STAT 117 Introduction to Statistics

Section C1B | C2B: Remote Asynchronous; May 25, 2021 – July 13, 2021
Lab for Section C2B: Thursdays*, 1 PM – 5 PM Bbd Collaborate

Dr. Sarah L. Mabrouk

Phone: (508) 626 – 4785   **Email**: smabrouk@framingham.edu
Student Hours *via Zoom*: MTWRF 4:30 PM – 5:30 PM
Problem Sessions: Sundays 2 PM – 3:30 PM

Statistics are everywhere – in newspapers and magazines, both online and in print, on the TV news, on web sites, and in advertisements, online, on the radio, and on television. For example, "4 out of 5 dentists surveyed who recommend gum would recommend Trident to their patients who chew gum[i]" and "80% of Toyotas sold in the last 20 years are still on the road today[ii]" were regularly used in television advertisements. Same-sex marriage is frequently in the news: according to a Gallup poll, released May 14, 2019, 71% of Democrats, 81% of Independents who lean toward the Democratic Party, 56% of Independents who lean toward the Republican Party, and 37% of Republicans support same-sex marriage, and these percentages have, for the most part, increased over time according to Gallup polls released on May 19, 2015 [76% of Democrats, 64% of Independents, and 37% of Republicans] and May 8, 2021 [65% of Democrats, 57% of Independents, and 22% of Republicans][iii]. Some statistics may seem discouraging such as the Institute for College Access & Success's *Project on Student Debt[iv]* report that "More than six in ten (62%) college seniors who graduated from public and private nonprofit colleges in 2019 had student loan debt and they owed an average of $28,950." and "This is a lower share of students than the Class of 2018 (65%), and a very slight decline (less than 1%) in total debt from the 2018 average of $29,200." This ongoing study revealed that 65% of those who graduated in 2017 had student loan debt of $28,650, on average, and 68% of graduates in 2015 had an average student loan debt of $30,100.[v] However, other statistics may be encouraging such as the 573 seven-day average for the number of new COVID-19 cases reported in Massachusetts on May 21, 2021 in comparison with Massachusetts' highest seven-day average for new cases for 2021, 6,475, reported on January 12[vi] and the 25,315 seven-day average for new cases reported in the United States on May 21, 2021 in comparison to the United States' 2021 highest seven-day average for new cases, 252,767, reported on January 8.[vii] Yet other statistics may be surprising such as those reported by J. Clement on April 30, 2021 on Statista, which include that "Google Sites were ranked first among the most popular multiplatform web properties in the United States with [271.8] million visitors from mobile and desktop connections" in comparison with Facebook's 220.01 million unique users.[viii], or interesting such as Framingham State University's having a lower Fall 2019 acceptance rate, 74%[ix] than Worcester State University, Bridgewater State University, Fitchburg State University, Salem State University, Massachusetts Maritime Academy, and Westfield State University, with acceptance rates of 81%[x], 88%[xi], 88[xii], 86%[xiii], 91%[xiv], and 87%[xv], respectively, all of which have rolling admission, as reported in U.S. News and World Report's education rankings. Should we believe all the statistics that we hear and read? How are these figures obtained? How are surveys conducted and how reliable are the results? Throughout the course we will endeavor to answer these questions and many others as we explore *Statistics* – the collection, classification, organization, analysis, and interpretation of data and the mathematical study of the likelihood that events occur based on known information and inferred by samples.

Course Description and Learning Objectives

An introduction to the discipline of statistics, emphasizing both statistical thinking and its application to analyzing data. Topics include sampling, design of experiments, organizing and exploring data, probability distributions such as the normal distribution, sampling distributions, hypothesis testing and confidence intervals, correlation and regression. Students are expected to express results of statistical procedures in ordinary non-technical language. Real world applications of statistical topics are emphasized throughout the course.

General Education Domain II-A
   Analysis, Modeling, and Problem Solving: The study of analytical, quantitative, and/or formal reasoning methods involving the manipulation of numbers or other symbols to solve problems.

Learning Objectives:
   3 – Solve Problems Using Quantitative Thinking
   8 – Solve Problems Using Creative Thinking

Overall, you should gain the understanding that Statistics is more than numbers, tables, and graphs: Statistics involves analysis, explanation, and interpretation of a variety of types of information.

Overall, you should gain the understanding that Statistics is more than numbers, tables, and graphs: Statistics involves analysis, explanation, and interpretation of a variety of types of information. You should be able to argue for your explanations, analyses, and interpretations of data in the same way that you might argue for your interpretation of history or a poem: the emphasis is on the careful analysis of data in context. Any "correct answer" is simply a by-product of a well-crafted argument and need not be a numerical value, a variable expression or an equation: an "answer" includes all representations of data, both tabular and graphical, analysis, calculations, if any, and explanation (expressed using grammatically correct *complete* sentences of more than one word) necessary for addressing the actual question being examined. By the end of the course, you should understand and be able to discuss and apply *Statistics* in a variety of situations as well as be able to communicate your analysis of data using clear, comprehensible language that anyone can understand.

Since inquiry is useful in learning, questions related to our study of Statistics are provided below for each course module. Throughout our exploration of Statistics, our aim is to understand and answer these questions as we explore and apply the concepts and methods of Statistics.

♠ **Module 1: An Introduction to Statistics**
What *is* Statistics, and what *are* statistics? How are statistics used in various disciplines?

♥ **Module 2: Data Collection, Sampling, and Design of Experiments**
How does one gather or collect data? What makes a data set representative of the target subjects? Can data be "bad"?

♦ **Module 3: Organizing Data and Summarizing Data Graphically**
How can we present data in a manner so that it can be easily understood? What types of representations can be used or cannot be used with different types of data? Can a graphical representation for data be misleading?

♣ **Module 4: Summarizing Data Numerically**
How can we represent data numerically using as few numbers as possible to convey the information associated with the data? How can data be summarized numerically? When is it impossible to summarize data numerically?

♦ **Module 5: Probability and Random Variables**
What is probability? How does probability affect what we expect to have happen? What does it mean for a die or a game to be "fair"? How can probability be used to determine one's expected winnings for a game of chance, a raffle, or the lottery?

♥ **Module 6: The Normal and Binomial Distributions**
How is the standard normal distribution related to any normal distribution, and how do we use the standard normal distribution to determine probabilities? What distinguishes a binomial probability distribution from other probability distributions? What is the connection between a binomial probability distribution and the standard normal distribution?

♣ **Module 7: Inferential Statistics**
How is inferential statistics different from descriptive statistics? What is a confidence interval? What is meant by margin for error, and how is the margin for error related to the confidence interval? What is meant by hypothesis testing, and how is hypothesis testing used in experiments, studies, and surveys?

♠ **Module 8: Analyzing and Representing the Relationship Between Two Variables**
How do we determine if two variables are associated, and what types of relations are there between variables? How can we determine, analyze, and interpret a relation between two variables? How do we determine the strength of the association between two variables? What is meant by correlation?

Course Etiquette

You are expected *and* required to be respectful of the members of the class – all students *and* the instructor. Postings, emails or any communication that is insulting, offensive, or hostile will NOT be tolerated. All disrespectful, offensive, and/or hostile communication of any kind directed to another student or to the instructor will be reported to the Dean of Continuing Education. All associated information regarding and/or evidence of disrespectful, offensive, and/or hostile communication – including emails, texts, online posting, transcripts of online chats, and/or recordings of online sessions – will be forwarded to the Dean.

Online Discussions

Every member of the class is expected to participate in online discussions on the Blackboard. For each discussion forum, you are expected to create a thread, post a response to another student's thread, and reply to a response posted to your

thread. Through this thread-response-reply sequence of postings, you will discuss course topics online; you are welcome to post additional replies to continue the conversation.

- All postings must be grammatically correct, contain meaningful statistics terminology, and include the source information with proper *Chicago* style citation which must include an *active* hyperlink for any online reference. Sources for postings may not be repeated: only the first person to post a source reference will earn credit for its use.

- Replies must be posted so that each student receives a response from a *unique* student in the class, and responses must be posted in a timely manner so that the thread-response-reply sequence can be completed before the due date.

- No credit will be awarded for posts/responses/replies which parrot posts/responses/replies of other students: each post/response/reply must be unique.

- No credit will be awarded for frivolous responses/replies such as "yeah", "I agree", "I did it like that too", "that's good" or other comments which do not continue the dialog.

- No credit will be awarded for posts/responses/replies which do not employ proper terminology and, when appropriate, meaningful statistics notation.

Assignments

Assignments must be completed by the specified due date and time: the submission venues on Blackboard and MyStatLab will not be accessible after the due date. Late assignments will not be accepted.

- Written assignments will be accessed and submitted via the *Assignment Turn-In* page on Blackboard; written assignments will not be accepted via email. Written assignments must be scanned to PDF format and saved in a single file for submission. Those taking pictures of written work must use proper lighting when taking pictures and trim pictures to fit pages prior to saving in PDF format.

- MyStatLab assignments require no written work and are completed *entirely* online.

Assignments are NOT group work, and you are expected to submit your own analysis and work; copying the work of others is unacceptable.

Examinations

There will be two (2) examinations and a *comprehensive/cumulative* final examination. The dates for these examinations are listed below.

Exam I	. . . .	**Wednesday, June 9, 2021**
Exam II	. . . .	**Friday, June 25, 2021**
Final Examination	. . . .	**Tuesday, July 13, 2021**

Examinations are NOT group work. Copying the work of others and receiving help from others during examinations are unacceptable: you are expected to do and submit your own work/analysis. Those submitting analysis and/or work procured through group efforts or copying, whether in whole or in part, will earn zero (0) points for the *entire* examination.

Make-up Policy

Make-up examinations will NOT be administered, and neither examinations nor assignments will NOT be accepted after the due date/time. The grade for an examination or an assignment which is not submitted will be recorded as zero (0). **NOTE**: The last day to withdraw from a course *without* a W-grade is Thursday, May 27, 2021, and the last day to withdraw from a course *with* a W-grade is Tuesday, June 22, 2021.

Course Grade Percentages

Your course grade will be determined by your contributions to online discussions and your performance on assignments, examinations, and the *comprehensive/cumulative* final examination. These components of your course grade will be weighted as follows:

Online Discussions and Assignments	. . . .	**50 %**
Two (2) Examinations (15% each)	. . . .	**30 %**
Final Examination	. . . .	**20 %**

The weights for the graded components may be adjusted, if necessary, to reflect any changes in the workload during the course.

Academic Honesty

You are expected to read the sections of the Framingham State University [Undergraduate Catalog](#) that describe the *University Policy Regarding Academic Honesty* and the *Procedures for Handling Cases of Alleged Infractions of Academic Honesty*.

- Giving/receiving help on assignments and/or examinations on which you are expected to do your own work, altering work on graded materials in an attempt to obtain additional credit/points, taking an examination *for someone else* or having someone take an examination *for you,* doing an assignment *for someone else*, and having someone write/do an assignment for you are *examples* of infractions of the *University Policy on Academic Honesty*. Plagiarism, looking at or copying from another student's examination or assignment, allowing another student to look at or copy from *your* examination or assignment, not being truthful regarding why you did not take an examination, and not being truthful regarding the submission of an assignment are additional examples of infractions of the *University Policy on Academic Honesty*.

- All infractions of the *University Policy on Academic Honesty* will be reported to the Dean and the appropriate University procedures will be followed.

Communication

All course emails will be sent via *myFramingham* to the email address associated with each student on the class list.

- All email correspondence must be signed using your full name. The subject line for course communication is "Sᴛᴀᴛ **117 Intro Stats:**" followed by a meaningful – *not blank* – reason for the communication (quotation marks are *not* used in subject lines for email); do *NOT* put your name in the subject line.

- When you communicate by **phone**, clearly identify yourself using your full name and state the course for which you are registered *at the beginning* of the conversation or voice message. If you leave a **voice message**, speak *slowly* and *clearly* so that your name, course information, contact information, and message can be understood.

Required Textbook, Software, and Supplies

Fundamentals of Statistics: Informed Decisions Using Data, 5th Edition, by Michael Sullivan III, with [MyLab Statistics](#)

We will use the [MyLab Statistics](#) (i.e. MyStatLab) system throughout the course for textbook access, practice exercises, online assignments, and assorted resources; MyStatLab provides access to the textbook in eBook form.

- MyLab Statistics access code (ISBN-13: 9780135910634) should be purchased via [MyStatLab](#) or from [Pearson](#) (the publisher).

The software for the course is MS Office, and you need a scientific calculator which must, at least, have built-in combination, permutation, and factorial functions.

FSU Notice of Non-Discrimination and Diversity

Framingham State University is committed to a policy of [non-discrimination](#), [equal opportunity](#), [diversity](#), and affirmative action. The University is dedicated to providing educational, working, and living environments that value the diverse backgrounds of all people. Furthermore, the Massachusetts Civil Rights Act ("MCRA", M.G.L. c. 12, §§ 11H, 11I, 11J) protects the rights of all residents of and visitors to Massachusetts to be free from bias-motivated threats, intimidation, and coercion that interfere with their civil rights. The MCRA protects the right to attend school, live peacefully, and enjoy other basic rights.

FSU Commitment to Antiracism

At Framingham State University, faculty, staff, and students work together to sustain a learning, working, and living community free from hate, discrimination, harassment, and intolerance. We recognize the damaging effects of systemic racism – including policies, structures, and historic practices – on the experience and success of communities of color. Coming from different backgrounds and different levels of privilege, we can all affirm and engage in antiracist work.

Diversity of voices, and of minds, strengthens our ability to solve problems and to ask and answer questions about the world we share. As your instructor, I commit to upholding community values of inclusion, civility, accessibility, and mutual respect. I expect *all course members* to commit to creating a community that affirms and welcomes all persons from diverse backgrounds and experiences, and supports the realization of everyone's potential.

Disability/Access Services

"Framingham State University offers equal opportunities to all qualified students, including those with disabilities and impairments. The University is committed to making reasonable accommodations as are necessary to ensure that its programs and activities do not discriminate, or have the effect of discriminating, on the basis of disability. Academic Success serves students with learning and psychiatric disabilities as well as students with visual, mobility and hearing impairments."✣

"Academic Success works to provide reasonable accommodations to qualified students. The purpose of accommodations, modification, and/or auxiliary aids is to reduce or eliminate any disadvantages that may exist because of a disability. Framingham State University is not mandated by law to waive specific courses or academic requirements considered essential to a particular program or degree. Rather, the University is mandated to modify existing requirements on a case-by-case basis in order to ensure that individuals are not discriminated against on the basis of their disability."✣

- For further information, please visit the Disability/Access Services page on the Center for Academic Success and Achievement (CASA) section of the Framingham State University web site or contact LaDonna Bridges, Associate Dean of Academic Success, at 508-626-4906 or lbridges@framingham.edu, or Vikky Angelico, Disability/Access Services Coordinator, at 508-626-4627 or vangelico@framingham.edu.

Math Lab Emporium (Section C1B *only*)

As stated on Page 55 (file Page 58) of the 2020-2021 Framingham State University Undergraduate Catalog, "First-Year students will be exempt from Math Emporium Lab if they have met the following specific criteria based on their high school transcript: 2.7 or higher GPA, and have taken a math course during the senior year of high school." Students who are not exempt from the Math Emporium Lab may take the Math Placement test in order to place out of the Math Emporium Lab requirement. The placement testing code explanation provides information for whether or not the Math Emporium Lab is required for each mathematics placement code. Participation in the Math Emporium Lab enables students who do not meet the University's high school GPA requirement to enroll in a mathematics course.

The Math Emporium Lab consists of a weekly lab during which students meet to review prerequisite material related to course topics as a means of co-requisite redress in mathematics. During the weekly lab meetings, students review supporting material related to course topics and work on the corresponding computer-based modules. Completion of the modules with 90% mastery level is required; students may rework the questions in each module until the respective due-date to achieve the required mastery level.

The labs begin on Thursday, May 27, 2021; students will receive the specifics regarding the modules and the labs, in general, during the first lab meeting.

Final Comments

You are welcome and encouraged to speak with me if you have any concerns about the course. It may happen that course material seems clear when you examine examples provided in readings or videos but seems foreign when you try to work practice exercises on your own: try discussing and working on practice exercises with others, meeting with me during student hours, or participating in weekly problem sessions. I would be glad to work with you: I am here to help you to learn and **I _want_ to help you**. When you learn new material, it is normal to have questions: *questions are a natural part of the learning process*. Asking questions helps you to identify concepts and methods that necessitate further exploration and helps you to integrate new concepts, methods, and strategies into your knowledge base. Always remember that **there is no such thing as a stupid question**.

[i] http://www.tridentgum.com/textonly/news.php and https://www.nytimes.com/2009/07/28/business/media/28adco.html#:~:text=THE%20slogan%20for%20Trident%20in,saccharine%2Dsweetened%20gum%20in%201964.

[ii] http://www.toyota.com/corolla/awards.html and https://www.balisetoyotaofwarwick.com/compare-toyota-vs-other-brands-welcome-all-challengers/

[iii] https://www.pewforum.org/fact-sheet/changing-attitudes-on-gay-marriage/
http://www.gallup.com/poll/183272/record-high-americans-support-sex-marriage.aspx and http://www.gallup.com/poll/154529/Half-Americans-Support-Legal-Gay-Marriage.aspx

[iv] https://ticas.org/our-work/student-debt/

[v] https://ticas.org/content/pub/student-debt-and-class-2015

[vi] https://www.nytimes.com/interactive/2021/us/massachusetts-covid-cases.html

[vii] https://covid.cdc.gov/covid-data-tracker/#trends_dailytrendsdeaths

[viii] https://www.statista.com/statistics/271412/most-visited-us-web-properties-based-on-number-of-visitors/

[ix] https://www.usnews.com/best-colleges/framingham-state-2185

[x] https://www.usnews.com/best-colleges/worcester-state-2190

[xi] https://www.usnews.com/best-colleges/bridgewater-state-college-2183

[xii] https://www.usnews.com/best-colleges/fitchburg-state-2184

[xiii] https://www.usnews.com/best-colleges/salem-state-2188

[xiv] https://www.usnews.com/best-colleges/massachusetts-maritime-academy-2181

[xv] https://www.usnews.com/best-colleges/westfield-state-college-2189

✣ https://www.framingham.edu/academics/center-for-academic-success-and-achievement/disability-access-services/