Syllabus

Data Analytics in Healthcare (3 Credits)
Summer 2018: May 30th to Aug. 1st
CSB, 261, Wednesdays, 6-8 pm
34:501:530:V6:05035
Master of Health Administration

I. Instructor Contact Information

Civic Square Building, Room 249
Telephone: 848 932 2750
Email: ffelder@rci.rutgers.edu
Instructor Background: http://bloustein.rutgers.edu/felder/
Center for Energy, Economic and Environmental Policy, http://www.policy.rutgers.edu/ceeep/

Office hours: Wednesday 5-6 pm or by appointment

II. Course Objectives

Goal: Improve students’ data analytical and decision-making skills in the context of health administration using a widely available and used tool, Excel.

Motivation: With the explosion of data in all aspects of the economy, and particularly within the health care field, data analytics is becoming a critical set of skills that health administrators need to understand and develop.

III. Course Catalog Description

See course catalog.

IV. Course Synopsis

This class will be conducted as a mixture of lectures, classroom discussion, and individual meetings with the instructor. Major topic areas include health care data analytics, big data, descriptive statistics, databases, decision making, optimization, and Excel.

V. Required and Recommended Readings

Big Data and Health Analytics, Katherine Marconi and Harold Lehmann (eds.), CRC Press, 2015; hereafter M&L

Rutgers website for Microsoft Office for Students to get recent version of Excel: https://oit-nb.rutgers.edu/node/460

Website with extensive Excel tutorials organized by level: beginner, intermediate and advanced https://excelexposure.com/lesson-guide/

VI. Academic Integrity

All members of our community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain advantage not given to all students is dishonest, regardless of whether the effort is successful. A violation of academic honesty is a breach of trust, and will result in penalties, including possible suspension or expulsion. When in doubt about plagiarism, paraphrasing, quoting, or collaboration, consult the course instructor. Please see: http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers/ for further information.

VII. Students with Disabilities

Students with disabilities are encouraged to contact the instructor so that appropriate accommodations can be made. See also https://ods.rutgers.edu/ for more information. Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines.

If the documentation supports your request for reasonable accommodations, your campus’s disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form

VIII. Grading

Assignments (best 5 out of 6 assignments, 10% each for a total of 50%)

Each assignment should be in a professional format, carefully written without any grammatical errors, direct, to the point, and key points supported with data and solid reasoning. Late assignments will not be accepted. Assignments should be submitted via Canvas.

Three assignments will be Excel based and two will be short memos. One Excel spreadsheet should be submitted per Excel-based assignment. A different sheet in Excel, appropriately labeled, should be created for each problem assigned. The spreadsheets should have a professional appearance, including appropriate labels.

Midterm (20%)

One-hour midterm is on June 26. The midterm is closed book and notes.
Final (25%)
Cumulative two-hour final is on August 1. The final is closed book and notes.

Class Attendance and Participation (5%)
Students will be evaluated based upon their attendance, engagement during class lectures, discussions, and small group assignments. All students must arrange a 10-minute meeting with the instructor either during office hours or by appointment.

1. Excel

20% professional appearance (Name and date included with in the file (just in the first worksheet), tables have a name, data columns are appropriately labeled, data names are in bold, number of decimal points is appropriate and consistent (typically no more than 2 for our homework), naming each worksheet tab with the homework problem number (per the syllabus). If the problem requires an explanation, the explanation is in the Excel file on the appropriate worksheet, written in a complete sentence that is grammatically correct, clear and concise.

80% correct answer and reasoning/logic.

2. Papers

20% professional appearance (name, date, descriptive title, consistent font and font size, overall look of the paper)

80% content: does the paper answer the question, are references provided and properly done, is the writing grammatically correct with no spelling error or misuse of words, is the writing clear and to the point, is the overall order and logic of the paper persuasive?

IX. Schedule of Classes and Assignments

The reminder of this syllabus is the class-by-class plan.

Students that have substantial familiarity with Excel can substitute assignments on topics that they are familiar with for other assignments with prior instructor permission. More advance topics include: macros, Monte Carlo simulation, sensitivity analysis, mapping, three dimensional formulas and hyperlinks, among many others.

Also, students that have an extensive Excel background may want to volunteer their expertise before and after class to informally assist other students as part of their class participation. Please contact the instructor.
Class 1: May 29: Introduction to Data Analytics in Healthcare

Themes

Importance of health care analytics, definition of big data, opportunities and challenges of health care analytics, types of data, description of common methodologies, and standard software solutions including Excel and alternatives

Reading due before class
- M&L: Foreword, Introduction, and Chapter 1 (Little Big Data)
- Winston: Chapters 1 (Basic Spreadsheet Modeling) and 2 (Range Names)

Assignment #1 due June 6 before class (submit via Canvas)

Write a 250-350-word paper that identifies and describes a publicly available data set related to health care, how that data set can help inform a pressing health care administration problem, and the limitations of that data set. An internet search will turn up multiple websites but also see Chapter 14 of M&L for options.

Format for the electronic file name of your assignment: LastName#1.doc
Class 2: June 5: Big Data and Descriptive Statistics

Themes

Variables, definition of a distribution, mean, median, model, range, variance, standard deviation, outliers, box plots, data visualization, types of graphs, uses and misuses of statistical data, randomized control experiments, and big data analytics

Assignment #1 due before class via Canvas

Reading due before class
- M&L: Chapters 2 (Unstructured Data) & 3 (Large Data Sets)
- Winston: Chapters 28 (The Analytics Revolution), 41 (Summarizing Data by Using Histograms and Pareto Charts), and 42 (Summarizing Data by Using Descriptive Statistics)

Assignment #2 due June 12 before class via Canvas

Winston, Chap. 41, problems 1 and 9
Winston Chap. 42, problems 4, 15, and 18
Class 3: June 12: Structured Data and Databases

Themes

Structured, semi-structured and unstructured data, database terms, SQL, relational databases, natural language processing, role of the Federal Government in health data, sources of data, social determinants of health, cleaning data

Assignment #2 due before class via Canvas

Reading due before class

- M&L: Chapters 4 and 6
- Winston: Chapters 26 (Tables)

Assignment #3 due June 19 before class via Canvas

Winston, Chap. 26, problems 1, 2, 3, 4, and 5
Class 4: June 19: Big Data Architecture

Themes

Data standards, data governance, data architecture, leveraging health care analytics, data and analytics supply chain, file types, data validation, model verification and validation

Assignment #3 due before class via Canvas

Reading due before class
- M&L: Chapter 8 (Big Data Architecture and Its Enablement)
- Winston: Chapters 39 (Importing Data from a Text File or Document) and 40 (Validating Data)

Prepare for One-hour Midterm June 26

The midterm is closed book and notes and covers all the materials through and including Class 4.
Class 5: June 26: One-hour midterm and Time Series and Relationship Between Variables

Themes

Correlation, causation, spurious variables, and linear regression, cross section vs. longitudinal studies

Assignment #4 due July 10 before class via Canvas

Winston, Chap. 53, problems 5, 6, and 7.
Class 6: July 3: Big Data Governance, Roadblocks and Optimization

Themes

Decision variables, constraints, optimization, minimization, maximization, tradeoffs, multi-variable optimization, data governance, big data roadblocks and regulation

Assignment #4 due before class via Canvas

Reading due before class
- M&L: Chapters 9 (Health Data Governance) & 10 (Big Data Road Blocks)
- Winston: Chapter 53 (Estimating Straight-line Relationships)

Optional YouTube Videos (for those with no to very little Excel experience)

Introduction to Designing Optimization Models Using Excel Solver (11:08)

https://www.youtube.com/watch?v=tKV24jzZ10s

Assignment #5 due July 18 before class via Canvas

Chapters 8 and 10 of M&L provide different assessments regarding the likely success of big data in health care. Write a 400-500-word paper that discusses two claims, one made in each chapter, that are in support and against the claim that big data will result in substantial success for health care. What is your assessment and why?
Class 7: July 10: Health Care Analytics and Decision Making

Themes

Publicly available health care data sets, future areas of research, decision making analytics and methodologies, uncertainty in decision making, discounting, measurement of health outcomes and value of life, and analysis of complex systems

Assignment #5 due before class via Canvas

Reading due before class
- M&L: Chapters 14 (Decision Making with Health Care Analytics) & 15 (Measuring Impacts)
- Winston: Chapter 29 (An Introduction to Optimization with Excel Solver) and Chapter 30 (Using Solver to Determine the Optimal Product Mix)

Assignment #6 due July 25 before class via Canvas

Winston, Chap. 30, problem 2
July 17: NO CLASS: Students are encouraged to form study groups and prepare for the final exam. A study guide will be provided.

Class 8: July 24: Health Care Analytics, Dashboards and to Infinity and Beyond

Themes

Types of health care analytics, dashboards, utilization analytics, predictive analytics, comparative analytics, triple aim, health care incentive structures and implications for treatment, future trends, and course review

Assignment #6 due before class via Canvas

Reading due before class
  • M&L: Chapter 13 (Population Health Management)

Class 9: July 31: Two-hour cumulative final, closed book and notes