

Elementary Statistics

Math 150-89

Spring 2012

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Virtual Office Hours: By appointment

Description: A non-calculus based introduction to descriptive and inferential statistics. Topics include measures of central tendency and measures of dispersion, correlation and regression, statistical inference, and analysis of variance.

Credits: 3 credits

Satisfies General Education Requirement: Mathematics/Quantitative Reasoning

Prerequisites: MAT040 or MAT 110 and ENL020 or satisfactory basic skills assessment score.

Access Statement: Students with disabilities who believe they need accommodations in this course must contact the O'Neill Center (South 222) at (508) 362-2131 ext. 4337 or 4317 as soon as possible.

Required Materials: MyMathLab/MyStatLab Standalone Student Access Kit, Pearson: ISBN: 0-321-19991-x This access kit is available at the college bookstore or for purchase directly at www.coursecompass.com. The code that is included with this access kit will allow you to access the e-book and the assignments for the course.

After you obtain the access kit, go to www.coursecompass.com and use the Course ID to access the course. You will be able to access the course one week before the beginning of the semester.

Textbook (Optional): If you would prefer to have a hard copy of the textbook instead of reading the ebook online, you can purchase the textbook bundled with an access code: Fundamentals of Statistics with MyMathLab/MyStatLab Student Access Code Card, Michael Sullivan, 3rd edition, Pearson, 2011. ISBN: 978-0321744418.

Technology Requirements: A TI-83 or TI-84 graphing calculator is required. Calculators are available to rent from the CCCC library.

Teaching Procedures: This is an online course, so you will be expected to work through the course by taking advantage of several tools intended to help you understand and learn the concepts. These tools include: lecture notes, videos, online guided exercises, and online assignments.

Online Homework: There will be approximately 10-20 homework problems for each section of the textbook. You will get three attempts to answer a question before MyStatLab will mark it incorrect. You can attempt a similar exercise for full credit. Therefore it is possible to receive 100% on each homework assignment. There are a number of learning aids available to help you solve the problems.

Any problems attempted after the due date will be marked down 25% per day late.

Here is a suggested approach to online homework based on feedback from previous students:

1. Obtain a three-ring binder and loose-leaf paper for notes.
2. Read the lecture notes and the ebook and write down the most important concepts.
3. Watch the videos associated with each section. Videos are located in the ebook and on my website at profsullivan.com. Take notes as you watch each video.
4. As you work through online homework problems, write down your steps in a clear manner. You may print each homework assignment if you prefer to work offline.
5. Ask questions by posting to the discussion board, sending an e-mail to the instructor, or attending office hours.
6. If you feel that you are getting overwhelmed, make an appointment for face-to-face tutoring at the Tutoring Center or visit the Math Lab.

Online Tests: There will be four online tests. Online tests will be untimed and do not need to be completed in one sitting. The learning aids (e.g. Help Me Solve This and View an Example) that are available for the homework problems will not be available for each test. On some test problems, there will be an option to show your work. Although you will not be required to show your work, if you do, there may be the possibility of partial credit on questions that are marked incorrect. Partial credit will not be awarded under any circumstances if you do not show your work.

Online tests will be available one week before they are due.

Data Analysis Projects: There will be two data analysis assignments that will be due when you take your midterm and final exams. You will be required to use StatCrunch, a web-based data analysis tool that is included with MyStatLab.

Discussion Board: Class participation is an important expectation of this course. To receive credit for class participation, you must post a minimum of three times per week (Sunday through Saturday) over three different days. If you post multiple times on one day, you will receive credit for only one post. (For example, if you post three times on Saturday evening, you will receive credit for one post.)

Here are the ways to get credit for the discussion board:

1. Respond to the instructor's weekly question (At least one post is required.) This should be posted in the weekly "Discussion Question" forum.

These postings must be substantive to receive credit. A substantive posting is one that is relevant to the class and demonstrates clear evidence of critical and reflective thinking. Substantive postings are expected to be at least three sentences long and contain correct grammar and punctuation. Saying "I agree", "Me too", or "Thanks" are not considered substantive postings.

2. **Post a problem that you're having difficulty solving, or help a fellow student with his or her question. This should be posted in the weekly "General Questions" forum.**

These posts must include complete mostly-accurate mathematical steps such as solving a problem with all work shown along with explanations to justify the steps. No credit will be given if you do not show your steps. For example, if your post says, "How do you do number 5?", you will not receive any credit.

When posting to the discussion board, you should be respectful of other students. Also, although your opinions are welcomed, please avoid long rants that are not related to the topic. Inappropriate, irrelevant, or excessive postings (more than 15 per week) will be removed and will result in a mandatory meeting with the instructor to discuss appropriate use of the discussion board.

Exams: There will be two proctored exams (the midterm and the final exam) which will be administered by CCC's Distance Learning Center located in the Lyndon P. Lorusso Technology Building. You must take the midterm exam on either Thursday, March 22 or Friday, March 23. You must take the final exam on either Thursday, May 10 or Friday, May 11.

You may schedule an appointment to take your exam by calling Cathy Fraser at (508) 362-2131 x4923. Please note that you will be required to show a photo ID upon taking the midterm and final exams.

If you are unable to come to campus, arrangements for proctored examinations at other distance learning centers can be made. Possible local alternatives include the distance learning testing centers at Bridgewater State University and UMass-Boston. Alternative proctoring arrangements must be in place at least two weeks before the exam is scheduled.

You will be allowed to use one 8 1/2 x 11 sheet of notes (both sides) on the midterm and final exams.

Grading: Your course grade will be based on the following:

Online Homework: 15%

Online Tests: 20%

Discussion Board: 5%

Data Analysis Projects: 10%

Midterm/Final Exams: 50%

above 92	A	80-82	B-	67-69	D+
90-92	A-	77-79	C+	63-66	D
87-89	B+	73-76	C	60-62	D-
83-86	B	70-72	C-	below 60	F

For course grades, I follow standard rounding procedures. Any percentage that ends in 0.5 or higher will be rounded up to the next percentage point. For example, if a student has a 79.5%, then that percentage will round up to an 80% or a "B-." That also means, however, if the number is 0.4 or less, then that percentage will be rounded down to the lower percentage point. For example, if a student earns a 79.4%, then that would round down to 79% or a "C+." As with any grading system, the cutoff points for the letter grades are arbitrary. That means that someone will always be close to getting the next letter grade.

The grade you earn is the grade you will receive in this course. Grades are not negotiable. You will not be allowed to make up work, substitute alternative assignments, or submit extra assignments in order to improve your grade during the semester or after the semester ends.

Extra Credit: There is no extra credit available in this class.

Incompletes: Grades of incomplete are given only in situations when extenuating circumstances such as an illness or a family emergency prevent a student from taking the final exam or fulfilling a specific requirement in the course. The grade of "I" cannot be used to give students additional time to complete course assignments in order to raise their grade.

Getting Help: There are several ways to get help during the semester.

1. You can contact me by email. I will answer all email within 24 hours (and usually much sooner).
2. You can post to the discussion board.
3. You can visit the Math Lab or the Tutoring Center on the CCCC campus. These places provide tutoring at no cost.
4. You may arrange for e-tutoring at CCCC.

Course Outline

The following is a **tentative** course outline. Changes may become necessary.

Chapter 1: Data Collection

- 1.1 Introduction to the Practice of Statistics
- 1.2 Observational Studies versus Designed Experiments
- 1.3 Simple Random Sampling
- 1.4 Other Effective Sampling Methods

Chapter 2: Organizing and Summarizing Data

- 2.1 Organizing Qualitative Data
- 2.2 Organizing Quantitative Data: The Popular Displays

Chapter 3: Numerically Summarizing Data

- 3.1 Measures of Central Tendency
- 3.2 Measures of Dispersion
- 3.4 Measures of Position and Outliers
- 3.5 The Five-Number Summary and Boxplots

Online Test 1: Chapters 1-3: Due February 16

Chapter 5: Probability

- 5.1 Probability Rules
- 5.2 The Addition Rule and Complements
- 5.3 Independence and the Multiplication Rule
- 5.5 Counting Techniques (*Combinations Only*)

Chapter 6: Discrete Probability Distributions

- 6.1 Discrete Random Variables
- 6.2 The Binomial Probability Distribution

Chapter 7: The Normal Probability Distribution

- 7.1 Properties of the Normal Distribution
- 7.2 The Standard Normal Distribution
- 7.3 Applications of the Normal Distribution

Online Test 2: Chapters 5-7: Due March 10

Midterm Exam: Chapters 1-3, 5-7: Thursday, March 22 or Friday, March 23
Data Analysis Project 1

Chapter 8: Sampling Distributions

- 8.1 Distribution of the Sample Mean
- 8.2 Distribution of the Sample Proportion

Chapter 9: Estimating the Value of a Parameter Using Confidence Intervals

- 9.1 Constructing Confidence Intervals for a Population Mean When the Population Standard Deviation is Known
- 9.2 Constructing Confidence Intervals for a Population Mean When the Population Standard Deviation is Unknown
- 9.3 Confidence Intervals for a Population Proportion

Online Test 3: Chapters 8 – 9: Due April 17

Chapter 10: Hypothesis Tests Regarding a Parameter

- 10.1 The Language of Hypothesis Testing
- 10.2 Hypothesis Tests for a Population Mean—Population Standard Deviation Known
- 10.3 Hypothesis Tests for a Population Mean—Population Standard Deviation Unknown
- 10.4 Hypothesis Tests for a Population Proportion

Online Test 4: Chapter 10: Due May 1

Chapter 4: Describing the Relation between Two Variables

- 4.1 Scatter Diagrams and Correlation
- 4.2 Least-Squares Regression

Final Exam: Chapters 4, 8-10: Thursday, May 10 or Friday, May 11
Data Analysis Project 2

Student Learning Outcomes

Upon successful completion of this course, students are able to do the following:

- Define common statistical terms.
- Identify level of measurement, unusual values, and rare events.
- Distinguish between good statistical practices and improper uses of statistics.
- Organize and display data by constructing frequency distributions, histograms, stem and leaf plots, boxplots, and scattergrams.
- Calculate measures of central tendency and dispersion.
- Compare individual values by using z-scores, quartiles, and percentiles.
- Apply Chebyshev's Theorem and Empirical Rule.
- Calculate probabilities using relative frequency method and classical method.
- Find the probability of compound events using probability rules, counting rules including permutations and combinations, and simulations.
- Identify and calculate means, standard deviation, percents, probabilities, and scores using tables, formulas, and technologies for discrete and continuous random variables including binomial, Poisson, normal distribution, and the sampling distributions of sample means and proportions.
- Calculate and interpret expected values, point estimates, and confidence intervals.
- Conduct and interpret hypotheses tests including test for a single mean or proportion, test for two means or proportions, 2χ test of independence and goodness of fit test, and regression.
- Find and interpret the least squares regression line and the coefficient of determination.
- Analyze errors and required sample sizes for testing.
- Solve application problems
- Identify sources of bias in surveys and experiments.
- Determine the population to which the results of statistical inference can be extended, if any, based on how the data were collected.
- Determine when a cause and effect inference can be drawn from an association, based on how the data were collected (e.g., the design of the study)
- Obtain or generate data.
- Graph the data as a first step in analyzing data, and know when that's enough to answer the question of interest.
- Interpret numerical summaries and graphical displays of data - both to answer questions and to check conditions (in order to use statistical procedures correctly).
- Make appropriate use of statistical inference.
- Communicate the results of a statistical analysis through written explanations.
- Use a sampling distribution and apply it to making statistical inferences based on samples of data, including the idea of standard error
- Determine statistical significance using significance levels and p-values.
- Determine confidence intervals, including the interpretation of confidence level and margin of error.
- Interpret statistical results in context.
- Critique news stories and journal articles that include statistical information, including identifying what's missing in the presentation and the flaws in the studies or methods used to generate the information.
- Use a graphing calculator to complete statistics problems.
- Use appropriate technology such as tutoring web sites online and MyStatLab
- Present appropriate statistical analyses in class.