

Statistical Reasoning
Math 120-01, Fall 2016

Professor:	Eric Ruggieri
Office:	325 Swords Hall
Phone:	(508) 793-2400
E-mail:	eruggier@holycross.edu
Office Hours:	Monday 2:00PM-4:00PM, Wednesday 12:00PM – 2:00PM, Thursday 1:00PM – 4:00PM, and by appointment
Class Hours:	Monday, Wednesday, Friday 10:00-10:50AM
Room:	302 Swords Hall
Textbook:	<i>Understandable Statistics, 11th Edition</i> by Brase and Brase
Course Website:	Moodle
Prerequisites:	None

Welcome to Math 120: Statistical Reasoning! This is an introductory statistics course geared towards a general audience which fulfills the Natural Science common area requirement at the College.

We live in a data driven world. This course will help you to better understand how the statistics we encounter in our daily lives are obtained and provide you with the necessary tools to make intelligent decisions about the statistical conclusions that you are faced with. At the end of this course, you will be able to:

- 1) Describe data sets using both graphical tools and numbers, such as mean and standard deviation
- 2) Understand the variation inherent to a sample from a population
- 3) Make inferences about a variable in question (confidence intervals and hypothesis tests)
- 4) Design a statistical experiment and clearly describe the results

The course calendar that follows will briefly describe each of the topics that we will cover. The class will, for the most part, follow the textbook, *Understandable Statistics*, by Brase and Brase. Although not enforced, class attendance and reading of the designated sections of the text prior to class are highly recommended. The textbook provides a very good explanation of the topics that we are going to cover this semester and therefore will help your understanding of these topics. The grade you earn will be a reflection of how well you have mastered the material in this course and will be based upon the following five criteria:

1) Homework Assignments (15%): Weekly homework assignments will be given. I truly believe that the only way to learn statistics (and mathematics, in general) is to *do* statistics. A majority of the problems will be drawn from the book, although I may incorporate some of my own questions. You are permitted (an encouraged!) to work with your classmates on these assignments. However, each student is expected to turn in their own set of solutions. To receive full credit, solutions to homework assignments

should be clearly written on the provided worksheet and have all relevant work organized in the proper sequence. Homework assignments will be due on Mondays by 4PM. Late homework assignments will not receive full credit and homework more than one day late will receive no credit.

2) Quizzes (15%): A (brief) quiz will be given on Friday of each week during the first 15 minutes of class. The quiz questions will be drawn only from the material covered in the homework assignment submitted that week (i.e. quizzes are not cumulative) and will resemble those seen on homework assignments. If necessary, quiz make-ups must be complete by the time quizzes are handed back at the start of class the following Monday unless prior arrangements have been made.

3) Data Analysis Project (10%): You and a partner will be asked to design an experiment or survey, gather the data in a manner appropriate for statistical analysis and inference, summarize your data using the descriptive and inferential tools from the course, and draw appropriate conclusions based on the results of your analysis. The first part of the project will be a one-page description of the question (project) you wish to address and the plan for gathering the data, which will be due on **Friday October 7th**. The final written report will be due on **Friday December 9th** [the final day of class]. Additional project details will be forthcoming.

4) Two In-Class Exams (40%): There will be two exams during the semester. The exams will not be exercises in memorization, but will try to be written so that students with a solid understanding of the concepts should have little, if any, trouble. The first exam is tentatively set for **Friday September 30th**, the second for **Wednesday November 16th**. There are no make-ups allowed on exams.

5) Final Exam (20%): The date and time of the comprehensive final examination will be announced by the Registrar's office. I will let you know once this information becomes available. There are no make-ups or other alterations to the timing of the final exam allowed.

Should you ever need help with this course, there are three great options available to you:

- 1) Ask a classmate for help
- 2) Stop by my office during office hours or make an appointment to see me
- 3) Meet with the TA for our course. Hours and location forthcoming.

Additional Course Policies:

Academic Integrity: A student found cheating on an examination or assisting others in the course of an examination will receive an F for the course and will be subject to further sanctions. Copying another student's assignment is considered cheating and will result in receiving a 0 for that assignment. As previously stated, you are encouraged to work together on homework assignments. However, each student is expected to write out their own solutions. For more information, please see the College's Academic Honesty Policy, which can be found at: <http://catalog.holycross.edu/node/1381#AHP>. Additionally, the Mathematics and Computer Science department has its own Academic Integrity policy that I will pass out for all of you to read and sign.

Information for Students with Disabilities: Holy Cross is committed to providing all students with equal access to learning. If you think you have a disability requiring accommodations, you must register with the Office of Disability Services, located in room 215A of the Hogan Campus Center (x3693) in order to receive reasonable accommodations in this course. Once a disability is officially documented at Holy Cross by this office, and with your permission, instructors will receive letters outlining the reasonable accommodations they are required to make. Once I have received this letter, you and I should meet to coordinate the way these will be implemented in this course. For more information, go to <http://www.holycross.edu/health-wellness-and-access/office-disability-services>

Cell Phones: Texting and/or playing games during class will hinder your ability to learn. As a deterrent, the first offense will be a warning, the second will result in dismissal from class for the day, and the third will result in a much longer suspension from class. In short, turn your cell phones off during class.

Calculators: A calculator is highly recommended but not required. You do not need to go out and buy a graphing calculator - a basic calculator will be sufficient for our course. Using your cell phone as a calculator is not permitted since phones are meant as communication devices (See Academic Integrity and Cell Phone policies above).

Grading: Final grades will be given according to the following percentage cutoffs. These cutoffs, although fairly strict, can be lowered (according to class performance), but not raised, no matter how well the class performs

Final Grade	Percentage
A	93 to 100
A-	90 to <93
B+	87 to <90
B	83 to <87
B-	80 to <83
C+	77 to <80
C	73 to <77
C-	70 to < 73
D+	67 to <70
D	63 to <67
F	0 to <63

Course Calendar (subject to change)

Date	Section	Topic	Notes
Aug 31 – W		Syllabus; Types of Data	
Sept 2 – F	1.2	Sampling Strategies	
Sept 5 – M	1.3	Design of Experiments	
Sept 7 – W	2.1-2.3	Visualizing Data: Bar Charts, Pie Charts, etc.	
Sept 9 – F	2.1-2.3	Visualizing Data, cont.	
Sept 12 – M	3.1-3.2	Measures of Center and Variation	HMWK #1 Due
Sept 14 – W	3.2	Measures of Variation; Chebyshev’s Thm.	
Sept 16 – F	3.3	Percentiles and Quartiles, Five # Summary, Boxplots	Quiz #1
Sept 19 – M	3.3	The IQR Rule	HMWK #2 Due
	4.1	Sample Spaces and Events; Set Theory	

Date	Section	Topic	Notes
Sept 21 – W	4.2	Probability Properties; Addition Rule; Independence of Events	
Sept 23 – F	4.2-4.3	Multiplication Rule, Conditional Probability	Quiz #2
Sept 26 – M	Appendix	Law of Total Probability and Bayes Rule	HMWK #3 Due
Sept 28– W	5.1	Random Variables; Discrete Probability Distributions; Expected Values	
Sept 30 – F		Exam #1 – Chapters 1-4	
Oct 3 – M	5.1	Mean and Variance of a RV	
Oct 5 – W	4.3	Counting Techniques	
Oct 7 – F	5.2-5.3	The Binomial Distribution	Project Proposal Due
Oct 8 – Oct 16		No Class! Fall Break!	
Oct 17 – M	5.4	Geometric and Poisson Distributions	HMWK #4 Due
Oct 19 – W	6.1	Probability Distributions for Continuous RV: The Uniform and Normal Distributions	
Oct 21 – F	6.1-6.3	The Normal Distribution	Quiz #4
Oct 24 – M	6.2-6.3	The Normal Distribution, cont.	HMWK #5 Due
Oct 26 – W	6.6	Normal Approx. to the Binomial	
Oct 28 – F	6.4	Sampling Distributions	Quiz #5
Oct 31 – M	6.4	Sampling Distributions, cont.	HMWK #6 Due
Nov 2 – W	6.5	The Central Limit Theorem	
Nov 4 – F	7.1	Point and Interval Estimation	Quiz #6
Nov 7 – M	7.3	Estimating a Population Proportion	HMWK #7 Due
Nov 9 – W	7.1	Estimating a Population Mean, σ known	
Nov 11 – F	7.2	Estimating a Population Mean, σ unknown	Quiz #7
Nov 14 – M	8.1	Introduction to Hypothesis Testing	
Nov 16 – W		Exam #2 – Chapters 5-7	
Nov 18 – F	8.2	Testing a Claim: Mean	
Nov 21 – M	8.3	Testing a Claim: Proportions	
Nov 23 – 27		No Class! Thanksgiving Break!	
Nov 28 – M	7.4, 8.5	Testing a Claim: Two Means	HMWK #8 Due
Nov 30 – W	7.4, 8.5	Testing a Claim: Two Means Testing a Claim: Two Proportions	Rough Draft of Project
Dec 2 – F	7.4, 8.5	Testing a Claim: Two Proportions	Quiz #8
Dec 5 – M	8.4	Matched Pairs Analysis	HMWK #9 Due
Dec 7 – W	9.1	Correlation and Regression	
Dec 9 – F	9.2	Simple Linear Regression	Last Day of Class Project Due

Final Exam: TBA [on or before Saturday December 17th]