

Hunter College of CUNY

Department of Mathematics and Statistics

SPRING 2016

SYLLABUS

STAT 113 ELEMENTARY PROBABILITY AND STATISTICS

Course Description: An Introduction to applied statistics and statistical computing. Hands-on data analysis. Graphical inference. The five number summary, box plots, scatterplots, normal probability plots. Elementary probability. Statistical estimation and hypothesis testing. Linear regression. Students are expected to analyze real data sets and write reports.

Expected Learning Outcomes:

At the end of the course, students in STAT 113 will be able to

- demonstrate an understanding of basic Probability and Statistics
 - Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
 - Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical/statistical problems.
 - Represent quantitative problems expressed in natural language in a suitable mathematical/statistical format
 - Effectively communicate quantitative analysis or solutions to mathematical and statistical problems in written or oral form.
 - Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation
 - Apply mathematical/statistical methods to problems in other fields of study.
- use a computer-based data-analysis package to analyze data and
- write reports on analyses using non-technical language

[Instructor's Name and Office Hours go here.]

Prerequisites: MATH 101 or equivalent; Pre or Co-Req ENGL 120.

There is NO textbook: **A computer access code** is required for the course. You must buy your code from the bookstore, from Shakespeare or online. Prices differ so you should do your own research to see which is the best for you. You will have temporary access for about two weeks in case you cannot purchase your code immediately. Your instructor will give you the details.

- Publisher: PEARSON C
- ISBN: [xxxxxxxxxxx](#)
- NOTE: At this time, the code is available only from the Hunter College bookstore, Shakespeare and the actual Pearson website. It is up to you to check prices and make the choice that is the most workable for you.

To find indicated videos, use the following procedure:

Go to the tab on the left that says **Multimedia Library**. Leave Chapter indicating **All Chapters** and Section indicating **All Sections**.

Videos marked AS: Check **ActivStats**. The videos are listed alphabetically. Be aware that your computer may have requirements for playing the videos that must be changed for you to see them. If you have technical difficulties seeing a video, contact the Student Help Desk; if that doesn't help, notify your instructor of the problem.

Videos marked STV: Check **Video**. Then scroll down to the bottom of the page where you will see Stat Talk Videos. They are listed alphabetically. Be aware that your computer may have requirements for playing the videos that must be changed for you to see them. If you have technical difficulties seeing a video, contact the Student Help Desk; if that doesn't help, notify your instructor of the problem.

Videos marked ANM: Check **Animation**. The videos are listed by chapter and name.

CLASS	You will be responsible for completing work prior to coming to class. The Chapters Listed below, together with any assigned homework and/or quiz must be done prior to coming to class. Check with your instructor about deadline times and dates.		RESOURCES	TESTING OBJECTIVES
1	PRETEST and INTRODUCTION TO THE COURSE			
2	Chapter 1	Data Collection		
	1.1	Introduction to the Practice of Statistics		
	1	Define statistics and statistical thinking	AS: Introduction to Statistics	1A1; 1A4
	2	Explain the process of statistics	WATCH THESE VIDEOS: ANM: 1. Types of Statistical Studies and 2. How Random is Random?	1A1, 1A3
	3	Distinguish between qualitative and quantitative variables	AS: Learn the definition of data; AS: Learn about Quantitative and Categorical (Qualitative) Variables.	1A2; 1A3
	4	Distinguish between discrete and continuous		1A5
	5	Determine the level of measurement of a variable	AS: Learn how variables are measured	1A4
	OTT*	Identify the cases or individuals (who?) and variables (what?) and the purpose (why?) in a description of a study.	AS: Learn About the three W's.	1A1

	OTT*	Distinguish between a statistics and a parameter.	Definitions are on page 5 in the e-text. Also see AS: Statistics and Parameters and AS: Notation for parameters; AS: Populations and Samples.	1A6	
		1.2	Observational Studies versus Designed Experiments		
		1	Distinguish between an observational study and an experiment.		NOT TESTED
			<i>Watch the StatCrunch Tutorial</i>	Find it in the Multimedia Library; Chapter: All chapters; Section: All sections; Check StatCrunch	
3&4	Chapter 2	Summarizing Data in Tables and Graphs			
		2.1	Organizing Qualitative Data		
		1	Organize qualitative data in tables	AS: Learn about categorical data.	2A1; 2A4
		2	Construct bar graphs	AS: Learn about Bar Charts	2A2
		3	Construct pie charts		2A3
		2.2	Organizing Quantitative Data: the Popular Displays		
		1	Organize discrete data in tables		2A8
		2	Construct histograms of discrete data		2A8
		3	Organize continuous data in tables		2A8
		4	Construct histograms of continuous data		2A8
		5	Draw stem-and-leaf plots	AS: Learn about stem and leaf displays.	2A7
		6	Draw dot plots		2A5

		7	Identify the shape of a distribution	AS: Attributes of Distribution Shape. AS: Practice Describing Distribution Shape.	2B1
		8	Draw time-series graphs		2A9
5	CH3	2.3	Graphical Misrepresentations of Data		
		1	Describe what can make a graph misleading or deceptive	ANM: Misleading Graphs	
			<i>Numerically Summarize Data</i>		
		3.1	Measures of Central Tendency	AS: Work with dotplots to compare centers and spreads.	
		1	Determine the arithmetic mean of a variable from raw data	STV: What is an average? AS: Formula for the mean	3A1
		2	Determine the median of a variable from raw data		3A1
		3	Explain what it means for a statistic to be resistant	STV: When should you use a mean and when should you use a median?.	3A2; 3A3
		4	Determine the mode of a variable from raw data	ANM: Mean, Median, and Mode	3A1
6			<i>Introduction to the Project:</i>		
			<i>Your instructor will use today to introduce you to the final project for the course. Part A is due by the 8th class meeting so you will want to attend and listen carefully.</i>		3B1
7		3.2	Measures of Dispersion		3B1
		1	Determine the range of a variable from raw data by hand and StatCrunch(SC)	ANM: Standard Deviation	3B1; 3B4

		2	Determine the standard deviation of a variable from raw data--small data sets by hand and others, SC	STV: Standard Deviation; AS: Formula for the standard deviation; STV: Standard Deviation (with a digression on Egg Roulette	3B1; 3B4
		3	Determine the variance of a variable from raw data--small data sets by hand and others, SC		3B1; 3B4
8		3.3	Measures of Position and Outliers		
		3	Determine and interpret quartiles.	STV: Introduction and Quartiles	2B3
		3.3	Measures of Position and Outliers		
		2	Interpret Percentiles		4A6
		4	Determine and interpret the InterQuartile Range		3B3
		5	Check a set of data for outliers		2A6; 2B2
		3.4	The Five-Number Summary and Boxplots		
		1	Compute the five-number summary	AS: Learn About the 5-Number summary	2A6; 3B2
2	Draw and interpret boxplots	AS: Boxplots; AS: Comparing groups numerically	2A6; 2B1; 3B3; 4B3		
9	CH4		<i>The Normal Probability Distribtuion</i>		
		4.1	Properties of the Normal Distribution	AS: Work with normal models	
		1	Use the uniform probability distribution		4A1; 4A2; 4A5; 4A8
		2	Graph a normal curve		4A1; 4A2; 4A5; 4A8

		3	State the properties of the normal curve	AS: Learn About the Properties of Normal Models	4A1; 4A2; 4A5; 4A8
		4	Explain the role of area in the normal density function		4A1; 4A2; 4A5; 4A8
10&11		3.2	Measures of Dispersion		
		4	Use the Empirical rule to describe data that are bell shaped	AS: Learn about Density Curves	4A1; 4A2
		5	Use Chebyshev's inequality to describe any set of data		4A3; 4A4
		3.3	Measures of Position and Outliers		
		1	Determine and interpret z-scores		4A5
		4.2	Applications of the Normal Distribution	STV: The Normal Distribution	
		1	Find and interpret the area under a normal curve		4B1
		2	Find the value of a normal random variable	AS: Learn to use the Normal Table	4B2; 4B4
		4.3	Assessing Normality		
		1	Use normal probability plots to assess normality	STV: Not the Normal Distribution	4A7
12	REVIEW/WORK	Review for Exam; Work on Project.			
13	EXAM 1				
14	CH5	<i>Describing the Relation between Two Variables</i>			
		5.1	Scatter Diagrams and Correlation		
		1	Draw and interpret scatter diagrams	AS: Graph Points on a scatterplot.	5A1; 5A2; 5A3; 6A1

		2	Describe the properties of the linear correlation coefficient	AS: Correlation [Students: Don't worry about the formula; we will do all this on the computer]; AS: Learn about Direction, Form and Strength	5B1
		3	Compute and interpret the linear correlation coefficient	ANM: Linear Correlation Coefficient	5B2
		4	Determine whether a linear relation exists between two variables		5B3
		5	Explain the difference between correlation and causation	STV: Confounding	5B4
		5.2	Least-Squares Regression		6A2
15&16		1	Find the least-squares regression line and use the line to make predictions	AS: Predict Manatee Kills using Least Squares Regression	6B1
		2	Interpret the slope and the y-intercept of the least-squares regression line	AS: Construct a plot with a given slope	6A3; 6B1
		3	Compute the sum of squared residuals		6A4; 6B1
		5.3	The Coefficient of Determination		
		1	Compute and interpret the coefficient of determination		6B3
17	CH6		<i>Probability</i>		
		6.1	Probability Rules	ANM: Frequency Tables and Probability Distributions	
		1	Apply the rules of probability		7A1; 7A2
		2	Compute and interpret probabilities using the empirical method	ANM Probability of Winning a Lottery	7A1

		3	Compute and interpret probabilities using the classical method		7A1
		6.2	The Addition Rule and Complements		
		1	Use the Addition Rule for Disjointed Events		7A4
		2	Use the General Addition Rule		7A4
		3	Compute the probability of an event using the Complement Rule		7A4;7B1
		6.3	Independence and the Multiplication Rule		
		1	Identify independent events		7A3
		2	Use the Multiplication Rule for independent events		7A3
		3	Compute at-least probabilities		7A3
		6.4	Conditional Probability and the General Multiplication Rule	AS: Relationship between Birthweight and Smoking	7B1
			For this section, you are learning how to use the contingency tables to compute marginal and conditional probabilities.		
19			REVIEW FOR TEST 2; DISCUSS PARTS D AND E OF PROJECT		
20			TEST 2		
	CH 7		<i>Sampling Distributions</i>	ANM: Standard Deviation of the Sample Means	
		7.1	Distribution of a Sample Mean	STV: Sampling and Parameters	
21		1	Describe the distribution of the sample mean: normal population	AS: Population and Samples	8A1
		2	Describe the distribution of the sample mean: nonnormal population	AS: Whether population size matters	8A2; 8A3

22&23	CH8	<i>Estimating the Value of a Parameter</i>			
		8.2	Estimating a Population Mean		
		1	Determine t-values	AS: Build t-intervals with the t-table	9A1; 9B1; 9C1
		2	State properties of Student's t-distribution	AS: Gain intuition for t-based intervals	9A1; 9B1; 9C1
		3	Construct and interpret a confidence interval for the population mean	ANM: Confidence Intervals	9A1; 9B1; 9C1
		4	Find the sample size needed for estimating a population mean within a given margin of error	AS: Population and Samples; AS: Whether population size matters	9A1; 9B1; 9C1
24&25	CH9	<i>Hypothesis Tests Regarding a Parameter</i>			
		9.1	The Language of Hypothesis Testing		
		1	Determine the null and alternative hypotheses	AS: Terminology of Significance Testing; ANM Identifying Ho and H1	10A1
		2	Explain Type I and Type II errors	AS: Type I and Type II Errors	10A1; 10C3
		3	State conclusions to hypothesis tests	AS: A result is not a conclusion; ANM: Wording of Final Conclusion	10A1; 10C2
		9.3	Hypothesis Tests for a Population Mean		
		1	Test hypotheses about a mean	ANM: Procedure for Finding p-Values; STV: Why use a p-value anyway?; STV: What does a p-value mean?; STV: A p-value is about the probability of the data, not of the hypothesis.	10B1; 10C1; 10C2

	2	Understand the difference between statistical significance and practical significance	STV: What is statistical significance?; STV: Basketball players won't accept the null hypothesis; STV: The Fish and Chip Guy won't accept the null hypothesis.	10B2; 10C2
26		REVIEW FOR TEST 3; WORK ON PROJECT		
27		TEST 3		
28		FINAL EXAM REVIEW; WORK ON PROJECT		

FINAL Exam: The final exam will be on the day set aside for uniform finals if you are in a weekday or evening class. This usually takes place on the Reading Day which is the day after the last day of classes. Saturday classes have their exams according to the school calendar. Online and hybrid classes have their exams with the uniform final group. College Now classes have their final exam on the last day of classes. Information will be given to you in writing by your instructor as soon as the schedule is set.

There is a Data Analysis Project that every student must complete in order to pass the course or to receive a NC. You will work on the project throughout the semester.

STAT113 STUDENTS:

1. It is your responsibility to have a working email address and to have access to Blackboard. See staff in 109 HN if there is a problem. It is your responsibility to check your email regularly for messages from your instructor.
2. Scientific or 4-function calculators ONLY will be allowed on all exams but are not necessary for the course. Exams are open notes. You may not use a book during any tests or the final exam; you may not use a computer during the final exam. You may not use copies of old exams during any tests of the final exam.
3. On the in-class exams, you may only use aspects of the computer that are allowed by your instructor. The instructor is able to see what is on your computer screen from his/her terminal in the front of the room.
4. Class assignments should be submitted electronically to your instructor in the Dolciani Mathematics Learning Center; you should also save them in your folder. You are responsible for the class assignments whether or not you attended that class. HOMEWORK is required; the homework is in MyStatLab and is available to you from your course website www.hunter.cuny.mylabsplus.com.
5. If you must miss an exam, contact your instructor and provide documentation for your absence. If your instructor believes your absence was unavoidable, you may take a make-up exam by appointment in the DMLC. You must also have the coordinator's approval. Speak with your instructor about this.
6. You will not pass the course if you do not turn in a final project. You will receive specific details about your final project later.
7. Your Data Analysis project will have a specific due date. You will **not** be eligible for a CR/NC grade unless your project is complete and turned in ON TIME.
8. Students wishing to request IN grades must put their request in writing. You must have a C average at the time of the request.
9. If you want to request a CR/NC grade, you must have completed ALL the requirements for the course. This includes meeting the scheduled dates for submission of the project. You must also have an average of at least 40 in the course. This is a departmental rule.
10. If you stop attending and do not complete the course work you will receive a grade of WU.

GRADING DETAILS	POINTS
PreTest	1
MSL Homework and Quizzes	10
Classwork/Participation	5
Semester Test 1	12
Test 2	15
Test 3	18
Final Data Analysis Project	20
Final Exam	20
Posttest	1
Extra point for taking Pre and posttests	<u>1</u>
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NOTE: There is no penalty for not taking pre and posttests and attitude surveys. There are bonuses for taking them.

If you are caught cheating on an exam or a project, you will fail the course and disciplinary charges may be brought against you. This means you may not use someone else's data, graphs or words in your project. Your work must be your own. If you have taken the course previously, you may NOT use the project you turned in to the previous course instructor. Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

IF YOU HAVE A DISABILITY THAT YOU BELIEVE REQUIRES SPECIAL ACCOMODATIONS: In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter 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 AccessABILITY located in Room E1214B to secure necessary academic accommodations. For further information and assistance please call (212- 772- 4857)/TTY (212- 650- 3230).