

Guttman Community College

Math 103 006 – Statistics

Spring I 2022

Course Details

Math 103**Credits/Contact Hours:** 3 credits/ 4.5 hours**Instruction Mode:** Online**Instructor Name:** Dr. James Frazee**Office Hours:** There are not set office hours. If you want to meet send me an email with a couple of days and times that you are available. I will respond and set up a Collaborative Ultra session and we will meet on line.**Class Meetings:** This is a synchronous class. We meet Monday, Thursday and Friday at xxx. The Lecture Material is posted in each week along with test and homework assignments. It is your responsibility to review and complete the assignments each week by Sunday at 11:59pm.**Email:** James.Frazee@Guttman.cuny.edu**EBlackboard:**https://bbhosted.cuny.edu/webapps/blackboard/execute/modulepage/view?course_id= 2182294 1&cmptab_id= 3466300 1&editMode=true&mode=cpview

Catalogue Description and Overview

This course will provide students with an in-depth understanding of the fundamental concepts and computational methods of statistics. These concepts will be developed through the question of how to estimate an unknown quantity using sample data. Students will learn to incorporate the foundational concepts of mathematics with statistical analysis to describe and solve real-life problems and questions. Students will be taught to use estimation as well as to be precise and accurate. The course will also focus on teaching math study skills so students may assess and enhance their learning, their process and their results. Students will use statistical software, or Microsoft Excel to carry out a semester-long project involving data description and analysis. Students will work collaboratively and write using appropriate mathematical and non-mathematical language to successfully complete their projects.

The topics addressed include: displaying categorical data using tables, bar graphs, and circle graphs; drawing conclusions about categorical data; displaying quantitative data using dot plots, stem-and-leaf plots, histograms and box-and-whisker plots; describing data distributions using measures of center

(mode, mean, and median) and measures of spread (standard deviation, range and IQR); Displaying bivariate data using scatterplots; analyzing bivariate data using linear regression; elementary probability; normal probability distributions, sampling distributions; confidence intervals and hypothesis testing of the proportion and the mean.

Co-requisites or Pre-requisites: Demonstration of Elementary Algebra Proficiency

CUNY Pathways Category: Mathematics and Quantitative Reasoning

Course Learning Outcomes

Upon successful completion of the course, students will be able to:

1. Identify and apply the concepts of numeracy to solve statistical and mathematical problems both with and without technological assistance.
2. Represent and know how to read, collect, and organize data in written and graphical forms as well as interpret the data and make appropriate inferences from their readings.
3. Demonstrate an understanding of proportional relationships and how statistical inference is based in probability.
4. Design a project involving sample data from a variety of fields and appropriate statistical data analysis including formulating a question, selecting data, and recognizing which statistical model is most appropriate for different data types and to answer different questions.
5. Recognize and understand functions as a way of modeling correspondence between two variables and employ appropriate statistical language, correct written English, and illustrative graphical depictions to communicate the relationship.
6. Construct, compute and accurately interpret confidence intervals and hypothesis tests and determine if the data supports a hypothesis to a given level of significance.
7. Demonstrate the ability to work collaboratively and independently on assignments in and outside a classroom setting.
8. Estimate mathematical quantities and evaluate the accuracy of their answers and adjust their work when necessary.

Guttman Learning Outcomes

Upon successful completion of this course, you will be able to do the following:

Broad, Integrative Knowledge:

- a. Exhibits an understanding of how different disciplines create knowledge and approach problem-solving
- b. Understand how data and statistics are used in everyday tasks.

Intellectual Skills for Life-Long Learning

- c. Presents accurate mathematical calculations and operations and explains how they are used to solve problems and to interpret data.
- d. Utilizes both quantitative and qualitative data to explore and understand important issues.

- e. Locates, evaluates, and cites multiple information resources in projects, papers, and presentations.
- f. Demonstrates ability to use appropriate technologies, acquire new ones and to resolve technology problems to meet academic, professional, and personal goals
- g. Displays ability to assess own work and its relative value
- h. Displays ability to assess own work and its relative value

Required Texts

This is an Open Educational Resource course. All readings are Open Access and available on course page. No purchase of textbook required for this course.

Textbook Information:



Title	Introductory Statistics
Author	Barbara Illowsky; Susan Dean
ISBN	978-1-947172-05-0
Publisher	OpenStax
Publication Date	September 19, 2013
Binding	E-Book
Price	\$0.00

You can download the [textbook](https://openstax.org/details/books/introductory-statistics) for free at <https://openstax.org/details/books/introductory-statistics>

Required Materials

Access to the Internet, Blackboard, Microsoft Word, Microsoft Excel, and GeoGebra

Course Format

To succeed in an online class, you must be motivated and well organized. Course materials are available via Blackboard (“Bb”). Regular Internet access is essential for successful completion of the course. If you have concerns about access to technology or internet, please contact the Office of Student Engagement at Dean.OSE@guttman.cuny.edu so that they can assist you.

The typical class structure will consist of learning modules, which include:

- PowerPoint Lectures
- Readings
- Online Discussions
- Exams
- Homework
- Project

This is an entirely Web-based course. We have no face-to-face class meetings, and you will complete your work asynchronously - which simply means that you will be working on it at different times than your classmates. You can log into the class to do your work at whatever time is convenient for you to meet class deadlines.

It is important to understand that this is not a self-paced class or an independent study. You will have assigned deadlines, and work must be submitted on time. You may not save up your assignments to complete in the last weeks or days of the semester. One critical part of this class is regular interaction with other students and with me, your instructor. Each assignment sequence must be completed on schedule – you can't work ahead or get behind and be successful.

How to Be a Successful Online Student

Successful online learners:

1. Do not procrastinate; keep up to date.
2. Are open to sharing professional experiences online.
3. Enhance online discussions.
4. Have good written communication skills.
5. Use proactive communication.
6. Are self-motivated and self-disciplined.
7. Have a commitment to learning.
8. Have critical thinking and decision-making skills.
9. Believe quality learning can take place in an online environment.
10. Have good time management skills.

Course Communication

I will be communicating with you regarding grades and assignments. Your grades are posted in your blackboard. If you need to get in touch with me, the best method is via email. Generally, I will reply to emails within 24 hours and will provide feedback on assignments within 72 hours. You may also post questions pertaining to the course on the Blackboard Discussion Board. These questions will be answered within 24 hours.

If you are having trouble with this course or its material, you should contact me via email to discuss the issues. Provide me with a couple of days and time you are available to meet. I will then set up a Collaborative Ultra meeting.

Announcements will be posted to this course whenever necessary. If there is any other information that I think is important, I will send it to your email address you have in Blackboard. It is your responsibility to ensure that your email account works properly to receive email.

Below is how you check your email address in Blackboard:

- Access blackboard
- Click your name on the main Blackboard navigation panel on the left
- Review your email address. By default, Blackboard uses your college email address

Course Module Schedule

Each week will begin on a Monday and will end on a Sunday. You will complete one course module each week of the course.

To complete the module assignments, you will spend about 12 hours per week on the course materials and course-related activities using Blackboard, discussion boards, and reading and reflecting on the texts. A list of weekly responsibilities/deadlines follows:

- All Week: Read assigned text(s) for week and complete the content. Add to Discussions.
- Monday: Homework for week will be open
- Sunday 11:59pm: Homework for week is due
- Sunday 11:59pm: Test assigned to that week is due

Recording of Class Sessions

Students who participate in this class with their camera on or use a profile image are agreeing to have their video or image recorded solely for the purpose of creating a record for students enrolled in the class to refer to, including those enrolled students who are unable to attend live. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.

CUNY discourages students from recording the sessions unless such recording is part of a reasonable accommodation under the law or is not prohibited by campus policy.

Technology Requirements

You must have access to the Internet to view/hear course materials. No special software is required.

The video and PowerPoint presentations, links to articles, assignments, quizzes, and rubrics are located on the Blackboard site for the course. To participate in learning activities and complete assignments, you will need:

- Access to a working computer that has a current operating system with updates installed, plus speakers or headphones to hear lecture presentations (transcripts provided);
- Reliable Internet access and a Guttman email account;
- A current Internet browser that is compatible with Blackboard (Google Chrome is the recommended browser for Blackboard);
- Microsoft Word as your word processing program; and
- Reliable data storage for your work, such as a USB drive, Dropbox or Office365 OneDrive cloud storage.

Minimal Technical Skills Needed

Minimal technical skills are needed in this course. All work in this course must be completed and submitted online through Blackboard. Therefore, you must have consistent and reliable access to a computer and the Internet. The minimal technical skills you have include the ability to:

- Organize and save electronic files,
- Use Guttman email and attached files,
- Check email and Blackboard daily,
- Download and upload documents,
- Locate information with a browser,
- Use Blackboard,
- Use Geogebra (will learn in Week 1)
- Excel and Microsoft Word
- MyOpenMath (will learn in Week 1)

Technical Support

If you need access to a laptop, need support or have any technology, IT-related questions including about Blackboard, please contact the helpdesk and submit an online request at helpdesk@guttman.cuny.edu.

The Help Desk is open Monday – Friday from 8:00 AM – 6:00 PM. If you need Blackboard help outside of these hours, you can contact Blackboard support at: 646-664-2024 or go to <https://www.cuny.edu/about/administration/offices/cis/core-functions/cuny-blackboard/helpsupport/>

If you do not have regular, reliable access to internet, please contact Dean.ose@guttman.cuny.edu so they can assist you.

General Support

Learning in this format at this time is a challenge for all of us. Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, or needs mental health support and believes this may affect their performance in this course is urged to visit the Guttman [Essential Information for Personal Well Being](https://guttman.cuny.edu/news/coronavirus-updates/essential-information-for-personal-wellbeing/) website for support and to email the Dean of Students at Dean.OSE@guttman.cuny.edu. Please use these resources for support and let your instructor know if we can support in any other ways.

<https://guttman.cuny.edu/news/coronavirus-updates/essential-information-for-personal-wellbeing/>

Course Assignments and Assessment

Means of formative and summative assessments are four online tests, weekly online problem sets and a semester-long project to be written in phases, including but not restricted to:

- a. The formulation of a research question
 - b. the design of data collection and sampling methods
 - c. collecting data
 - d. descriptive analysis of the database population represented graphically, mathematically and in text
 - e. calculating confidence interval and performing and hypothesis test
1. **Classroom Discussions:** Each week discussion items will be under DISCUSSION, each discussion a different Forum. You are responsible to add your thoughts to the forum. It is also here where you will be giving information on the Project Phases and what is required. Check the Discussion area several times during the week. Time will be given at the end of each class to complete the Discussion for that week.
 2. **Online Homework:** Each week, there will have up to 4 online problem sets that are due. Once you start the homework assignment you can attempt each problem three times with 50% penalty on the third attempt. You can also reattempt questions using different versions without penalty. You will be allowed to access the assignments an unlimited number of times until the due date Sundays 11:59 PM. Once the deadline passes, you may work on the homework (if you have not already started it) for half-credit using your LatePasses. The late place gives you an additional 24 hours to complete the assignment. If the homework is due on Sunday and you wish to complete it on Tuesday, you will use 2 LatePasses (each LatePass is equal to 24 hours). It is therefore wise to complete the home on time.
 3. **Tests:** There will be five tests during the semester. The top 4 grades will use used in determining your cumulative test scores. These tests will be given online and will be completed individually.

Two tests (Tests 1 and 2) will be taken at home. You will have a 24-48-hour window to take each test. Once you begin the test, you will have 120 minutes to complete it. You can attempt each problem three times by reattempting different versions. If you CAN NOT take the test by the deadline, you need to contact your instructor at least 48 hours prior to the test date and provide a legitimate document reason for missing the deadline to request an extension. Otherwise, no make-up tests will be given. Test dates will be announced at least one week in advance in course content. Three tests (Tests 3, 4, and final) will be taken in class

4. **Project:** You will be doing a semester long Project. You will be collected data from the internet and then use the tools you learn this semester to analyze the data. The project will be done in 5 parts.

Part 1: Record Your Data (due Week 2)

Part 2: Characterize your neighborhoods, including Graphs (due Week 4)

Part 3: Discussion the relationship between rent and square footage (due week 7)

Part 4: Confidence Interval Analysis (due Week 9)

Final Paper: Final paper including parts 1-4, plus conclusions is due December 11.

General Assignment Information

- All coursework (assignments, exams, etc.) is secured in Blackboard.
- All assignments and exams are due by 11:59 PM (Eastern Daylight Time) on the day indicated on the course schedule (usually Sunday)
- All online discussions are found in Blackboard
- Complete rubrics will be provided in Blackboard

Grading

Discussion Participation	15%
Online Homework	25%
Four (4) Tests	40%
Semester-long project	20%
Total	100%

- ❖ There will be an **optional final exam** at the end of the semester that could replace the grade on one of the tests if you wish to improve your grade.

Overall grades will be based on the following scale

A+ 97% and up A Between 93% and 97% A- Between 90% and 93%

B+	Between 87% and 90%	B	Between 83% and 87%	B-	Between 80% and 83%
C+	Between 77% and 80%	C	Between 73% and 77%	C-	Between 73% and 70%
D+	Between 67% and 70%	D	Between 60% and 67%	NC or F	Below 60%

Incompletes are rarely given and will only be considered under the following circumstances: The student has completed the majority of the work for the course, the student is passing the course based on the work completed at the time the incomplete is requested, and there are extenuating circumstances that prohibit the completion of a small portion of the course.

College-wide Policies

Policy on Academic Honesty

Guttman Community College considers intellectual honesty to be the cornerstone of all academic and scholarly work. GCC views any form of academic dishonesty as a serious matter and requires all instructors to report every case of academic dishonesty to its Academic Integrity Officer, who keeps records of all cases. All work submitted or posted by students in this course must be their own. Submission of writing or ideas which are not the original work of the student, or which is not adequately referenced, is considered plagiarism. Unintentional plagiarism is still plagiarism, so if you have any question about whether to acknowledge a source, acknowledge it. And if you are still uncertain, be sure to ask. Refer to Article II of your Student Grievance Procedures for further details on academic honesty and Guttman's academic integrity procedures, at [Academic Policies URL link]. Penalties for academic dishonesty include academic sanctions, such as failing or otherwise reduced grades, and/or disciplinary sanctions, including suspension or expulsion.

Disability Support Services

In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Guttman Community College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical and/ or Learning) consult the Office of Accessibility located in Room 506 to secure necessary academic accommodations. For further information and assistance please call 646-313-8061 or speak to your Student Success Advocate or Career Strategist.

Critical Incident Management

Guttman expects students to respect the rights, privileges, and property of other people. Faculty are required to report disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment or inhibits students' ability to learn.

Viewpoint Tolerance

Some of the issues covered during the seminar may evoke strong emotions. Students, faculty, and staff must be able to disagree respectfully with others on topics that are personally very important to them.

Civility is essential to all scholarly discourse.

Professionalism is always required, but most especially with your interactions online. Because the university classroom is a place designed for the free exchange of ideas, we must show respect for one another in all circumstances. We will show respect for one another by exhibiting patience and courtesy

in our exchanges. Appropriate language and restraint from verbal attacks upon those whose perspectives differ from your own is a minimum requirement. Courtesy and kindness are the norm for those who participate in my class.

Our discussion board is a way for you to share your ideas and learning with your colleagues in this class. We do this as colleagues in learning, and the Discussion Board is meant to be a safe and respectful environment for us to conduct these discussions.

Some Netiquette Rules:

- Treat one another with respect. It will be expected that we will not attack one another personally for holding different opinions.
- Do not use all CAPITAL LETTERS in emails or discussion board postings. This is considered "shouting" and is seen as impolite or aggressive.
- Begin emails with a proper salutation (Examples: Dr. Name; Ms. Name; Hello Professor Name; Good afternoon, Mr. Name). Starting an email without a salutation or a simple "Hey" is not appropriate.
- When sending an email, please include a detailed subject line. Additionally, make sure you reference the course number (Ex. ENGL 287) in the message and sign the mail with your name.
- Use proper grammar, spelling, punctuation, and capitalization. Text messaging language is not acceptable.
- Re-Read, think, and edit your message before you click "Send/Submit/Post."

Please remember when posting to be respectful and courteous to your colleagues and limit your posts to discussions of this course and its assignments.

Expectations for Out-of-Class Time

For each one instructional credit hour in class, a Guttman student is expected to spend at least two hours out-of-class studying, reading, writing, researching, and working on projects, and preparing for tests. e.g., for a 3-credit course that meets for 3 hours each week, a student is expected to spend at least 6 hours outside of class time doing related course work. If a course provides more time in class than one hour for one credit, the additional time may offset out- of- class time expectations.

Starfish

Starfish is a communication tool for students, faculty, advisors, and many academic support and student service areas at Guttman. Instructors and advisors will use Starfish to provide you with feedback about your progress. Throughout the semester, you may receive emails or text messages regarding your academic performance and referrals to specific campus resources, such as peer mentors or tutors. You can use Starfish to "Raise Your Hand" and ask questions and make appointments with your advisor or with other service areas. To access Starfish log into my.guttman.cuny.edu and click the Starfish icon on the left side of the page. If you need help using Starfish, you can speak to your advisor. **NOTE:** For this class do not use Starfish as specified above. Email me directly.

Attendance Policy

Success in this course is dependent on your active participation throughout the course. You are expected to log into Blackboard several times a week and complete course assignments. Even if your work is completed, you still need to login to ensure that you have seen all announcements, etc. It is your responsibility to check updates related to the course.

Late Work/Make-up Policy

All assignments, quizzes, and tests are due by the deadline as posted on the course schedule.

Please plan accordingly and complete these assignments in advance of their deadlines to ensure any unanticipated circumstances do not result in a missed assignment. User error does not qualify you for any kind of makeup or retake opportunity.

Completing and submitting the assignments or exams responses by the due date is the sole responsibility of you. If you receive an incomplete score because of failure to submit the assignment or test by the due date, then your score for that assignment will be recorded as "zero."

You will be allowed to access the assignments an unlimited number of times until the due date/time and take tests one time each on or before the due date/time as indicated on the course calendar. If you are concerned about missing a deadline, you may want to do any of the following:

- Submit your assignment the day before the deadline; or
- Begin tests as soon as they are made available online.

Late tests will be accepted if the following three requirements are met:

- You have a written excuse from a doctor explaining why you cannot take the exam.
- You must contact me in advance of the exam's deadline to arrange for its completion.
- You must complete the exam within the week following its due date.

Late tests will be subject to the following penalty: 10% will be deducted from your grade for the first day late, and an additional 5% will be deducted on each subsequent day.

Be Careful: The clock on your computer may be different than the clock in Blackboard. If the clock is different by one second, you will be locked out of the assignment or quiz. Plan accordingly. I recommend that you submit your assignments, quizzes, and exams well before the deadline.

Tentative Calendar

Week 1: Housekeeping and Definitions

Study Objectives
<ul style="list-style-type: none">• Understand how to use GeoGebra

Study Objectives
<ul style="list-style-type: none">Start Collecting Data for your project

Week 2. Organizing Data

Study Objectives
<ul style="list-style-type: none">Know how to draw a random sample and understand that random sampling reduces bias.Create and interpret frequency, relative frequency, and cumulative frequency tables.Distinguish between observational studies and controlled experiments.Identify explanatory and response variables, treatments, control and treatment groups, and possible lurking variables.Understand what it means for an experiment to be blind or double blind.Know how to make histograms, dotplots, stemplots, bar graphs, and box plots and interpret the graphs in context.Calculate and interpret the measures of center of data: mean, median, and mode.Identify explanatory and response variables, treatments, control and treatment groups, and possible lurking variables.Understand what it means for an experiment to be blind or double blind.

Project: Part I: Due, Sunday, September 25

Week 3: Summarizing Data and Numeric Spread

Study Objectives
<ul style="list-style-type: none">Calculate and interpret the measures of center of data: mean, median, and mode.Calculate and interpret the measures of spread of data: variance, standard deviation, iIdentify the shape of data distribution.Know how measures of center and spread are related to the shape of a data distribution.Compare centers and spreads of distributions of samples informally.Write comparison statements between samples of data in context.Determine and interpret z-scores and compare values from different data sets using z-scores.

Test 1: Due, Sunday, October 2 (Taken at home)

Week 4: Skewed Data and BoxPlot

Study Objectives
<ul style="list-style-type: none">Using BoxPlot to show spread, Calculate IQR, and identify outliers.Use the 1.5-rule to identify outliers.

Study Objectives
<ul style="list-style-type: none">• Know how measures of center and spread are related to the shape of a data distribution.• Understand ScatterPlots

Project: Part 2: Due, Sunday, October 9

Week 5: Linear Regression and Correlation

Study Objectives
<ul style="list-style-type: none">• Discuss basic ideas of linear regression and correlation.• Describe and interpret strength, trend, and shape of scatterplots.• Calculate and interpret the correlation coefficient.• Explain the difference between correlation and causation.• Create and interpret a line of best fit and know how to use the regression line to predict values of the response variable.• Identify outliers and describe how outliers might affect correlation and the regression line.

Week 6: Probability Topics

Study Objectives
<ul style="list-style-type: none">• Understand that probability is a long-term relative frequency.• Know the difference between empirical and theoretical probabilities and how to calculate them.• Understand that The Law of Large Numbers enables us to use empirical probabilities to estimate theoretical probabilities.• Calculate probability from contingency tables.

Test 2: Due Sunday, October 23. Taken at home.

Week 7: Probability Distribution Functions and the Normal Distribution

Study Objectives
<ul style="list-style-type: none">• Recognize and understand discrete probability distribution functions, in general.• State the properties of a normal probability distribution.• Use the Empirical Rule to find probabilities related to normal distributions.

Study Objectives
<ul style="list-style-type: none">• Use technology to determine probabilities associated with normal distributions and interpret the probabilities.• Find and interpret z-scores related to normal distributions.

Project: Part 3 due October 30

Week 8: Standard Error

Study Objectives
<ul style="list-style-type: none">• Apply and interpret the central limit theorem for sample proportions.• Apply and interpret the central limit theorem for sample means.

Week 9: Confidence Intervals for one sample

Study Objectives
<ul style="list-style-type: none">• Find, interpret and use confidence intervals for a single population mean.• Find, interpret and use confidence intervals for a single population proportion.• Discriminate between problems applying the normal and the Student's t distributions.• Calculate the sample size required to estimate a population mean and a population proportion given a desired confidence level and margin of error.•

Test 3: Taken in class November 14

Week 10: Confidence Intervals for two samples

Study Objectives
<ul style="list-style-type: none">• Use confidence intervals to compare two population means.• Use confidence intervals to compare two population proportions.• Conduct and interpret hypothesis tests for a single population mean, σ unknown.• Conduct and interpret hypothesis tests for a single population proportion.•

Week 11: Hypothesis Testing

Study Objectives
<ul style="list-style-type: none">• Hypothesis Testing

Week 12: Hypothesis Testing with One Sample

Study Objectives

- Conduct and interpret hypothesis tests for a single population mean, σ unknown.
- Conduct and interpret hypothesis tests for a single population proportion.
- Understand the meaning of a p-value and how it is used.
- Two Population Means with unknown Standard Deviation
- Comparing Two Independent Population Proportions
- Difference between Type 1 and Type 2 Errors

Week 13: Hypothesis Testing with Two Samples

Study Objectives

- Comparing Two Independent Population Proportions
- Difference between Type 1 and Type 2 Errors

Test 4: Taken in class December 12

Final Project Paper Sunday, December 18