SYLLABUS

STT 315 – SECTION 202

INTRODUCTION TO PROBABILITY AND STATISTICS FOR BUSINESS

SUMMER B 2020

Instructor Information

Instructor: Dr. Elijah E. **Dikong**

Office: C444 Wells Hall

Virtual Office Hours: MW 03:00 P.M. – 04:00 P.M. – **On appointments only**

Telephone: 517-353-7201

E – mail: dikonge@msu.edu

Course Information

Meeting Time : MWF 12:40 P.M. – 02:30 P.M.

Class Website: https://d2l.msu.edu

Course Description

- STT 315 is a three credit course and is the first course in probability and statistics mainly for business majors. The topics include descriptive statistics, probability models, random variables, sampling distribution, estimation, confidence intervals, and hypothesis testing. These topics are covered in Chapters 1 – 7 of the textbook.

Course Objectives

- The purpose of this class is to give you experience with statistical procedures in personal and professional spheres, including where they are used, how they are used, the advantages they provide, and their limitations.
- This course will also provide you with a foundation for future Statistics courses.

- Along the way you will learn some basic techniques that statisticians (and many non-statisticians) use to visualize and summarize data, some methods for determining what can be due to chance and what cannot, and the limitations as well as the value of these procedures.

- By the end of this course, you should be able to:

    - Analyze and present data

    - Use probabilities to describe and assess random events

    - Use tests of statistical significance to answer questions of scientific and business nature.

- This course will strive to add to your progress towards meeting the MSU Undergraduate Learning Goals of

    - Analytical Thinking
    - Cultural Understanding
    - Effective Citizenship
    - Effective Communication
    - Integrated Reasoning

Textbook and Course Materials

Required Textbook

- **Statistics for Business and Economics**, McClave, Benson, and Sincich, 13th Edition, Pearson, 2013, (or **Statistics for Business and Economics**, McClave, Benson, and Sincich, 12th Edition, Pearson).

- **Power Point Lecture Slides Notes:** Detailed course notes for each module or chapter will be posted on D2L to download and print.

Graphing Calculator

- Contemporary statistical methods make substantial use of technology. The students are required to have a calculator capable to compute summary statistics (mean, standard deviation, median, etc.); to perform inference tests. TI-83 Plus or TI-84 PLUS is strongly recommended. If you have a calculator other than the TI-83 PLUS or the TI-84 PLUS, that is fine with me, but you are on your own to learn how to use it. A graphing calculator is

necessary because of the quizzes, midterm examination and final examination which do not permit other technology.

Desire2Learn (D2L)

- Desire2Learn or D2L is MSU's Learning Management System.
- This course will be delivered entirely online through the course management system Desire2Learn. You will use you Michigan State University (MSU) account to login to the course from D2L Login Page. If you have not activated your MSU account, please do so immediately.
- In D2L, you will access online lessons, course materials, check your grades, communicate with the instructor and other students in the class, and resources. Make sure that all your contributions are civil, respectful of other students and the instructor, and on topic. It is my intension that at designated times throughout the semester we will participate in a blend of self-paced and group-paced activities using D2L and or alternative internet-based technologies. Activities may consist of chat or discussion forums.
- To access this course on D2L you will need access to the minimum recommended computer and internet configurations for online courses, and a supported Web browser (Internet Explorer, Chrome, Firefox, Safari). To ensure that you are using the recommended personal computer configurations, please refer to the D2L settings link.
- If you need technical assistance at any time during the course or to report a problem with D2L, you can seek assistance from the MSU IT Desk.

Lecture Videos and Webinars

- Several lecture videos covering sections of each module or chapter will be posted in D2L. You are strongly advised to **watch** these videos, endeavor to understand the concepts disseminated by solving the associated practice problems for that section.
- The regular Mondays and Wednesdays class meetings times will be zoomed webinars. Friday classes will take the form of a meeting. This will encourage more teacher-student interaction, discussion, and engagement. More details will be provided for the Friday classes. You have to first log in to the MSU Zoom client at https://msu.zoom.us/ I recommend you download and install the zoom client to have the best experience.

- Here is your invitation. The essential part of the invitation is the **Meeting ID** and the **Password.**
- Hi there,
- You are invited to a Zoom webinar.
- When: Jun 29, 2020 12:00 PM Eastern Time (US and Canada)
- **Topic: US20-STT315-202 Webinars**
- **Register** in advance for this webinar:
- https://msu.zoom.us/webinar/register/WN_Wr_XaTDaQEKpDjDiz9l2AA
- Or an H.323/SIP room system:
- H.323:
- 162.255.37.11 (US West)
- 162.255.36.11 (US East)
- 115.114.131.7 (India Mumbai)
- 115.114.115.7 (India Hyderabad)
- 213.19.144.110 (EMEA)
- 103.122.166.55 (Australia)
- 209.9.211.110 (Hong Kong SAR)
- 64.211.144.160 (Brazil)
- 69.174.57.160 (Canada)
- 207.226.132.110 (Japan)
- **Meeting ID: 960 1070 9465**
- **Password: 157647**
- SIP: 96010709465@zoomcrc.com
- Password: 157647
- After registering, you will receive a confirmation email containing information about joining the webinar.

Department of Statistics Learning Center

- Please come to the Statistics Learning Center prepared with specific questions after reading the assigned material and making a good faith effort at understanding the concepts and doing exercises.

- Do not expect to be taught the basics from scratch in the Help Room. The Statistics Learning Center is designed to supplement a student's learning and comprehension of

classroom material. The Statistics Learning Center will be delivered through Zoom. Be reminded again that, the help room is a supplement and not a substitute for attending lectures meetings. Instructions, links and the Statistics Learning Center Schedule can be accessed online: https://stt.natsci.msu.edu/academics/statistics-learning-center/

- Professor Dikong will make efforts to ensure that the teaching assistants in the Help Room are informed in regard to sections and materials covered in STT 315 – 103.
- Nonetheless, on occasion, you may receive bad advice on a homework assignment, etc. In such cases, you are responsible for the homework assignment that you submit. Do not submit work that you do not understand.
- Join the **Zoom Help Room** by first logging in to the MSU Zoom client at https://msu.zoom.us/ I recommend you download and install the Zoom client to have the best experience. Then, click on this link: https://msu.zoom.us/j/91029294809 or join the meeting using **the Meeting ID: 910-2929-4809; Password: 872020; M – F: 04 – 010 PM.**
- When you first click on the link, you will enter a waiting room. This will allow the room's moderator to keep track of the order in which students come to the help room. You are advised to cultivate patience.
- A moderator will allow you access to the room, and then move you to a break out room with a tutor as soon as one is available. If you attempt to sign in to the Zoom Help Room outside of the scheduled hours, you will not be able to join the meeting.

Zoom Office Hours

- Join the zoom office hours using the link https://msu.zoom.us/j/6401587418 or using the **Meeting ID: 640-158-7418** and **Password: Elijah1**. Please come prepared with specific questions. **You must in advance set up an appointment.**

Topic Outline and Schedule

Week 1: June 29 – July 05, 2020

Topic	Student Study Material	Quiz or Midterm or Final	Quiz Open Date in D2L	Quiz Closed Date in D2L
Chapter 1 **Statistics; Fundamental elements of statistics; Types of data; Sampling Designs**	• **Chapter 1 power point lecture slides notes;** • **Watch Chapter 1 lecture videos** • **Solve practice exercises on Chapter 1**	• **Practice Quiz 1;** • **Actual Quiz 1**	• **6/29/2020 at 8:00 AM** • **7/03/2020 at 8:00 AM**	• **7/03/2020 at 11:59 PM** • **7/06/2020 at 11:59 PM**

Week 2: July 06 – July 12, 2020

Topic	Student Study Material	Quiz or Midterm or Final	Quiz Open Date in D2L	Quiz Closed Date in D2L
Chapter 2 **Graphical and Numerical Methods for Describing Sets of Data**	• **Chapter 2 power point lecture slides notes;** • **Watch Chapter 2 lecture videos** • **Solve practice exercises on Chapter 2**	• **Practice Quiz 2;** • **Actual Quiz 2**	• **7/06/2020** • **7/10/2020**	• **7/09/2020** • **7/12/2020**

Week 3: July 13 – July 19, 2020

Topic	Student Study Material	Quiz or Midterm or Final	Quiz Open Date in D2L	Quiz Closed Date in D2L
Chapter 3 Events, Sample Spaces, and Probability; Probability Rules and Conditional Probability; Bayes's Rule	• Chapter 3 power point lecture slides notes; • Watch Chapter 3 lecture videos • Solve practice exercises on Chapter 3	• Practice Quiz 3; • Actual Quiz 3	• 7/13/2020 at 8:00 AM • 7/17/2020 at 8:00 AM	• 7/16/2020 at 11:59 PM • 7/19/2020 at 11:59 PM

Week 4: July 20 – July 26, 2020

Topic	Student Study Material	Quiz or Midterm or Final	Quiz Open Date in D2L	Quiz Closed Date in D2L
Chapter 4 Discrete and Continuous random variables and their probability distributions;	• Chapter 4 power point lecture slides notes; • Watch Chapter 4 lecture videos • Solve practice exercises on Chapter 4	• Practice Quiz 4; • Midterm Exam: (Actual Quiz 4)	• 7/20/2020 at 8:00 AM • 7/24/2020 at 8:00 AM	• 7/23/2020 at 11:59 PM • 7/26/2020 at 11:59 PM

Week 5: July 27 – August 02, 2020

Topic	Student Study Material	Quiz or Midterm or Final	Quiz Open Date in D2L	Quiz Closed Date in D2L
<u>Chapters 5 and 6A</u> Sampling distributions for sample mean and sample proportion; Confidence Intervals for one sample proportion.	• Chapters 5 and 6A power point lecture slides notes; • Watch chapters 5 and 6A lecture videos • Solve practice exercises on chapters 5 and 6A	• Practice Quiz 5; • Actual Quiz 5	• 7/27/2020 at 8:00 AM • 7/31/2020 at 8:00 AM	• 7/30/2020 at 11:59 PM • 8/02/2020 at 11:59 PM

Week 6: August 03 – August 09, 2020

Topic	Student Study Material	Quiz or Midterm or Final	Quiz Open Date in D2L	Quiz Closed Date in D2L
<u>Chapters 6B and 7A</u> Confidence intervals for one sample mean; Hypothesis tests for a population proportion	• Chapters 6B and 7A power point lecture slides notes; • Watch Chapters 6B and 7A lecture videos • Solve practice exercises on Chapters 6B and 7A	• Practice Quiz 6; • Actual Quiz 6	• 8/03/2020 at 8:00 AM • 8/07/2020 at 8:00 AM	• 8/06/2020 at 11:59 PM • 8/09/2020 at 11:59 PM

Week 7: August 10 – August 13, 2020

Topic	Student Weekly Study Material	Final Exam	Open Date in D2L	Closed Date in D2L
Chapter 7B **Hypothesis tests for a population mean;** **Decision Errors;** **Review for the final examination**	• **Chapter 7B power point lecture slides notes;** • **Watch chapter 7B lecture videos** • **Solve practice exercises on Chapter 7B**	• **Final exam: (Quiz 7)**	• **8/13/2020 at 8:00 AM**	• **8/14/2020 at 11:59 PM**

Practice Quizzes, Actual Quizzes, Homework Assignment, Midterm, and Final Examinations

- Click on **Assessments** to access the **practice** and **actual quizzes**. Take note that **Quiz 4** and **Quiz 7** are respectively, the **midterm** and the **final examinations**.
- Associated with each **actual quiz** is a **practice quiz**. The practice quizzes contain problems similar to those in the actual quiz. There are three attempts for each practice

quiz and the practice quizzes will remain open Mondays at 8:00 AM through Thursdays 11:59 PM each week. Be advised to first take the practice quiz for the week before taking the actual quiz. This will gauge your level of preparedness before taking the actual quiz for the week.

- **Special Notes On Actual Quizzes**:

- There is a **maximum of two attempts** for the actual quizzes.
- Each Actual Quiz will have a time limit of one hour fifteen minutes, that is, 75 minutes, except for quizzes 4 and 7 which respectively, are the midterm and final examinations. This means you have 75 minutes from the time you start the quiz to complete it. You must complete the actual quiz within the 72 hours in which it is open. You will have **two attempts** on the quiz as a whole. That means, after you submit the quiz the first time, you will have one more try to take the entire quiz again. You will not be told which questions you answered incorrectly. Your next attempt will give you different questions in a different order. Read them carefully!

- **How to Study for the Actual Quizzes**: (1) Review the chapter practice exercises suggested in the chapter practice exercises module. (2) Do the practice quizzes under test conditions. (3) Do all the practice quiz questions in one siting, referring only to your notes and no other outside help. (4) Note how long this takes you so you can adjust your pacing for the actual quiz.

- **How to Take the Actual Quizzes**: (1) Arrange for an un-interrupted hour and a quarter to take the quiz during the open time window. (2) I strongly suggest you take it early to leave time for a second attempt. (3) During the quiz, you may refer to your notes, but I expect you to do your own work by not referring to the internet or another human during the quiz time. (4) If you are satisfied with your score after the first attempt, you are finished. Otherwise, arrange to take the quiz a second and last time. (5) After the due date of the quiz, you will not be offered to take the quiz a second time, irrespective of whether you took the quiz only once.

- **Quiz Scores**: (1) Your highest score from two attempts will count for that quiz in your final grade calculation. (2) You will not be able to see which questions you missed. This is because these same questions will be used for upcoming semesters.

- It is your responsibility to complete assignments as early as possible to avoid potential incident.

- **Homework Assignment**: There will be 1 homework assignment worth **60 points**. The homework will be based on the statistical topic: Observational Studies and Experimental Designs. Be informed that this is an independent reading and study, though these topics will be briefly touched on during lectures. This assignment will be **submitted** via email on **Monday July 27, 2020**, between 12:00 PM and 6:00 PM Eastern U.S. Time.

- **Homework Assignment Learning Objective**

1. For **Designed Experiments,** given a description of the research, be able to
    a. Identify the treatment and control groups.
    b. Identify and evaluate the use of randomization.
    c. Explain why randomization in the assignment of subjects to treatment and control groups is important.
    d. Identify the use and non-use of a placebo and explain its role in the experiment.
    e. Distinguish between blind and double-blind experiments and explain the reasons for each.
    f. Explain when and why randomized, controlled, double-blind experiments allow the cautious inference of causation.

2. For **Observational Studies**, given a description of the research, be able to
    a. Identify and evaluate the sampling methods used
        i. Simple random sampling
        ii. Cluster sampling
        iii. Stratified sampling
        iv. Systematic sampling
        v. Convenience sampling
    b. Identify and evaluate the use of randomization.
    c. Identify and explain types of bias that may be introduced based on the sampling method.
        i. Nonresponse
        ii. Response
        iii. Selection
    d. Identify and explain possible confounding factors.
    e. Explain why observational studies do not allow the inference of causation.

- **Homework Assignment Study Notes**: See lecture slides number 69 through 93 of the file Summer20BSTT315Chapter1B posted in the Power Point Lecture Notes Module under Content in D2L.

Evaluation and Grading Policy

Your grade will be based on a weighted scale. Your percentage score on each component of the course will contribute to your grade according to the breakdown below:

Component	Points	Percentage
Practice Quizzes	6x10pts = 60 points	10%
Actual Quizzes	5x36pts = 180 points	30%
Homework Assignment	1x60pts = 60 points	10%
Midterm Examination	1x150pts = 150 points	25%
Final Examination	1x150pts = 150 points	25%
Total	600 points	100%
Extra-credit	30 points	5%

I fully expect final course grades to be assigned based on the grading scale below. I do not curve the class unless there is a major problem (which is rare.) Don't expect a curve.

Numeric Grade	Point Range	Percentage Range
4.0	540 – 600	90% - 100%
3.5	514 – 539	85% - 89.99%
3.0	480 – 513	80% - 84.99%
2.5	450 – 479	75% - 79.99%
2.0	420 – 449	70% - 74.99%
1.5	390 – 419	65% - 69.99%
1.0	360 – 389	60% - 64.99%
0.0	0 – 359	0% - 59.99%

I don't move cutoffs. Many people end up close to cutoffs, but moving cutoffs only creates more people being close to the new cutoffs, etc. **Email requests to round grades or change the cutoffs at the end of the semester will not receive a response.**

Any questions about the grading policy or your standing in the class can be addressed through email or during office hours.

An I-Incomplete may be given only when: the student (a) has completed at least 6/7 of the term of instruction, but is unable to complete the class work and/or take the final examination because of illness or other compelling reason; and (b) has done satisfactory work in the course; and (c) in the instructor's judgment can complete the required work without repeating the course.

Late Work Policy

Be sure to pay close attention to deadlines – there will be no make-up assignment or quizzes, or late work accepted without a serious and compelling reason and instructor approval.

Viewing Grades in Desire2Learn

Points you receive for graded quizzes will be posted to the D2L Grade Book. Click on the Grades link to view your points.

Netiquette Guidelines

Netiquette is a set of rules for behaving properly online. In an online classroom, our primary means of communication is written. The written language has many advantages: more opportunity for reasoned thought, more ability to go in-depth, and more time to think through an issue before posting a comment. However, written communication also has certain disadvantages such as lack of face-to-face signaling that occurs through body language, intonation, pausing, facial expressions, and gestures. As a result, please be aware of the possibility of miscommunication and compose your comments in a positive, supportive, and constructive manner.
The following netiquette tips will enhance the learning experience for everyone in the course:

- Do not dominate any discussion.
- Give other students the opportunity toi join in the discussion.
- Do not use offensive language. Present ideas appropriately.

- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Popular emoticons such as smiley can be helpful to convey your tone but do not overdo or overuse them.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Never make fun of someone's ability to read or write.
- Share tips with other students.
- Keep an "open-mind" and be willing to express even your minority opinion. Minority opinions have to be respected.
- Think and edit before you push the "Send" button.
- Do not hesitate to ask for feedback.
- Using humor is acceptable.

Instructor Feedback and Communication

I am happy to answer your questions and address your concerns and will make every effort to respond to your emails within one business day. If you email the instructor after 5 pm on a Friday, do not expect your email to be answered until Monday.

All the important course announcements will be made in class and via email or using D2L announcements. It is your responsibility to check your email and the D2L course page regularly.

Commit to Integrity: Academic Honesty

Michigan State University affirms the principle that all individuals associated with the academic community have a responsibility for establishing, maintaining, and fostering an understanding and appreciation for academic integrity. Academic integrity is the foundation for university success. Learning how to express original ideas, cite works, work independently, and report results accurately and honestly are skills that carry students beyond their academic career. In addition, the Statistics and Probability department adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See Spartan Life: Student Handbook and Resource Guide and/or the MSU Web site.)

Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, projects, and exams, without assistance from any source.

You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the www.allmsu.com Web site to complete any course work in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also the Academic Integrity webpage.)

Limits to Confidentiality

All conversations and course materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that University employees, including instructors and TAs, may not be able to maintain confidentiality when it conflicts with their responsibility to report certain issues to protect the health and safety of MSU community members and others. As the instructor, we must report the following information to other University offices (including the Department of Police and Public Safety) if you share it with me:

- Suspected child abuse/neglect, even if this maltreatment happened when you were a child,
- Allegations of sexual assault or sexual harassment when they involve MSU students, faculty, or staff, and
- Credible threats of harm to oneself or to others.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual. If you would like to talk about these events in a more confidential setting you are encouraged to make an appointment with the MSU Counseling Center.

Inform Your Instructor of Any Accommodations Needed

From the Resource Center for Persons with Disabilities (RCPD): Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or online. Once

your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form. Please present this form to the instructor at the start of the term and/or two weeks prior to the accommodation date (test, project, etc.). Requests received after this date may not be honored.

Commercialized Lecture Notes

Commercialization of lecture notes and university-provided course materials is not permitted in this course.

Disruptive Behavior

Article 2.III.B.4 of the Academic Freedom Report (AFR) for students at Michigan State University states: "The student's behavior in the classroom shall be conducive to the teaching and learning process for all concerned." Article 2.III.B.10 of the AFR states that "The student has a right to scholarly relationships with faculty based on mutual trust and civility." General Student Regulation 5.02 states: "No student shall . . . interfere with the functions and services of the University (for example, but not limited to, classes . . .) such that the function or service is obstructed or disrupted. Students whose conduct adversely affects the learning environment in this classroom may be subject to disciplinary action through the Student Judicial Affairs office.

Grief Absence Policy

The Statistics faculty and staff work hard to be sensitive and to accommodate the bereavement process of a student who has lost a family member or who is experiencing emotional distress from a similar tragedy so that the student is not academically disadvantaged in their class. The Statistics Department relies on the University's Grief Absence Policy to alert us of when it is appropriate to grant additional accommodations. According to the University's Grief Absence Policy it is the responsibility of the student to: a) notify the Associate Dean or designee of their college of the need for a grief absence in a timely manner, but no later than one week from the student's initial knowledge of the situation, b) provide appropriate verification of the grief absence as specified by the Associate Dean, and c) complete all missed work as determined in consultation with the instructor. It is the responsibility of the Associate Dean or designee to: a) determine with the student the expected period of absence – it is expected that some bereavement processes may be more extensive than others depending on individual circumstances, b) notify the faculty that the student will be absent, and c) receive verification of the authenticity of a grief absence request upon the student's return.
https://reg.msu.edu/ROInfo/Notices/GriefAbsence.aspx

Attendance

Students whose names do not appear on the official class list for this course must not attend this class. Students who fail to attend the first four class sessions or class by the fifth day of the semester, whichever occurs first, may be dropped from the course. **You must attend all zoom class webinars.**

Build Rapport

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the semester so that we can help you find a solution.

Changes to Syllabus

The instructor reserves the right to make changes to this syllabus as the semester progresses. Substantial changes will be announced on D2L.

Important Dates

June 29:	First Day of Classes
July 03:	Holiday – University closed
July 27:	Middle of Semester (Deadline to Drop With no Grade Reported)
August 13:	Last Day of Classes/**Final Examination**

Advice for Students: DON'T FALL BEHIND!! This class moves at a rapid pace.

- Come to class prepared.
  - Read the chapter before lecture.
  - Reread the chapter after lecture to see if you have follow up questions.
  - Do the suggested exercises and come to office hours or visit the Statistics Help Room prepared with questions.
- Form a study group.
- Learn how to use your calculator.
- Keep a notebook of vocabulary.
- Keep a list of reference examples.

Recommended Textbook Exercises

Chapter 1

1.2, 1.6-1.10, 1.17, 1.18, 1.19, 1.27, 1.29, 1.33

Chapter2

2.1 – 2.3, 2.5, 2.15, 2.20 – 2.23, 2.35, 2.37, 2.39, 2.41, 2.48 – 2.49, 2.55; 2.56 – 2.58, 2.63 – 2.64, 2.71 – 2.74, 2.78 – 2.79, 2.82, 2.90 – 2.91, 2.93 – 2.96, 2.106 – 2.108; 2.122 – 2.123

Chapter 3

3.1 – 3.7, 3.11, 3.13; 3.30 – 3.35, 3.37, 3.45; 3.49, 3.52 – 3.56, 3.63, 3.81 – 3.83;

Chapter 4

4.1 – 4.2, 4.11 – 4.16, 4.17 - 4.19, 4.21, 4.41, 4.43 – 4.45, 4.47, 4.49; 4.61 – 4.68, 4.71; 4.85, 4.89, 4.91, 4.93 – 4.94, 4.117 – 4.119, 4.133, 4.135, 4.137 – 4.138, 4.143

Chapter 5

5.1, 5.3; 5.36 – 5.59 (odd); 5.15, 5.17 – 5.21

Chapter 6

6.1 – 6.5; 6.23, 6.25 – 6.28, 6.41 – 6.43, 6.45, 6.47, 6.60 – 6.63

Chapter 7

7.1 – 7.8, 7.19 – 7.27, 7.28 – 7.31; 7.47 – 7.51, 7.64 – 7.65, 7.68, 7.69

Chapter Content and Learning Objectives

Chapter 1 Content

- The Science of Statistics
- Types of Statistical Applications in Business
- Fundamental Elements of Statistics
- Types of Data
- Collecting Data: Sampling and Related Issues
- Critical Thinking with Statistics

Chapter 1 Learning Objectives

- Introduce the field of statistics
- Demonstrate how statistics applies to business
- Introduce the language of statistics and the key elements of any statistical problem
- Differentiate between population and sample data
- Differentiate between descriptive and inferential statistics
- Identify the different types of data and data-collection methods
- Discover how critical thinking through statistics can help improve our quantitative literacy

- Given a described research question and/or results, be able to
    f. Identify the population of interest and the sample.
    g. Identify the experimental unit and the variables.
    h. Classify variables as categorical (ordinal/not ordinal) or numerical.
- Given the description of conducted research, be able to
    i. Classify the research as a designed experiment or an observational study.
    j. Identify explanatory and response variables.
- Identify and evaluate the sampling methods used
        i. Simple random sampling
        ii. Cluster sampling
        iii. Stratified sampling
        iv. Systematic sampling
        v. Convenience sampling
- Identify and explain types of bias that may be introduced based on the sampling method.
        vi. Nonresponse

vii. Response
viii. Selection

- Identify and explain possible confounding factors.
- Explain why observational studies do not allow the inference of causation.
- Given a sampling situation, be able to distinguish between a population, a parameter, a sample, and a statistic.

Chapter 2 Content

- Describing Qualitative Data
- Graphical Methods for Describing Quantitative Data
- Numerical Measures of Central Tendency
- Numerical Measures of Variability
- Using the Mean and Standard Deviation to Describe Data
- Numerical Measures of Relative Standing
- Methods for Detecting Outliers: Box Plots and *z*-scores
- Graphing Bivariate Relationships
- The Time Series Plot

Chapter 2 Learning Objectives

- Describe data using graphs
- Describe data using numerical measures
- Calculate basic descriptive statistics for small data sets using statistical functions of a calculator. (mean, median, variance, SD, quantiles, percentiles, range, IQR)
- Interpret data visualizations (dot plot, histogram, box plot, scatter plot, bar chart, mosaic plot).
- Estimate descriptive statistics from visualizations.
- Use histograms to identify the shape of a data distribution (symmetric, right/left skew).

Chapter 3 Content

- Events, Sample Spaces, and Probability
- Unions and Intersections
- Complementary Events
- The Additive Rule and Mutually Exclusive Events
- Conditional Probability
- The Multiplicative Rule and Independent Events
- Bayes's Rule Via Probability Tree Diagrams

Chapter 3 Learning Objectives

- Develop probability as a measure of uncertainty
- Introduce basic rules for finding probabilities
- Use probability as a measure of reliability for an inference
- Provide an advanced rule for finding probabilities

Chapter 4 Content

- Discrete and Continuous Random Variables
- Probability Distributions for Discrete Random Variables (Binomial, Poisson, and Hypergeometric Probability Distributions)
- Probability Distributions for Continuous Random Variables (Normal distribution and methods for assessing normality, Uniform and Exponential distributions)

Chapter 4 Learning Objectives

- Develop the notion of a random variable
- Learn that numerical data are observed values of either discrete or continuous random variables
- Study two important types of random variables and their probability models: the binomial and normal model
- Present some additional discrete and continuous random variables
- Given the average and standard deviation of a normally distributed data set, be able to calculate and interpret z-scores.
- Calculate the percentage of the data that falls within a specified range.
- Calculate the percentile rank for a given data point.

- Calculate the raw score for a given percentile rank.
- Given a real-world scenario, be able to identify the mean and standard deviation and use a normal curve approximation to calculate probabilities.
- Given a histogram and/or a QQ-plot of data, be able to evaluate the appropriateness of the normal model.

Chapter 5 Content

- The Concept of a Sampling Distribution
- Properties of Sampling Distributions: Unbiasedness and Minimum Variance
- The Sample Distribution of the Sample Mean and the Central Limit Theorem
- The Sampling Distribution of the Sample Proportion

Chapter 5 Learning Objectives

- Establish that a sample statistic is a random variable with a probability distribution
- Define a *sampling distribution* as the probability distribution of a sample statistic
- Give two important properties of sampling distributions
- Learn that the sampling distribution of both the sample mean and sample proportion tends to be approximately normal

Chapter 6 Content

- Identifying and Estimating the Target Parameter
- Confidence Interval for a Population Mean: Normal (z) Statistic
- Confidence Interval for a Population Mean: Student's t-Statistic
- Large-Sample Confidence Interval for a Population Proportion
- Determining the Sample Size

Chapter 6 Learning Objectives

- Estimate a population parameter (means, proportion, or variance) based on a large sample selected from the population
- Use the sampling distribution of a statistic to form a confidence interval for the population parameter
- Show how to select the proper sample size for estimating a population parameter
- Be able to correctly interpret a confidence interval, confidence level.

- Given a real-life estimation procedure, be able to construct and interpret confidence intervals for a single population proportion.
- Given a real-life estimation procedure for a single proportion and a confidence level, be able to calculate the sample size needed to obtain a given margin of error.
- Given a real-life estimation procedure, be able to construct and interpret confidence intervals for a single population mean.
- Given a real-life estimation procedure for a single mean and a confidence level, be able to calculate the sample size needed to obtain a given margin of error.

Chapter 7 Content

- The Elements of a Test of Hypothesis
- Formulating Hypotheses and Setting Up the Rejection Region
- Observed Significance Levels: *p*-Values
- Test of Hypothesis about a Population Mean: Normal (*z*) Statistic
- Test of Hypothesis about a Population Mean: Student's *t*-Statistic
- Large-Sample Test of Hypothesis about a Population Proportion
- Type I and Type II Errors
- Calculating Type I Error Probabilities
- Power of a test; Calculating the Power of a test

Chapter 7 Learning Objectives

- Introduce the concept of a *test of hypothesis*
- Provide a measure of reliability for the hypothesis test, called the *significance level* of the test
- Test a specific value of a population parameter (mean, proportion) called a *test of hypothesis*
- Given a real-life decision situation, identify when and be able to conduct a hypothesis test for
  a single population proportion

  by

  a. formulating a null and alternative hypothesis appropriate to the research question
  b. identifying and checking necessary conditions for the test

c. calculating a test statistic and p-value (including degrees of freedom, where applicable)
d. interpreting the p-value and evaluating whether the null model is consistent with observed sample results.

- Given a real-life decision situation, identify when and be able to conduct a hypothesis test for
  a single population mean

  by

  a. formulating a null and alternative hypothesis appropriate to the research question
  b. identifying and checking necessary conditions for the test
  c. calculating a test statistic and p-value (including degrees of freedom, where applicable)
  d. interpreting the p-value and evaluating whether the null model is consistent with observed sample results.
- Given a description of a hypothesis testing situation for means, be able to identify and contextually interpret Type I and Type II errors.
- Given a hypothesis test scenario for a single population mean, and a decision rule, be able to calculate the chance of making a Type I error and the power of a test for a given alternate mean value.