The George Washington University
Department of Statistics
Syllabus: Statistics 1051 (Intro. to Business and Economic Statistics)

Course: STAT 1051.14, Fall 2024
Time: Monday & Wednesday, 11:10 AM-12:25 PM
Class Location: PHIL B152
Instructor: Prof. Reza Modarres
E-mail address: reza@gwu.edu
Office hours: Wednesday 10:00-11:00 AM, Location: 760 B Rome Hall

TA: Yong Wang (ywang98@gwmail.gwu.edu)

STAT 1051.38, Recitation, FNGR 223,   T 12:45PM - 01:35PM

STAT 1051.39 Recitation,   1957 E 111, T 02:20PM - 03:10PM

TEXT book: Statistics for Business and Economics, 14th Edition, McClave, Benson and Sincich, ISBN: 0134506596

This course is included in the library's Top Textbooks program. There is at least one copy of the textbook(s) for this course on reserve at Gelman Library. You can borrow the textbook for free for up to three hours at a time. For more information, visit https://library.gwu.edu/top-textbooks.

R Software (free): R: https://www.r-project.org/
                       R Studio: https://www.rstudio.com/products/rstudio/download/

COURSE DESCRIPTION

This is an introductory course in statistical sciences applicable to Business and Economic using R. The topics include introduction to numerical measures of central tendency and variability, frequency distributions & graphical presentations, probability, random variables, properties of basic probability distributions, sampling distributions, estimation, confidence intervals, testing of hypotheses, linear regression and correlation.

LEARNING OUTCOMES:
At the end of the semester, you should be able to
1) apply laws of probability and use various probability distributions
2) construct and interpret tests and confidence intervals
3) apply simple linear regression, evaluate the models and interpret the results
4) use basic R functions to do statistical analysis

GRADING: All exams and quizzes are **open book** (**not notes**) and given in class. Final grade will be based on

- Quizzes :   30%,
- Midterm Examination: 30%,
- Course Project: 10%,
- Final Examination: 30%,

Quizzes: There will be six quizzes. The lowest two scores are dropped. There is no makeup for any quiz you miss.

Course Project: The course project instructions will be posted to Blackboard after the midterm. A *hard copy* of the report and completed course project is due at the end of the course. *See the course calendar. You may work in groups of up to three students.*

Students should expect to spend approximately 3 hours per week on direct instruction (class time) and 5 hours per week on independent learning (assignments, studying, and independent learning activities). Stat 51, 53, 91, 104, 111, and 127 are related in their subject matter, and credit for only one of the six may be applied toward a degree.

Course Policies:

- <u>Regular class attendance.</u>
- <u>No late</u> work is acceptable (unless for serious reasons with documentation).
- No make-up quizzes/exams (unless for serious reasons with documentation).
- The Blackboard System (http://blackboard.gwu.edu/) will be used for this course.

<u>University policies:</u>

University policy on observance of religious holidays
In accordance with University policy, students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. students.gwu.edu/accommodations-religious-holidays.

Academic integrity code
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.

Safety and security
- Monitor GW Alerts and Campus Advisories to Stay Informed before and during an emergency event or situation
- In an emergency: call GWPD/EMeRG 202-994-6111 or 911
- In the event of an armed Intruder: Run. Hide. Fight.

Disability Support Services (DSS)
Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Rome Hall, Suite 102. disabilitysupport.gwu.edu/

Mental Health Services 202-994-5300
The University's Mental Health Services 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. counselingcenter.gwu.edu/

Topics

Chapter 1: Introduction to Statistics

Chapter 2: Methods for describing datasets: Grouped Data: The Frequency Distribution, Descriptive Statistics: Measures of Central Tendency, Descriptive Statistics: Measures Of Dispersion

Chapter 3: Basic Probability Concepts: Two views of probability: objective and subjective, elementary properties of probability, calculating the probability of an event, Bayes' theorem

Chapter 4: Random Variables and Probability Distributions: Probability Distributions Of Discrete Variables, The Binomial Distribution, Continuous Probability Distributions, The Normal Distribution, Normal Distribution Applications

Chapter 5: Sampling Distributions: Sampling Distributions, Distribution Of The Sample Mean, Distribution Of The Difference Between Two Sample Means, Distribution Of The Sample Proportion, Distribution Of The Difference Between Two Sample Proportions

Chapter 6: Estimation and CI: One Sample: Confidence Interval (CI) For A Population Mean, The T Distribution, CI For The Difference Between Two Population Means, CI For A Population Proportion, CI For The Difference Between Two Population Proportions, Determination Of Sample Size For Estimating Means And Proportions

Chapter 7: Hypothesis Testing: One Sample: Hypothesis Testing: A Single Population Mean, The Difference Between Two Population Means, Paired Comparisons, Single Population Proportion, The Difference Between Two Population Proportions, The Type Ii Error And The Power Of A Test

Chapter 8: CI and Testing: Two Samples

Chapter 11: Simple Linear Regression and Correlation

Fall 2024 Calendar

First Day of Classes	Thursday, August 22, 2024
Labor Day (no classes)	Monday, September 2, 2024
Fall Break (no classes)	Thursday - Friday, October 10-11, 2024
Thanksgiving Break (no classes)	Monday, November 25 - Saturday, November 30, 2024
Last Day of Classes	Tuesday, December 10, 2024
Make-up/Reading Day	Wednesday, December 11, 2024
Final Exams	Thursday, December 12 - Tuesday, December 17, 2024

Tentative Schedule

Class	Date	Sections	Topics
1	M 8/26	Introduction: Class Syllabus, R Introduction	Chapter 1: What is Statistics? R Introduction
2	W 8/28	Chapter 2	Chapter 2: Sample Vs Statistic
3	W 9/4	Chapter 2: Data Exploration	Chapter 2: Methods for describing sets of data
4	M 9/9	Chapter 2 continued	Chapter 2: Measures of center and spread
5	W 9/11	Chapter 2 continued	Chapter 2: Detecting outliers using Box plots and z-Score, The Empirical Rule
6	M 9/16	Chapter 3: Probability **Tuesday 9/17 Quiz #1 in the lab**	Chapter 3: Introduction to probability
7	W 9/18	Chapter 3 continued	Chapter 3: Conditional probability, Independence events
8	M 9/23	Chapter 4: Random Variables and Probability Distributions	Chapter4: Types of Random Variables, Probability Distributions for Discrete Random Variables
9	W 9/25	Chapter 4 continued	Chapter 4: Binomial Random Variables
10	M 9/30	Chapter 4 continued **Tuesday 10/1 Quiz #2 in the lab**	Chapter 4: Continuous Probability Distribution, Normal and Uniform
11	W 10/2	Chapter 5: Sampling Distribution	Chapter 5: Sampling Distribution
12	M 10/7	Chapter 5	Chapter 5: Sampling Distribution Properties of Sampling Distributions The Central Limit Theorem
13	W 10/9	Chapter 6	Chapter 6: Point Estimation Confidence Interval (CI) for the Population Mean
14	M 10/14	Chapter 6 continued **Tuesday 10/15 Quiz #3 in the lab**	Chapter 6: Large Sample CI for Proportion Determining Sample Size
15	W 10/16	Review for Midterm	
16	M 10/21	**MIDTERM**	

17	W 10/23	Midterm Recap **Project Introduction**	Chapter 7: Hypothesis Testing
18	M 10/28	Chapter 7: Hypothesis Testing	Chapter 7: Hypothesis Testing
19	W 10/30	Chapter 7 continued	Chapter 7: Hypothesis Testing for Means with Small Samples Hypothesis Testing for Proportions
20	M 11/4	Chapter 7 continued **Tuesday 11/5 Quiz #4 in the lab**	Type I and Type II errors
21	W 11/6	Chapter 7 continued	Test for proportions
22	M 11/11	Chapter 8: Two-sample Inference	Chapter 8: Comparing Two Population Means Determining the Sample Size
23	W 11/13	Chapter 8: Two-sample Inference	Comparing two population means (large samples)
24	M 11/18	Chapter 8: Two-sample Inference **Tuesday 11/19 Quiz #5 in the lab**	Comparing two population means (small samples)
25	W 11/20	Chapter 11: Regression Analysis	Chapter 11: Simple Linear Regression
26	M 12/4	Chapter 11 continued **Projects Due**	Chapter 11: Model Assumptions Parameter Estimation
27	W 12/6	Chapter 11 continued	Chapter 11: Coefficients of Correlation and Determination Model Estimation and Prediction
28	M 12/9	Review for Final **Tuesday 12/10 Quiz #6 in the lab**	
		TBA Final Exam	

NOTE: For the final exam, please see Administration of Final Examinations during the Examination Period (http://provost.gwu.edu/administration-final-examinations-during-examination-period).