MIS-64005-201380: STATISTICS FOR MANAGEMENT

Murali Shanker
E-mail: mshanker@kent.edu
Phone: (330) 672-1165
Office Hours: MW: 10:30 - Noon, and by appointment
Office Location A401 BSA
Class Times MW: 9:15 - 10:30 a.m., A325 BSA
Web: http://learn.kent.edu

Course Description

This course is an introduction to concepts in statistical methods and their applications to real-world problems. This course will examine both the theoretical and practical side of the different methods. Students will be given ample opportunities to apply the techniques to different problems. The goal of the course is for students to understand fundamental statistical concepts and methods, and their applications.

Course Requirements

Last day to withdraw from a course: Sunday, 3 November 2013

Prerequisites: Graduate Standing. Students attending the course who do not have the proper prerequisite risk being deregistered from the class.

Enrollment: Students have responsibility to ensure they are properly enrolled in classes. You are advised to review your official class schedule (using Student Tools on FlashLine) during the first two weeks of the semester to ensure you are properly enrolled in this class and section. Should you find an error in your class schedule, you have until Sunday, 8 September 2013 to correct the error. If registration errors are not corrected by this date and you continue to attend and participate in classes for which you are not officially enrolled, you are advised now that you **will not** receive a grade at the conclusion of the semester for any class in which you are not properly registered.

Students With Disabilities: University policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit http://www.kent.edu/sas/index.cfm for more information on registration procedures).

Learning Outcomes

1. Examine distributions.
    a. Summarize and describe the distribution of a categorical variable in context.
    b. Generate and interpret several different graphical displays of the distribution of a quantitative variable (histogram, stemplot, boxplot).
    c. Summarize and describe the distribution of a quantitative variable in context: a) describe the overall pattern, b) describe striking deviations from the pattern.
    d. Relate measures of center and spread to the shape of the distribution, and choose the appropriate measures in different contexts.

     e.   Compare and contrast distributions (of quantitative data) from two or more groups, and produce a brief summary, interpreting your findings in context.

     f.   Apply the standard deviation rule to the special case of distributions having the "normal" shape.

  2. Explore relationships between variables using graphical and numerical measures.

.   Classify a data analysis situation (involving two variables) according to the "role-type classification," and state the appropriate display and/or numerical measures that should be used in order to summarize the data.

a.   Compare and contrast distributions (of quantitative data) from two or more groups, and produce a brief summary, interpreting your findings in context.

b.   Produce a two-way table, and interpret the information stored in it about the association between two categorical variables by comparing conditional percentages.

c.   Graphically display the relationship between two quantitative variables and describe: a) the overall pattern, and b) striking deviations from the pattern.

d.   Interpret the value of the correlation coefficient, and be aware of its limitations as a numerical measure of the association between two quantitative variables.

e.   In the special case of linear relationship, use the least squares regression line as a summary of the overall pattern, and use it to make predictions.

f.   Recognize the distinction between association and causation, and identify potential lurking variables for explaining an observed relationship.

g.   Recognize and explain the phenomenon of Simpson's Paradox as it relates to interpreting the relationship between two variables.

  3. Sampling. Examine methods of drawing samples from populations

.   Identify the sampling method used in a study and discuss its implications and potential limitations.

a.   Critically evaluate the reliability and validity of results published in mainstream media.

  4. Probability: Concepts and properties

  5. Random Variables: Discrete and continuous. Using distributions of random variables to compute probabilities.

  6. Sampling distributions of the sample mean and proportion.

.   Identify and distinguish between a parameter and a statistic.

a.   Explain the concepts of sampling variability and sampling distribution.

b.   Apply the sampling distribution of the sample proportion (when appropriate). In particular, be able to identify unusual samples from a given population.

c.   Apply the sampling distribution of the sample mean as summarized by the Central Limit Theorem (when appropriate). In particular, be able to identify unusual samples from a given population.

  7. Estimation: Determine point and interval estimates for the population mean and proportion

.   Determine point estimates in simple cases, and make the connection between the sampling distribution of a statistic, and its properties as a point estimator.

a.   Explain what a confidence interval represents and determine how changes in sample size and confidence level affect the precision of the confidence interval.

b.   Find confidence intervals for the population mean and the population proportion (when certain conditions are met), and perform sample size calculations.

  8. Hypothesis Testing: Logic and process. Conduct tests for the population mean and proportion. Understand relationship between hypothesis testing and estimation.

.   Explain the logic behind and the process of hypotheses testing. In particular, explain what the p-value is and how it is used to draw conclusions.

a.   In a given context, specify the null and alternative hypotheses for the population proportion and mean.

b.   Carry out hypothesis testing for the population proportion and mean (when appropriate), and draw conclusions in context.

c.   Apply the concepts of: sample size, statistical significance vs. practical importance, and the relationship between hypothesis testing and confidence intervals.

d.   Determine the likelihood of making type I and type II errors, and explain how to reduce them, in context.

9. Comparing Two Means and Two Proportions

.   Compare two population means when the samples are independent.

a.   Compare two population means when the data are paired.

b.   Compare two population proportions using large independent samples.

10. Statistical Inferences for Population Variances

11. Designing Studies. Distinguish between multiple studies, and learn details about each study design.

.   Identify the design of a study (controlled experiment vs. observational study) and other features of the study design (randomized, blind etc.).

a.   Explain how the study design impacts the types of conclusions that can be drawn.

b.   Determine how the features of a survey impact the collected data and the accuracy of the data.

12. Simple Linear Regression

13. Multiple Regression and Model Building

Course Outline

Date	Chapters
August 26	Introduction
August 28	Chapter 2: Descriptive Statistics
September 4	Chapter 2: Descriptive Statistics
September 9	Chapter 3: Descriptive Statistics
September 11	Chapter 4: Probability
September 16	Chapter 4: Probability
September 18	Chapters 5 and 6: Random Variables
September 23	Chapters 5 and 6: Random Variables
September 25	Chapter 7: Sampling Distributions
September 30	Chapter 7: Sampling Distributions
October 2	Chapter 8: Confidence Intervals
October 7	Chapter 8: Confidence Intervals
October 9	Chapter 9: Hypothesis Testing
October 14	Chapter 9: Hypothesis Testing
October 16	Chapter 10: Comparing Two Means and Two Proportions
October 21	Chapter 10: Comparing Two Means and Two Proportions
October 23	Chapter 11: Statistical Inferences for Population Variances
October 28	Chapter 12: Experimental Design and ANOVA

October 30	Chapter 12: Experimental Design and ANOVA
November 4	Chapter 12: Experimental Design and ANOVA
November 6	Chapter 13: Chi-Square Tests
November 13	Chapter 14: Simple Linear Regression
November 18	Chapter 14: Simple Linear Regression
November 20	Chapter 15: Multiple Linear Regression
November 25	Chapter 15: Multiple Linear Regression
December 2	Class Presentation
December 4	Class Presentation

Class Materials

Statistical Software: This course makes extensive use of statistical software. I would recommend ***JMP*** statistical software. JMP is free to all Kent State Students, reads Excel files, and has been developed for statistical analysis and data exploration.

To get a copy of JMP, please go to Statistical Software. University licensing provides this software at no cost to you. Please access the extensive help menu system in JMP to learn how to use it. Also, the multimedia lectures show you how to use JMP for various topics. A complimentary webcast on learning JMP is being offered. Click here to register.

Book. We will be using the following custom book *Statistics for Management*, Bowerman (Create), Student Value Edition, includes Connect Plus Access, for Course Number M&IS 64005. ISBN-13 9781121935259 / 1121935257. Purchase this at the Campus Bookstore.

Equivalently, you can buy the 7th Edition of the above book with Connect Plus Access, or just get the electronic edition with Connect +. You will need the Connect code to register and access your quizzes and e-book.

Lectures: As with any new subject, comprehension improves with greater exposure. To facilitate this, I will provide online access to every class lecture in multimedia format. These multimedia lectures will duplicate each lecture that I give in class, including the overhead presentation, any notations that I make on these slides, and the audio explaining the slides.

Assessments

There will eight (8) Quizzes, two (2) Assignments, and a Project.

Quizzes: There will be eight quizzes, and will consist of multiple choice, true or false, fill-in-the blanks, short-answer, matching, and calculation type questions, and may require the use of statistical software. All quizzes will be taken online, and are best taken using a standards-compliant web browser like Mozilla Firefox. You will have 60 minutes to complete each quiz, and all quizzes can be taken anytime during their availability. Once a quiz has been started, you need to complete it in one sitting. You will have one attempt to take each quiz, and

results from the quizzes will be known once the quiz closes for all students. All quizzes are open-book, open notes, but cheating in any form will result in a failing grade for the course. As such, while you are allowed to use books and notes for the quizzes, it is cheating if you ask other students to help you while taking the tests.

Quiz available and due dates are given in the Assessment Schedule section of this syllabus. While the number of questions, and points, for each quiz may vary, the total maximum points from all quizzes is 100.

Assignments: There are two individual assignments for this class. Each assignment is worth 50 points. Each assignment will require the statistical analysis of a dataset and a short report of your findings. You will have one week to complete each assignment. The maximum points from Assignments is 100.

Project: The project will require the application of statistical methods to a real-world problem. The project will consist of several milestones, including a final report and class presentation. The maximum points for the project is 100.

Grades

The following table summarizes the maximum points that can be earned in the course.

Description	Maximum Points
Quizzes	100
Assignments	100
Project	100
Course	300

Your grade will depend on your total score, and the grading scale given below.

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum Score Required	282	270	261	252	240	231	222	210	201	192

- Scores below 192 results in an "F".
- None of the assessments can be made up. Missed assessments will receive a score of zero.
- Please print and keep a copy of your assessments. That will be the proof I will require if there are any disputes about scores.
- You will have **one week** after receiving the score for each assessment to request any corrections.

Extra Credit

Statistical literacy, reasoning, and thinking are important aspects of this course. By statistical literacy we refer to the basic understanding of the language and tools of statistics. Statistical reasoning refers to the way students understand and make sense of statistical information, and finally, statistical thinking refers to why and how statistical investigations are carried out. By taking this course, I am hoping that your statistical literacy, reasoning, and thinking will improve. To determine this, you will have the opportunity to take two surveys. Details are given below, but please note the following:

- While these surveys are scored, the score **does not** affect your grade for the course.
- You will be given 8 extra credit points for taking each survey. To ensure accuracy of credit, please do the following on the survey:
  - When requested to enter your name on the survey, enter your Kent UserID instead. For example, a person named *Snares Gentoo*, with Kent UserID sgentoo2, will enter *sgentoo2*, rather than Snares Gentoo. So, please put your **username** on the survey **exactly** as you have on your Kent account. That way, I can give credit to the right student.
- Each survey takes between 30 and 40 minutes.

Pretest Survey: Please take this survey before you start work on your course. This is a pretest survey, that is, it measures your knowledge before you learn the concepts in this course. To access this survey:

- Go to https://apps3.cehd.umn.edu/artist/user/scale_select.html
- Enter **BSU2781HRY** for Access Code.

This survey is available only between **09:00 on 08-26-2013 and 23:55 on 09-02-2013 (EASTERN).**

Posttest Survey: Please take this survey after you have completed all assessments. This is a posttest survey. To access this survey:

1. Go to https://apps3.cehd.umn.edu/artist/user/scale_select.html
2. Enter **TOE3434CZD** for Access Code

This survey is available only between **09:00 on 12-02-2013 and 23:55 on 12-09-2013 (EASTERN).**

Academic Honesty

Cheating means to misrepresent the source, nature, or other conditions of your academic work (e.g., tests, papers, projects, assignments) so as to get undeserved credit.   In addition, it is considered cheating when one cooperates with someone else in any such misrepresentation. The use of the intellectual property of others without giving them appropriate credit is a serious academic offense. It is the University's policy that cheating or plagiarism result in receiving a failing grade for the work or course. Repeat offenses result in dismissal from the University.

Unless noted, all assessments are open-book, open notes, but please remember that academic dishonesty will result in a failing grade, and may result in dismissal from the University. As part of the instructor tools, I can observe the progress of each student, and also of the class. As such, it is within my right to ask any student suspected of cheating to establish the validity of their work. Failure to do so will result in failing grade.

Please Do The Following Immediately

- Install *JMP* statistical software
- Take the pretest survey at https://apps3.cehd.umn.edu/artist/user/scale_select.html, with access code **BSU2781HRY**

Assessment Schedule

Assessment	Start and Due Dates
Quiz 1: Chapters 1 and 2	**08/26/13- 09/09/13**
Quiz 2: Chapter 3	**09/09/13- 09/23/13**
Quiz 3: Chapters 4, 5, and 6	**09/16/13- 09/30/13**
Quiz 4: Chapter 7	**09/30/13- 10/07/13**
Quiz 5: Chapter 8	**10/07/13- 10/14/13**
Quiz 6: Chapter 9	**10/14/13- 10/21/13**
Quiz 7: Chapter 10	**10/21/13- 10/28/13**
Quiz 8: Chapter 14	**11/18/13- 11/25/13**

Assignments and project information, including due dates, will be given in class.