincich (with MyStatLab)	Statistics	13^h

Recommended: Student Solution Manual
Statistical Software (required): Either Statistix ver. 10 ($47 a copy – GWU Store or
                  Use the link https://www.statistix.com/
                  Or any other package (i.e. SPSS/R/Excel/Minitab/SAS,…)

COURSE DESCRIPTION:

The course will cover the basics of statistics and probability and their applications in Social science. We will cover Chapters 1-9 and 11 from the textbook. The main topics include: descriptive statistics for univariate and bivariate data, probability, binomial and normal distributions, confidence intervals, hypothesis testing, correlation and regression.

Course Content: The course will cover the following materials:
1. Chapter 1 (Statistics, fundamental Elements of statistics, Types of Data & Statistical Thinking);
2. Chapter 2 (Methods of Describing Sets of Data – Graphical Presentations, Summary Statistics & Outliers);
3. Chapter 3 (Probability Theory – Sample Spaces, Events and computing probability of events & Probability Rules–Conditional Prob. & Bayes Rule);
      ---------------------- **Midterm Exam 1 (Chapters 1-3)**   -------------------------
4. Chapter 4 (Types of Random Variables (RV), Prob. Dist. Of Discrete RVs – computing expected and variance – Bernoulli, Binomial and Poisson distributions);
5. Chapter 5 (Continuous Random Variables–Uniform, Normal, Computing area under the curve – Approximation of Binomial Prob. With Normal Distribution);
6. Chapter 6 (Sampling Distributions – Distribution of sample mean – Central Limit Theorem – Distribution of Sample Proportions);
      ---------------------- **Midterm Exam 2 (Chapters 4-6)**   -------------------------
7. Chapter 7 (Parameter vs. Statistics; Inference about a Single Sample – Confidence Interval and sample size calculation for means and proportions);
8. Chapter 8 (Hypothesis Testing: mean and proportions – Null vs. Alternative Hypothesis; One Sided vs. Two Sided Alternatives; Types of Error – Critical Value(s) vs. P-values);
9. Chapter 9 (Hypothesis Testing: two mean and two proportions);
10. Chapter 11 (Simple Linear Regression: Pearson Correlation and estimating linear relationship using regression)

      -------------- **Final Exam (cumulative - Chapters 1-9, 11)**   ------------------

Course Homepage: http://blackboard.gwu.edu. Please check this page frequently. I will post important information (homework, quizzes, projects, lecture notes, etc.).

Learning Outcomes/Objectives:
1. Distinguish types of studies and their limitations and strengths.
2. Describe a data set including both discrete and continuous variables to support or refute a statement.
3. Apply laws of probability to concrete problems
4. Perform statistical inference in several circumstances and interpret the results in an applied context.
5. Use confidence intervals and hypotheses tests in statistical inference and explain their meaning.
6. Examine statistical modeling assumptions in contexts including linear regression and analysis of tables of counts
7. Use a statistical package to prepare a data analysis.

Average minimum amount of independent, out-of-class, and learning expected per week:

According to GW: In a 15 week semester, including exam week, students are expected to spend a minimum of 100 minutes of out-of-class work for every 50 minutes of direct instruction, for a minimum total of 2.5 hours a week. A 3-credit course should include 2.5 hours of direct instruction and a minimum of 5 hours of independent learning or 7.5 hours per week.

Class Schedule [week-by-week] See supplement to this document.
NOTE: In accordance with university policy, the final exam will be given during the final exam period and not the last week of the semester

CLASS FORMAT
Classes will be a combination of lectures, problem solving, use of statistical software (e.g. SPSS, Statistix, SAS, etc.), and discussions. The class environment will be informal and relaxed. I would like to encourage you to participate by asking questions and volunteering answers. Class time will be used to build upon the concepts covered in the text, not to simply repeat them. You should therefore do the assigned readings before class, so you will:
    (1) be able to partake in class discussion;
    (2) be able to follow the in-class examples, which may not be in the text; and
    (3) be prepared to ask any unanswered questions you might have.
We will usually follow statistical theories with problem solving and use of statistical software in class. In order to strengthen the course and make it a more interesting and valuable experience, several assignments are included to sharpen your problem solving skills and SAS programming skills necessary

for statistical thinking and data analysis in business and economics fields. Therefore, I recommend you attend each lecture and view the assignments as an opportunity to gain valuable experience for your future.

Homework: Homework (HW) problems for the entire semester have been assigned and provided at the end of this syllabus. Please try to do the assigned HW problems after each lecture. You are required to post your answers within 3 days of the completion of each chapter and post it through BB. While your HWs are not going to be graded based on correct answers, HW will be graded as 10/10; 5/10 and 0/10 based on whether you attempted to answer all the questions (10/10); partial attempts (attempted 50% or less 5/10); and 0/10 if no answers submitted or attempted less than 50% of the assigned HW problems. You MUST POST YOUR ANSWERS before we post the answers for a given chapter. We will post the answers to the assigned HW problems for previous chapter on the day we start a new chapter. For example, the answers for Chapter 2 HW problems will be posted on the day I start Chapter 3, etc. and if you post your answers after our posting, you will get 0/10 for that chapter.

In order for you to do well in this course, I strongly suggest that you do all the assigned HW problems before the due date because many problems and questions on the midterm and final exams are based on HW problems and those discussed in class. HW will count toward 7% of your final grade.

Quizzes: There are NO quizzes this semester.

Midterm Exams: There will be two midterm exams. Midterm Exam 1, will cover chapters 1-3 and midterm exam 2, will cover chapters 4-6. The midterm exams will count toward 45% of your final grade (20% first midterm and 25% for 2nd midterm).

Term Project: There is a mini-project that you will do during the semester. The project will involve (1) selection of your project (you can ask for my help), (2) data collection (at least 70 observations with 5-6 variables), (3) descriptive analysis & graphical presentation of data using a statistical package (e.g. SPSS, Statistix,..) and subjects you will learn in Chapters 1-4), and (4) one or two inferential statistical analysis (based on the subjects that you will learn in Chapters 5-9 & 11). The data collection must be completed before the midterm exam and the final project is due exactly one week before the final exam (NO EXCEPTIONS).

The project will be graded and counts toward 8% of your final grade. You may work in teams of up to two students with team members will get the same scores. You need to disclose the names of your team members to me on or before the Midterm Exam.

Some helpful hints/guidelines about the mini-project:
The project is designed to teach the students on how to work with real data, use commercially available statistical software and develop statistical analysis and writing skills.

Data: I prefer you collect your own data (original) on at least 70 subjects on 5-6 variables. You should have at least one variable that is nominal, ordinal and continuous (e.g., gender, race, how many times did you call home last month, how much cash you have in your pocket, age, height, weight, the number of times you go to the gym every week, what is the distance of your home from GWU,.. etc.). If you cannot or do not want to collect your own data, you can use any database that has the above mentioned characteristics for which you have a research interest.

Analysis: You need to use the most appropriate tools you learned in the class to analyze your data. You should have both **descriptive** (e.g., graphs, summary statistics, etc.) and **inferential** Statistics (e.g., testing claim(s) using appropriate objective hypothesis techniques -- testing of mean(s), regression analysis,.. etc.). I use Statistix in class)

Report: A short report describing 1) your data (e.g. where did you get it, how did you get it, what is the number of subjects, what the variables of interest and whether they are nominal, ordinal, continuous, etc.); 2) what statistical tools you used to analyze the data, 3) results of your analysis and 4) conclusion, is expected. *Additional instructions may be provided in the class and you can contact me regarding your project at any time.*
The project is a semester-long assignment and should NOT be done on the day it is due. It is 8% of your final grade and getting a good grade is highly correlated with your efforts during the entire semester.

Exam Format: There will be three exams: two midterms and a final. The final exam is cumulative. Each exam will have two parts: (1) closed book (about 50% of each exam score). This section will include multiple choice, short answers, fill-in and True/False questions; and (2) open book (text book only) with 50% of the score for each exam. The questions in this part are similar to questions in the text book and/or those assigned as homework problems. ***No make-up exams are allowed***. The exam dates are listed below:

Midterm #1 Date: October ??, 2022 (in class).
Midterm #2 Date: TBA 2021 (in class).
Final Exam Date: TBA (December 14-)
Grading Policy: The final grade is computed as follows:
Midterm Exam #1: 20%
Midterm Exam #2: 25%
Homework Submission: 7%
Mini-Project: 8%%
Final exam: 40%.

Letter Grades of A, A-, B+, B, B-, C+, C, C-, D+, D, D-, and F are possible results for the semester grade based on the student's performance. The major letter grades are pegged to the following total points out of a possible 100.

Grade	Points Needed	Corresponding
A	90+	90- 100%
B	80 89	80- 89%
C	70 79	70- 79%
D	60 69	60- 69%
F	60	< 60%

Plus and minus levels will be assigned accordingly between these scores. As a general rule, students should not anticipate any deviation from this grading scale. There is no "curve" in the grading scale.

>> <u>ATTENDANCE:</u> I will not take attendance but attendance is necessary to perform well in the course. Please be in the class before the start of lecture and leave after the lecture has ended. Students are expected and strongly encouraged to attend all class meetings. It is my expectation that students will have read the assigned text material prior to coming to class, and will be prepared to discuss this material in class. I would strongly suggest that if you are unable to attend a particular class, you should obtain the lecture notes from another student. I do not provide copies of my lecture notes to students who have missed a class. Furthermore, students are expected to be aware of any changes in the dates of assignments or tests. Absence will not be accepted as an excuse for ignorance.

>> <u>HOLIDAYS & BREAKS (NO Class):</u>
  1. *Fall Break, Tuesday, October 25, 2022*
  2. *Thanksgiving Break. Thursday, November 24, 2022*

Make-Up Exams: No make-up exams are allowed, except under extraordinary circumstances such as a death in the immediate family or a true medical emergency. In such cases, I will require written proof (a note from a GW physician) of the cause of the absence. If you will miss a graded assignment due to a religious holiday, you must notify me during the first week of the semester.

Extra credit: No extra-credit assignments will be given.

IMPORTANT NOTES:
  (1) No social networking or use of laptops for any purposes other than note taking is permitted in the classroom.
  (2) No cellular phones are allowed in the classroom.

A grade of <u>Incomplete</u> will only be given to a student who is passing the course and cannot complete the course due to **illness or other well-documented circumstances beyond his/her control**.

SPECIAL REQUESTS FROM YOUR INSTRUCTOR.   Please,…
- If you want a quick reply to your email, send them to:
    a. sbajd98@yahoo.com
    b. your emails must have your full name, course number (STAT1053) and a mention of the issue in the <u>SUBJECT</u> <u>line</u> of the email.
- **Bring your textbook to class.**
- **Please bring a calculator and notes from blackboard to every class**.
- Turn off your cell phones during the class.
- Avoid using your personal computer for anything other than accessing the course materials. Sit in the last row of the class if you plan to use your computer/smart phone for unrelated purposes.
- Do not engage in conversation with your neighbors while the instructor teaches.
- Do not disturb the class or your classmates.
- Avoid tardiness. Come to class on time and do not leave before the class ends.

LEARNING ENVIRONMENT

The class is expected to maintain a respectful learning environment. This includes arriving and leaving on time. If you do arrive late or leave early, please do so quietly and sit in the back row of the room near the exit, as to minimize the disruption to the class and instructor. **Violation of this policy will result in a reduction in your final grade.**

EMAIL COMMUNICATIONS

Emails with the instructor and the TAs should be conducted in a respectful manner. This includes a proper greeting in the original email and a follow-up thank you email if appropriate.

ACADEMIC INTEGRITY

I personally support the GW Code of Academic Integrity. It states: "Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information." For the remainder of the code, see: **http://www.gwu.edu/~ntegrity/code.html**.

TUTORING

The Undergraduate Tutoring Lab is available for free walk-in tutoring help. It is located in the Statistics Department conference room at Laura E. Phillips Hall (Address: Statistics Department, ROME Hall, 801 22nd Street, N.W., Room: TBA). The hours are posted at ttp://www.gwu.edu/~stat/tutoringschedule_fall2010.htm

SUPPORT FOR STUDENTS OUTSIDE THE CLASSROOM
DISABILITY SUPPORT SERVICES (DSS)
Please inform the instructor if you have a documented disability and need special arrangements for tests or quizzes. To establish eligibility and coordinate reasonable accommodations for exams, please contact the Disability Support Services Office (202-994-8250), in the Marvin Center, Suite 242, or at http://gwired.gwu.edu/dss/

UNIVERSITY COUNSELING CENTER (UCC)
The University Counseling Center offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:
* Crisis and emergency mental health consultations
* Confidential assessment, counseling services (individual/small group), and referrals:
http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices

UNIVERSITY TITLE IX POLICY
The George Washington University (GW) and its faculty are committed to creating a safe and open learning environment for all students. If you or someone you know has experienced sexual harassment, including sexual assault, dating or domestic violence, and stalking, please know that help and support are available. GW strongly encourages all members of the community to take action, seek support, and report incidents of sexual harassment to the Title IX Office. You may contact the Title IX Office at 202-994-7434 or at titleix@gwu.edu or learn more by visiting titleix.gwu.edu. Please be aware that faculty members are required to disclose information about suspected or alleged sexual harassment or other potential violations of the Title IX Sexual Harassment and Related Conduct Policy to the Title IX Office. If the Title IX Office receives information about an incident, they will reach out to offer information about resources, rights, and procedural options as a member of the campus community. Community members are not required to respond to this outreach. If you, or another student you know, wishes to speak to a confidential resource who does not have this reporting responsibility, please contact Counseling and Psychological Services through the Colonial Health Center 24/7 at 202-994-5300, or the Office Of Advocacy and Support at 202-994-0443 or at oas@gwu.edu.

SECURITY
In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.

To Report an Emergency or Suspicious Activity
Call the University Police Department at 202-994-6111 (Foggy Bottom) or 202-242-6111 (Mount Vernon).

Emergency Information
Additional emergency information may be obtained by visiting the Campus Advisories webpage (http://CampusAdvisories.gwu.edu) or calling the GW Information Line at 202-994-5050.

Class Schedule and Assignments

Date	Day	Topic	Chapter
8/30	T	*Introduction to Basic Concepts: Data, and Statistical thinking	Ch. 1
9/1	TR	*types of Data, Data Collection, identifying misleading statistics	Ch. 1
9/6	T	*Describing/summarizing Qualitative/Quantitative data, Graphical presentation of data (frequency tables, Histograms pie & bar charts, stem-leaf display, etc.)	Ch. 2
9/8	TR	*Describing/summarizing numerical data (center, variation, etc.) Numerical & Graphical Summary of quantitative data	Ch. 2
9/13	T	*Describing/summarizing numerical data (variance, SD, etc.) Measures of Relative Standing (Z-scores, percentile ranking, ..) For sample, population; Concept and detection of outliers	Ch. 2
9/15	TR	*Event, Sample Space, and probability	Ch. 3
9/20	T	*Computing probability of an event, using Combinations rule	Ch. 3
9/22	TR	*Probability Theory – Rules of Probability, (sample space, event) Venn Diagrams, Independent events, Unions, Intersections, disjoint	Ch. 3
9/27	T	*Conditional Probability – Tree Diagrams, 2x2 Table Bayes's Rule	Ch. 3
9/29	TR	*Conditional Probability & Bayes's Rule	Ch. 3
10/1	SAT	* Review Chapters 1-3 (classroom will be announced) Attendance is Voluntary (11am-1pm) Depending on the GWU Covid protocol, I may provide Pizza and Soft drinks	Ch. 1-3
10/4	T	Midterm Exam 1 – Will Cover Chapters 1-3	
10/6	TR	Review of Midterm Exam I & Start of Random Sampling	Ch. 4
10/11	T	*Discrete Random variables (DTV), probability dist. DRV	Ch. 4
10/13	TR	*Expected Value and variance of DRV	Ch. 4
10/18	T	*Bernoulli & Binomial Distributions and their means & Var	Ch. 4
10/20	TR	*Continuous Random variables, Continuous probability Dist.	Ch. 5

10/25	T	*Fall Break, Tuesday, October 25, 2022 – NO CLASS*	
10/27	TR	*Standard & General Normal Distributions	Ch. 5
10/28	TR	*Methods for Assessing Normality	Ch. 5
11/1	T	* Methods for Assessing Normality & Approximating the Binominal Distribution with a Normal Dist.	Ch. 5
11/3	TR	*Population Parameter vs. Statistics; Concept of a Sampling Distribution	Ch. 6
11/8	T	*Sampling Distribution of a Sample Mean-Continuous Distribution Central Limit Theorem,	Ch. 6
11/10	TR	*Sampling Distribution of the Sample Proportion	Ch. 6
11/12	SAT	* Review Chapters 4-6 (classroom will be announced) Attendance is Voluntary (11am-1pm) Depending on the GWU Covid protocol, I may provide Pizza and Soft drinks	Ch. 4-6
11/8	T	Midterm Exam 2 – Will Cover Chapters 4-6	
11/10	TR	* Quick Review of Exam & Start Chapter 7 on Concept of Target Parameters and Point vs. Interval Estimates	Ch. 7
11/15	T	* Estimating confidence intervals for population means (single Population) using Z vs. t distribution	Ch. 7
11/17	TR	*Statistical Inference: estimating confidence intervals For single population proportion (large sample)	Ch. 7
11/22	T	*Statistical Inference: Sample size Calculations For single population Confidence Interval for Population Variance (single population)	Ch. 7
11/24	TR	*No Class – Thanksgiving Break	
11/29	T	*Hypothesis testing – Tests of Significance, Hypothesis Null & Alternative hypothesis (one sided; two sided) test statistics, critical values, p-values (single sample) for Populations Means and proportions	Ch. 8

12/1	TR	*Comparing two Population Means (assuming equal & unequal Population Variances); Confidence Interval; Degrees of Freedom	Ch. 9
12/6	T	*Comparing two Population Means & Paired data Confidence Interval; Degrees of Freedom, and sample size calculations	Ch. 9
12/8	TR	*Comparing two Population proportions, Variances Confidence Interval; testing hypothesis, and sample size calculations	Ch. 9
12/8	TR	*Simple Linear Regression, Correlation, least square estimates	Ch. 11
12/10	Sat	*Review of Chapters 1-9, 11 (11am-1pm; classroom will be announced)	
		FINAL EXAM: Chapters: 1-9, 11	
		Final Exam Date, time: TBA (December 14-)	

Assigned Homework Problems: (for some of the HW problems you may need to use Computer and statistics software)
Problems are assigned from 13th Edition (our Textbook)

HW 1: 1.2, 1.3, 1.5, 1.6, 1.7, 1.12, 1.18, 1.20, 1.25, 1.27, 1.31, 1.34
HW2: 2.4, 2.8, 2.9, 2.11, 2.30, 2.37, 2.46, 2.59, 2.62, 2.72, 2.78, 2.80, 2.87, 2.98, 2.107, 2.118, 2.131, 2.137, 2.146, 2.162, 2.187, 2.189, 2.194, 2.205, 2.209
HW3:3.9, 3.11, 3.13, 3.15, 3.35, 3.45, 3.47, 3.51, 3.57, 3.59, 3.73, 3.77, 3.84, 3.89, 3.96, 3.109, 3.116, 3.124, 3.136, 3.139, 3.142, 3.172, 3.178, 3.191

Midterm #1

HW4: 4.4, 4.5, 4.20, 4.22, 4.24, 4.26, 4.33, 4.43, 4.46, 4.59, 4.61, 4.69, 4.73, 4.74, 4.79, 4.128, 4.134, 4.136, 4.143, 4.147
HW5: 5.3, 5.4, 5.6, 5.9, 5.17, 5.25, 5.28, 5.31, 5.37, 5.40, 5.44, 5.68, 5.83, 5.84, 5.88, 5.89, 5.122, 5.131, 5.143, 5.146
Ch. 6: 6.3, 6.5, 6.15, 6.30, 6.35, 6.37,6.39, 6.50,6.52,42, 6.62, 6.71, 6.73, 6.82

Midterm #2

Ch 7: 7.10, 7.15,7.16,7.22, 7.33, 7.34, 7.46, 7.47, 7.55, 7.59, 7.75, 7.76,64,7.85,7.90, 7.94,7.114, 7.116, 7.124, 7.125, 7.130, 7.137
Ch. 8: 8.8, 8.11, 8.12, 8.13, 8.15, 8.34, 8.37, 8.38, 8.55, 8.57, 8.60, 8.63, 8.78, 8.82, 8.88, 8.90, 8.121, 8.126, 8.142, 8.148, 8.156
Ch. 9: 9.6, 9.12, 9.17, 9.19, 9.35, 9.36, 9.38, 9.60, 9.67, 9.87, 9.88, 9.93, 9.102, 9.105, 9.108, 9.122, 9.123, 9.130, 9.145
Ch.11: 11.13, 11.18, 11.19, 11.21

Final Exam -- Chapters 1-9 & 11