

# NEW YORK CITY COLLEGE OF TECHNOLOGY



## The City University of New York

DEPARTMENT:	Mathematics
COURSE:	MAT 1272
TITLE:	Statistics
DESCRIPTION:	An introduction to statistical methods and statistical inference. Topics include descriptive statistics, random variables, distributions, sampling estimation and inference, t-tests, Chi-square tests and correlation.
TEXT:	Introductory Statistics, 10 <sup>th</sup> edition, Prem S. Mann, John Wiley & Sons
CREDITS:	3
PREREQUISITES:	MAT 1190 or MAT 1190CO or higher. Not open to students who have completed MAT 1372 or MAT 2572.

Prepared by: Prof Johanna Ellner, Spring 2021

Updated by: Prof Ezra Halleck, Spring 2022

A. Testing; suggested examination schedule:

1. A one-hour exam at the completion of Lessons 1 - 5
2. A one-hour exam at the completion of Lessons 7 - 11
3. A one-hour exam at the completion of Lessons 13 - 18
4. A one-hour exam at the completions of Lessons 20 - 25
5. A one session Final Examination.

B. Requirement: A statistical calculator.

1. Instructions for the TI Graphing Calculator 83 or higher are provided in the textbook.

C. [Wiley Plus](#): an electronic version of the textbook is available.

1. Required for sections whose instructors opt to use the on-line homework assignments.
2. Cost for students is \$40 using promotion code CTC06. There is free access for 14 days.
3. When registering, students should use information and instructions provided by instructor.
4. For additional fee, students may acquire printed version (see instructor's handout for details).

D. Instructors may assign on-line homework assignments in Wiley Plus.

1. They contain exercises similar to the textbook problem sets.
2. Students are allowed two attempts at each question for full credit.
3. Further attempts reduce the grade for that problem by 30%.
4. Hints are provided along the way.
5. Solutions are provided after the due date has passed.

<b>Learning Outcomes</b>	<b>General Ed. Learning Outcomes</b>	<b>Flexible Core Learning Outcomes</b>
Define the basic terms and describe the differences between descriptive and inferential statistics.	Think creatively, critically, and develop quantitative and qualitative literacy.	Assess information from a variety of sources and articulate how meanings are created in communications and how experience is interpreted and conveyed.
Organize, construct and interpret tables using quantitative or qualitative data.	Ability to use appropriate graphical methods to draw accurate conclusions.	Interpret and draw inferences and conclusions from representations in graphs and tables using data pertaining to interdisciplinary fields.
Calculate and interpret statistics such as the mean, mode, median, standard deviation, quartiles and percentiles. Identify outliers.	Able to identify the context of a situation in order to select the appropriate representation of data.	Apply statistical analysis in various fields of study.
Use technology given a set of paired data to find the correlation coefficient, the regression lines and the predicted y-value given an x-value.	Ability to apply numerical and graphical methods to make appropriate predictions based on the findings.	Use appropriate technology to conduct research and to communicate the results.
Calculate the probability of and events. Explain what a random variable is and be able to do calculations with and provide real life examples modeled by the binomial, hypergeometric and normal distributions.	Apply mathematical methods to make decisions under conditions of uncertainty.	Gain an understanding of how the determination of an event's probability affects us all.
Apply the Central Limit Theorem to find the mean and standard deviation of a sampling distribution as well as its shape. Given an interval in the sampling distribution, determine its probability.	Apply mathematical methods to make decisions under conditions of uncertainty.	Gain an understanding of how the determination of an event's probability affects the population.
Conduct hypothesis testing using the critical value approach with the normal and chi-square distributions.	Be able to connect the concepts of probability to test hypotheses and under the estimated level of significance of each test.	Ability to explain information presented in mathematical forms and make judgements and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis

Lessons	Sections to Read	Homework
Lesson 1	<b>1.1</b> Statistics and Types of Statistics <b>1.2</b> Basic Terms <b>1.3</b> Types of Variables <b>1.5</b> Population vs. Sample	<b>Textbook (Practice) Homework</b> <b>1.1:</b> 1.1, 1.3 <b>1.2:</b> 1.5, 1.6 <b>1.3:</b> 1.7, 1.9 <b>1.5:</b> 1.13,1.19, 1.21, 1.25 <b>Wiley Plus (Graded) Homework CHAPTER 1</b>
Lesson 2	<b>2.1</b> Organizing and Graphing Qualitative Data <b>2.2</b> Organizing and Graphing Quantitative Data (Omit subsections 2.2.5 and 2.2.8.)	<b>Textbook (Practice) Homework</b> <b>2.1:</b> 2.1, 2.5, 2.7 b <b>2.2:</b> 2.9, 2.11, 2.17 a - d <b>Wiley Plus (Graded) Homework CHAPTER 2</b>
Lesson 3	<b>2.3</b> Stem-and-Leaf Displays <b>1.7</b> Summation Notation using a T1 84 <b>3.1</b> Measures of Central Tendency for Ungrouped Data <b>Learn how to use the calculator to find measures of central tendency</b>	<b>Textbook (Practice) Homework</b> <b>2.3:</b> 2.25, 2.27 <b>1.7:</b> 1.37, 1.39 <b>3.1:</b> 3.1, 3.9, 3.13 a, b, d, 3.19 <b>Wiley Plus (Graded) Homework CHAPTER 3: # 1 of 2</b>
Lesson 4	<b>3.2</b> Measures of Dispersion for Ungrouped Data (omit coefficient of variance) <b>Learn how to use the calculator to find standard deviation</b> <b>3.4</b> Use of Standard Deviation only section 3.4.2 <b>3.5</b> Measures of Position <b>3.6</b> Box-and-Whisker Plot; outliers, left and right skews	<b>Textbook (Practice) Homework</b> <b>3.2:</b> 3.29, 3.35 a, c, 3.39 a, c, 3.43  <b>3.4:</b> 3.59, 3.63 <b>3.5:</b> 3.69, 3.73 <b>3.6:</b> 3.75, 3.77 <b>Wiley Plus (Graded) Homework CHAPTER 3: # 2 of 2</b>
Lesson 5	<b>13.1</b> Simple Linear Regression Model (Omit 13.1.7) <b>13.4.</b> Linear Correlation – only calculating $r$ <b>13.4.1</b> <b>Learn how to use the calculator to find slope and y-int of regression line and the value of <math>r</math>. To find <math>r</math> go to CATALOG scroll down to DIAGNOSTIC and turn it ON (press enter twice).</b>	<b>Textbook (Practice) Homework</b> <b>13.1:</b> 13.2, 13.4, 13.11. 13.15, 13.19 a, b, 13.21 all parts <b>13.4:</b> 13.45 - 13.53 odd, 13.57 a, b <b>Wiley Plus (Graded) Homework CHAPTER 13</b>
Lesson 6	<b>Exam 1</b>	
Lesson 7	<b>4.1</b> Experiment, Outcomes and Sample Space <b>4.2</b> Calculating Probability	<b>Textbook (Practice) Homework</b> <b>4.1:</b> 4.1, 4.3, 4.7, 4.9 <b>4.2:</b> 4.15, 4.17 - 4.21 odd, 4.25, 4.27 <b>Wiley Plus (Graded) Homework CHAPTER 4: # 1 of 4</b>
Lesson 8	<b>4.3.</b> Different Probability Concepts <b>4.3.1</b> Marginal and Conditional Probabilities and Related <b>4.3.2</b> Mutually Exclusive Events <b>4.3.3</b> Independent vs. Dependent	<b>Textbook (Practice) Homework</b> <b>4.3:</b> 4.29 – 4.31 all, 4.33 a, b, 4.35 <b>Wiley Plus (Graded) Homework CHAPTER 4: # 2 of 4</b>
Lesson 9	<b>4.3. 4</b> Complementary Events <b>4.4.</b> Intersection of Events and the Multiplication Rule	<b>Textbook (Practice) Homework</b> <b>4.3:</b> 4.32, 4.33 (c), 4.39 b, 4.41 <b>4.4:</b> 4.43, 4.45, 4.49 a, 4.53-4.57 odd, 4.61 <b>Wiley Plus (Graded) Homework CHAPTER 4: # 3 of 4</b>
Lesson 10	<b>4.5</b> Union of Events and the Addition Rule <b>4.6.</b> Counting Rule, Factorials, Combinations, and Permutations <b>Learn how to use the calculator for combinations and permutations (MATH)</b>	<b>Textbook (Practice) Homework</b> <b>4.5:</b> 4.67, 4.71 (a), 4.73, 4.75, 4.77 <b>4.6:</b> 4.83, 4.87, 4.91, 4.93 odd <b>Wiley Plus (Graded) Homework CHAPTER 4: # 4 of 4</b>
Lesson 11	<b>5.5</b> The Hypergeometric Probability Distribution <b>5.1</b> Random Variables	<b>Textbook (Practice) Homework</b> <b>5.5:</b> 5.43 - 5.45 all <b>5.1:</b> 5.1 – 5.3 all <b>Wiley Plus (Graded) Homework CHAPTER 5: # 1 of 3</b>
Lesson 12	<b>Exam 2</b>	

Lesson 13	<p><b>5.2</b> Probability Distributions of a Discrete Random Variable</p> <p><b>5.3</b> Mean and Standard Deviation of a Discrete Random Variable</p> <p><b>Learn how to use the calculator to find mean and standard deviation</b></p>	<p><b>Textbook (Practice) Homework</b></p> <p><b>5.2:</b> 5.5 - 5.7 all, 5.11</p> <p><b>5.3:</b> 5.15 - 5.19 odd, 5.21, 5.23</p> <p><b>Wiley Plus (Graded) Homework CHAPTER 5: # 2 of 3</b></p>
Lesson 14	<p><b>5.4</b> The Binomial Probability Distribution</p> <p><b>Use formulas to find its mean and standard deviation</b></p> <p><b>Learn how to use the calculator to find binomial probabilities.</b></p>	<p><b>Textbook (Practice) Homework</b></p> <p><b>5.4:</b> 5.27, 5.29, 5.30, 5.33 - 5.37 odd</p> <p><b>Wiley Plus (Graded) Homework CHAPTER 5: # 3 of 3</b></p>
Lesson 15	<p><b>6.1</b> Continuous Probability Distribution and the Normal Probability Distribution</p> <p><b>Learn to use the calculator to find area under standard normal curve –end of Chapter 6.</b></p>	<p><b>Textbook (Practice) Homework</b></p> <p><b>6.1:</b> 6.1, 6.5 – 6.17 odd</p> <p><b>For 6.11-6.17: draw normal curve and shade the requested area(s).</b></p> <p><b>Wiley Plus (Graded) Homework CHAPTER 6: # 1 of 3</b></p>
Lesson 16	<p><b>6.2</b> Standardizing the Normal Distribution</p> <p><b>6.3</b> Applications of the Normal Distribution</p> <p><b>Learn to use the calculator with nonstandard normal distributions.</b></p>	<p><b>Textbook (Practice) Homework</b></p> <p><b>6.2:</b> 6.19 using the formula, and use the calculator for 6.21 – 6.23 odd</p> <p><b>6.3:</b> use the calculator for 6.25 – 6.31 odd</p> <p><b>Write answers in a complete sentence.</b></p> <p><b>Wiley Plus (Graded) Homework CHAPTER 6: # 2 of 3</b></p>
Lesson17	<p><b>6.4</b> Determining the of <math>z</math> and <math>x</math> Values when an Area Under the Normal Curve is Known</p> <p><b>Learn to use the calculator to find z-score given the area or percentage.</b></p>	<p><b>Textbook (Practice) Homework</b></p> <p><b>6.4:</b> use the calculator for: 6.37,</p> <p>For the following, your instructor may require you to use the calculator to find <math>z</math> score and then use the <math>z</math>-score, mean and standard deviation to find <math>x</math>:</p> <p>6.39 a-d, 6.40, 6.41</p> <p><b>Write answers in a complete sentence.</b></p> <p><b>Wiley Plus (Graded) Homework CHAPTER 6: # 3 of 3</b></p>
Lesson 18	<b>Exam 3</b>	
Lesson 19	<p><b>7.1</b> Sampling Distributions, Sampling Error, and Non-sampling Errors</p> <p><b>7.2</b> Mean and Standard Deviation of <math>\bar{x}</math></p> <p><b>7.3</b> Shape of the Sampling Distribution of <math>\bar{x}</math></p>	<p><b>Textbook (Practice) Homework:</b></p> <p><b>7.1:</b> 7.1 -7.3 all, 7.4 use the calculator for parts a – c.</p> <p><b>7.2:</b> 7.7, 7.11, 7.14, 7.15 use the formulas</p> <p><b>7.3:</b> 7.18,</p> <p><b>Wiley Plus (Graded) Homework CHAPTER 7: # 1 of 2</b></p>
Lesson 20	<p><b>7.3.1</b> (Continued) Central Limit Theorem, and Ex.7-3 &amp; Ex 7-4</p> <p><b>7.4</b> Applications of the Sampling Distribution of <math>\bar{x}</math></p>	<p><b>Textbook (Practice) Homework</b></p> <p><b>7.3:</b> 7.23- 7.27 odd</p> <p><b>7.4:</b> 7.31, 7.35, 7.39</p> <p><b>Write answers in a complete sentence.</b></p> <p><b>Wiley Plus (Graded) Homework CHAPTER 7: # 2 of 2</b></p>
Lesson 21	<b>9.1</b> Hypothesis Tests: An Introduction	<p><b>Textbook (Practice) Homework</b></p> <p><b>9.1:</b> 9.1 - 9.5 all, 9.7</p> <p><b>Wiley Plus (Graded) Homework CHAPTER 9: # 1 of 4</b></p>
Lesson 22	<p><b>9.2:</b> Hypothesis Tests about <math>\mu : \sigma</math> <u>Known</u></p> <p><b>Only section 9.2.2</b> Use critical value approach (Omit 9.21)</p>	<p><b>Textbook (Practice) Homework</b></p> <p><b>9.2:</b> 9.11, 9.12, 9.16, 9.19</p> <p>(Type 1 error is rejecting a true hypothesis), 9.21, 9.23</p> <p><b>Wiley Plus (Graded) Homework CHAPTER 9: # 2 of 4</b></p>
Lesson 23	<b>9.2:</b> Application using critical value approach	<p><b>Textbook (Practice) Homework</b></p> <p><b>Suggested: 9.2:</b> 9.25 (a), 9.27 (a), 9.29 (a), 9.31(a) [<math>p</math>-value]</p> <p><b>Alternative: 9.2:</b> 9.25 (b), 9.27 (b), 9.29 (b), 9.31(b) [crit.val]</p> <p>Instructors may require one or other approach or a mix. Regardless, students must produce a sketch to get full credit.</p> <p><b>Write answers in a complete sentence.</b></p> <p><b>Wiley Plus (Graded) Homework CHAPTER 9: # 3 of 4</b></p>

Lesson 24	<b>9.3:</b> Hypothesis Tests about $\mu : \sigma$ <u>Unknown</u> <b>Only section 9.3.2</b> Use critical value approach only (Omit 9.3.1)	<b>Textbook (Practice) Homework</b> <b>9.3:</b> 9.34, 9.35, 9.38, 9.39, 9.45(a)- only using t-test, 9.45(b), 9.47 use calculator. Instructors may require $p$ -val or crit region approach or a mix. Regardless, students must produce a sketch to get full credit. <b>Write answers in a complete sentence.</b> <b>Wiley Plus (Graded) Homework CHAPTER 9: # 4 of 4</b>
Lesson 25	<b>Exam 4</b>	
Lesson 26	<b>11.1</b> The Chi-Square Distribution <b>11.2</b> A Goodness-of-Fit Test	<b>Textbook (Practice) Homework</b> <b>11.1:</b> 11.1,11.2, 11.5a <b>11.2:</b> 11.8, 11.9 – 11.15 odd <b>Wiley Plus (Graded) Homework CHAPTER 11: #1 of 2</b>
Lesson 27	<b>11.3</b> A Test about Independence or Homogeneity	<b>Textbook (Practice) Homework</b> <b>11.3:</b> 11.21 - 11.25 odd <b>Wiley Plus (Graded) Homework CHAPTER 11: #2 of 2</b>
Lesson 28	Review	TI calculator needed
Lesson 29	Review	TI calculator needed
Lesson 30	<b>Final Examination</b>	TI calculator needed