

IS647: Statistical Methods for Data Analytics

Summer 2018



Instructor Contact Information

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CRC GCTR 224

Course Description

This course emphasizes statistical approaches to support managerial decisions. Where applicable the course material is related to the Six Sigma management philosophy, finance, marketing, or health management applications. With the help of a statistical package, case studies from these areas of application are analyzed and interpreted. Setting the proper problem statement, examining the type of data required and available, analyzing these data, then drawing and discussing possible conclusions for each case are emphasized. Focus on mathematical formulas is minimized.

Prerequisites

None

Instructional Materials

Textbook

JMP Means Business: Statistical Methods for Management, J. Schmee and J.E. Oppenlander, 2010, SAS Publishing. ISBN 978-1-59994-299-5.

Other Reading and Course Materials

- Other materials are posted in each course Week on the Moodle site.
- Materials used in this course may be subject to copyright protection.

Technology

Computer System and Software Requirements

- Internet access
- Chrome, Firefox, Internet Explorer, or Safari
- Microsoft Office or OpenOffice
- Adobe Reader, Adobe Flash Player
- Computer microphone for optional online session
- Optional: Speakers or headphones to listen to videos (closed captions available; see Accessibility)
- JMP Statistical Software (a product of SAS Institute) should be downloaded from the course Moodle site - SAS Institute offers live webinars to help you get started with the JMP software at no cost. To view the schedule and register go to the [JMP website](#). Other available resources include videos, tutorials and one-page guides. While it is possible to use Excel to complete some simple assignments early in the course, in the long run this will slow your progress and therefore its use is highly discouraged.

Minimum Technology Skills

- Use a learning management system.
- Use email with attachments.
- Create and submit files in commonly used word processing and presentation formats.
- Copy and paste.
- Download and install software

Accessibility and Privacy Policies

- [JMP Software Accessibility Policy](#)
- [JMP Software Privacy Policies](#)
- [Software Accessibility Policies in General](#)
- [Software Privacy Policies in General](#)

Course Outcomes (CO)

By completion of this course you should be able to:

1. Translate business problems into statistical problems that can be solved with data analysis.
2. Prepare data for analysis in a statistical software package, including identification of potential data errors and file reformatting.
3. Prepare a statistical summary of data using visualizations and descriptive statistics.
4. Select an appropriate statistical method for a problem based on the measurement levels of the response and predictor variables and the number of predictor variables.
5. Conduct a data analysis using the selected method in a statistical software package.
6. Identify the key statistical results for a given statistical method.
7. Interpret statistical results in language targeted to the general business audience without the use of statistical jargon.
8. Interpret statistical results in the problem context.
9. Integrate the problem statement, statistical results, and recommendations in the problem context into a technical report that integrates the problem statement, statistical results, and recommendations in the problem context.

Competencies Taught

- Analytic abilities: Defining the problem, gathering and analyzing appropriate data.
- Decision-making skills: Selecting actions based on evidence and analysis.
- Communicate effectively in written form.
- The ability to work effectively in groups.
- The ability to synergistically accomplish common goals.

Assignment Submission Requirements:

Getting Acquainted with the Course Assignment

- This 10-week course moves at light-speed. It is extremely important that you begin the course as soon as the term starts and get acquainted with its general layout and structure. The first assignment will help you accomplish this and it is due by 9pm on June 14. The assignment will be

a quiz and will ask about information you can easily find in the syllabus and will ask questions ensuring you have completed certain tasks.

Graded Assignments

- Graded assignments (with the exception of PowerPoint presentations) must be double-spaced, Arial 11 font. All assignments are due on or before the due date and time in pdf format only. All assignments shall use this file format: **IS647_assignment name_your last name.pdf** Writing quality (including spelling and grammar) as well as content will be evaluated. Do not write in the first person voice, and always explain statistical terminology to the reader. Assignments shall follow a clearly recognizable format and structure and incorporate graphs and only relevant computer results from JMP. Assignments must be within the prescribed page limits. Please write your name on the first page of each submission.

Late Assignment Policy

- All students are required to submit assignments on or before the due date and time. Never wait for the deadline to submit your work, because Moodle is configured to block all submissions at the deadline. A submission even one second late will be blocked! Late work will not be accepted and there are no valid excuses. It is always acceptable to submit assignments early. Extensions will not be granted so please do not ask; plan your schedule accordingly. There is no extra credit available in this course.

Academic Integrity

- You are expected to practice academic honesty in every aspect of this course. Make sure you are familiar with the [Clarkson University Regulations](#), especially **Section IV Academic Integrity**. Students who engage in academic misconduct are subject to university disciplinary procedures, as well as consequences with regard to this course.

Etiquette Expectations and Learner Interaction

- Online universities promote the advance of knowledge through positive and constructive debate--both inside and outside the classroom. Discussions, however, can occasionally degenerate. Such activity and the loss of good manners are not acceptable in a university setting--basic academic rules of good behavior and proper "netiquette" must prevail. Please view the [NETIQUETTE GUIDE FOR ONLINE COURSES](#). Remember that you are in a place of learning that does not include descent to personal attacks, or attempts to stifle the discussion of others. We all learn through academic debate and constructive criticism. Despite the best of intentions, jokes and--especially--satire can easily be misinterpreted. If you feel the need for humor, you may wish to add "emoticons" to help alert your readers.
- All submissions must be in English.
- Because this course will be conducted entirely online, it is important for all students to keep up with the required readings and assignments; I have found that once a student falls behind it can be extremely difficult to catch up. There are weekly deadlines to ensure that everyone moves through the course at the same pace. Plan your time accordingly.

Student Participation and Collaboration Statements:

- It is anticipated that each student will need to dedicate at least 12-15 hours per week to course participation, readings, activities, and assignments.
- Students may work together on assignments, but each must turn-in a separate and original submission for grading.

Instructor Participation

Office Hours: Tuesdays and Thursdays, 6:00-7:00 Eastern online and by appointment. Please email me if you would like to set up a time to talk in person, online, by telephone, or via Skype. My Skype ID is dean.poeth.

e-mail: When sending me an email, always start the subject line with "IS647" followed by your last name and then the topic. Note that I am unable to check my email during the day. I normally check email in the early evening, and I will respond to your email as quickly as possible. I will, at a minimum, make every effort to respond to emails within 24 hours.

You should use email rather than the Moodle open discussion forum when inquiring about grades or anything of a personal nature.

Assignments and Discussions: Typically, I will grade your assignments within one week of the due date. I will let you know if more time is required.

Program/School Policies Academic Integrity

Students are expected to abide by the standards of academic honesty as described in the Clarkson Regulations. The work or words of others must be properly cited. Please read the Guide to Plagiarism and Citation found on the Moodle site for this course.

Institutional Policies

Institutional Policies and Regulations

Students with Disabilities Policy

Clarkson University welcomes inquiries and applications from individuals who have disabilities. Information relating to disabling conditions is not a determining factor in admission decisions. The University strives to make all facilities and programs accessible to students with disabilities by providing appropriate academic adjustments and other appropriate modifications (accommodations), as necessary. Timely notification of any need for accommodations due to a disability is encouraged so that the Office of Accommodative Services (OAS) may provide for students in an efficient manner. For more information or other appropriate campus referrals, contact:

Director of Accommodative Services - Clarkson University, PO Box 5645 Potsdam, NY 13699-5635

Phone: 315-268-7643 Fax: 315-268-2400

Email: oas@clarkson.edu

[Office of AccessABILITY Services Website](#)

Grading

Grade Ranges

A = 93-100 B+ = 87-89 C+ = 77-79
A- = 90-92 B = 83-86 C = 73-76
B- = 80-82

Final course grades will be based on the following:

Item	Weight (%)
Course Introduction Quiz	5
Discussions	30
Assignment 1 Data Description Memo	10
Assignment 2 PowerPoint Slides	10
Assignment 3 Business Startup	15
Case Study #1 Sherri's Bakery	15
Case Study #2 Challenger Disaster	15

1. Students are expected to be active participants in this course. Active participation includes asking and answering questions in discussion forums. An initial post is due by Saturday noon EST and at least two more responses to other posts are the minimum expected.
2. All posts must add substantially to the topic. For example, a post such as, "I agree with what John posted last week," is not substantive and will not count toward the frequency of participation component of the grade.
3. I primarily want to see that you are taking the time to first work through the assignment independently, read and reflect on what others in the class are saying, and in addition posting your own comments, questions, and thoughts. A post made at the end of the discussion period does not allow sufficient opportunity for your classmates to read and respond to your submission and will have a lower weight.
4. Stick to the subject and write thoughtfully and concisely. Be sympathetic and encouraging to others. Avoid disrupting the flow by introducing unrelated subjects. Instead, wait until the current topic winds down.
5. Each discussion has a closing date and time. Late submissions will not count toward your discussion grade.
6. Each discussion will be graded on a 10 point scale. Please note that discussion grades are for the thoughtfulness, active engagement, and professionalism shown by your comments and responses, not their technical correctness.

Discussion grading rubric

Criteria as outlined above	Points
Your initial post (thoughts and answers to assignment, having taken the time to work through the assignment independently first)	5
Posted at least two additional times (comments and responses to what others have posted, answers to my questions, additional ideas)	5

Scheduled Study Problems

Study Problems are given to reinforce the methods and concepts presented in this course and to prepare for the graded assignments. Problem solutions can be found in the folders containing the corresponding data files. Students are encouraged to work the problems prior to studying the solutions.

Week	Problems	Objective(s) of Study Problems
1	Chapter 3 - 3, 4, 9	Use numeric and graphic statistical analysis to critically evaluate and summarize data.
2	Chapter 5 - 4, 5 Chapter 6 - 4, 7	Apply basic probability operations and models to business problems.
3	Chapter 7 - 2, 9 Chapter 8 - 6, 10	Apply one-sample hypothesis tests and confidence intervals to business problems.
4	Chapter 9 - 3, 5	Apply two-sample hypothesis tests and confidence intervals to business problems.
5	Chapter 10 - 2, 3	Compare the means from several groups using one-way ANOVA.
6	Chapter 11 - 2, 9	Compare the means from several groups using two-way ANOVA.
7	Chapter 12 - 2, 3, 6 Chapter 13 - 1, 2	Conduct tests and compute confidence intervals for proportions and Chi-square tests for independence.
8	Chapter 14 - 3 Chapter 15 - 1	Focus on interpretation of simple regression analysis results: meaning of coefficients, recognition of poor fit and model inadequacy, outlier detection. Describe the association between continuous variables through simple correlation analysis.
9	Chapter 16 - 3 Chapter 17 - 3, 5 Chapter 18 - 7	Focus on constructing and interpreting multiple regression analysis: meaning of coefficients, assessing model adequacy, multicollinearity, and importance of predictors. Create regression models containing both nominal and continuous variables.

Supplemental Information:

- Examination of data, application of statistical models and methods and the effective communication of statistical results are emphasized in this course. Written work shall be clear, concise, and focused on the application of statistical methods to the business problem.
- We will be using JMP extensively throughout the course. Most of the answers will rely on some computer results, both numerical and graphical. All computer packages provide you with comprehensive output; much of it is unnecessary in answering the question posed in your problem statement. Therefore select only those results that support your analysis. Do not append the totality of the output at the end; it will earn you a reduction in your grade. Incorporate the output into your answers through cutting and pasting.
- Be careful if you decide to share your homework with a colleague before the assignment deadline. It's fine to work together if you choose, but remember that each student is required to submit a separate and original submission for grading.

Roundtable

The content of this course is the direct product of prior students' comments and suggestions for improvement over my many years of teaching. This feedback has primarily occurred through roundtable discussions that are held during every class I teach. Your input is critical to the continued success of this course, and I hope you will participate in this optional discussion.

Course Schedule and Graded Activities

Week	Topics	Activities
1	Course Introduction Describing Data	Course Introduction Quiz opens 6/11/18 closes 6/14/18 (11pm) Discussion 1. First post due 6/16/18 (noon) closes 6/19/18 (11pm)
2	Probability Distributions	Discussion 2. First post due 6/23/18 (noon) closes 6/26/18 (11pm) Assignment 1 Data description memo due 6/26/18 (11pm)
3	Single Variable Analysis	Discussion 3. Data visualization. First post due 6/30/18 (noon) closes 7/5/18 (11pm)
4	Comparing Two Means	Assignment 2 PowerPoint Slides due 7/5/18 (11pm)
5	One-way Analysis of Variance	Case Study #1 Sherri's Bakery due 7/10/18 (11pm) Discussion 4. First post due 7/14/18 (noon) closes 7/17/18 (11pm)
6	Two-way Analysis of Variance	Discussion 5 First post due 7/21/18 (noon) closes 7/24/18 (11pm)
7	Methods for Nominal Variables	Roundtable Discussion (ungraded) opens 7/23/18 closes 7/27/18 (11pm) Discussion 6. First post due 7/28/18 (noon) closes 7/31/18 (9pm)
8	Simple Linear Regression Introduction to case study: Challenger Disaster	Assignment 3 Startup due 7/31/18 (11pm)
9	Multiple Regression Analysis	Discussion 7. First post due 8/4/18 (noon) closes 8/7/18 (11pm)
10	Ethics of Statistics and Big Data Introduction to Predictive Analytics	Discussion 8. First post due 8/11/18 (noon) closes 8/14/18 (11pm) Case Study #2: Challenger Disaster due 8/17/18 (11pm)