Economic Data Analytics
Introduction to Data Management, Statistics, and Regression Methods for Decision Making
01:220:212

Instructor: Nora Paxton   **Classroom:** Tillett Hall 204
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Class Hours: M 6:40-9:30

Introduction:

Organizations of all sorts—business, government, scientific, educational, non-profit and cultural—have 'customers' and need to make allocation decisions to operate effectively and efficiently. While certain specialized skills in big data analytics are strongly in demand in the current job market, many employers also look for individuals with general skills who are "trainable" in the specifics of a job. This lower-level course provides the tools and knowledge to use data to "size up" a situation or problem and to suggest alternative approaches or solutions based on available data. This course will demystify the process of data collection, visualization, analysis, and presentation. It will also show you how to work in the ubiquitous Microsoft Excel environment and how to do basic statistical analysis. In addition, you will be able to enhance your Excel skills by learning basic regression methods, which are econometric tools for estimating and explaining relationships among variables. These tools will allow you to provide important data-based decision support that organizations require.

Upon conclusion of the course, students will have an introduction to methods of economic data analysis and will be able to:
- Use spreadsheet software to collect, clean, transform, visualize, interpret and present data.
- Understand, conduct and interpret basic statistics including means, variability, and correlations.
- Present results of data analysis for a non-specialist audience.

Prerequisites: Advanced algebra, placement into precalculus. Those intending to complete the Economic Data Analytics Minor should take precalculus (640:111, 640:115, or equivalent), as this is required for the introductory economics sequence, Introduction to Microeconomics (220:102) and Introduction to Macroeconomics (220:103).

Text: *Statistics for People Who (Think They) Hate Statistics*, Excel 2016 version, by Neil Salkind

Data analysis tools: Microsoft Excel. Access to personal or laptop computer with Excel installed is essential.

Evaluation: How is the grade determined?
- Class participation (10%)
- Quiz 1 – Data types and structures (20%)
- Quiz 2 - Descriptive statistics (20%)
- Quiz 3 - Inferential statistics (20%)
- Final in-class presentation (30%) – **December 4th and December 11th**
- *There is no extra credit given in this course*

Logistics and grade scale - Presentations and other class materials will be made available through SAKAI or email as needed. The syllabus on SAKAI will be the most current one and will supersede any previous versions. The grade scale used for the class is 90-100 = A / 85-89.99 = B+ / 80-84.99 = B / 75-79.99 = C+ / 70-74.99 = C / 60-69.99 = D / 0-59.99 = F.

Late policy – All work must be submitted on the due date. Late submissions will be penalized with five percentage points per day after the due date. For example, if you get 90% on an assignment but it was handed in one day late, the grade will go down to 85%. Late submissions without penalty allowed only in cases of documented health or medical emergency. Missing assignments will get a zero grade.

Make-up exam policy – In cases of documented illness or personal emergency, email me prior to the exam. If a delay is granted, make up exams will be held by the economics department in **New Jersey Hall on Fridays from 12pm to 3pm in room SC 216**.

Academic integrity - Get familiar with the university's policy on academic integrity, it will be enforced in this class: http://academicintegrity.rutgers.edu/academic-integrity-policy/

Absence reporting - It is expected that students attend all sessions. Please note dates of the quizzes (3) and the Final In-class presentations (**December 4th and December 11th**) to ensure you will be in class on those dates. However, if are going to miss more than one class due to illness or a family emergency, please use the University absence reporting website https://sims.rutgers.edu/ssra/ to indicate the date and reason for your absence. An email is automatically sent to me. Note, reporting your absence does not excuse from your course responsibilities.

Accommodations - If you need special accommodation due to disability, check the procedures and guidelines set by the Office of Disability Services: https://ods.rutgers.edu.

Class Topics

Class	Date	Topic	Readings
1	9/11	Introduction • What is data analysis and why do we care? • Excel is a powerful and ubiquitous tool • Review syllabus • Review class logistics Types of data • Time series • Cross sectional • Pooled data (panel/longitudinal data) Sources of data • Survey data • Administrative data • Extant data from domestic and international agencies • Client data (sales, revenue, outputs, etc.)	Chapter 1 Chapter 22 http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html?_r=0 https://www.brookings.edu/wp-content/uploads/2016/06/04_obama_social_policy_haskins.pdf

2	9/18	Methods of evaluation
		   • Exploratory
		   • Descriptive
		   • Inferential
		
		Qualitative vs. quantitative data and analysis
		
		Exploring Excel - The Basics and Beyond
		--In-class Excel exercises
			https://ies.ed.gov/ncee/pubs/20104029/pdf/20104029.pdf (pages 1-22 and pages 41-51)
			
			pact RF Social Networks.pdf (on Sakai)
			
			Appendix A (start here)
			Chapter 1.A
			Chapter 1.B

3	9/25	How to prepare data for analysis *In-class Excel exercises*	

4	10/2	***QUIZ 1***
		
		Descriptive Statistics
		   • Averages
		   • Median
		   • Mode
		   • Variability
		
		In-class Excel exercises
			Chapter 2
			
			Chapter 3

5	10/9	Class discussion of Final In-Class Presentations
		   • Overview of requirements
		   • Brainstorm research questions
		   • Brainstorm data sources
		
		Exploratory analysis
		   • Using descriptive statistics
		   • Plotting data
		   • Scatter plots, histograms
		   • Outliers
		
		Correlations
		   • What is correlation?
		   • How do we measure it?
		   • Correlation does not equal causation
		
		Reliability and Validity
		
		In-class Excel work
			Come to class with potential paper topics!
			
			Chapter 4
			Chapter 5
			Chapter 6

6	10/16	**Quiz 2** Hypothesis testing	Chapter 7 Chapter 8

		Distributions • General definition • Normal distribution • Z score	
7	10/23	Inferential statistics • Statistical significance • Significant vs meaningful • Determine what test to use Testing one sample • Z test • How to interpret	Chapter 9 Chapter 10
8	10/30	Q&A session on Final In-Class Presentations Testing two independent samples • T test • How to interpret Testing two dependent (related) samples • T tests again • How to interpret *In-class Excel work*	Bring ideas/questions about Final In-Class Presentations Chapter 11 Chapter 12
9	11/6	Linear Regression • What is a simple linear regression? • Dependent and independent variables • Using Excel data analysis • Assess quality of regression • Multiple regressions • Logistic regressions	Chapter 16 Chapter 17 Chapter 18
10	11/13	Review Linear Regression • *In-class Excel work* Testing more than two samples • Analysis of variance • ANOVA • Intro to factorial analysis	 Chapter 13 Chapter 14

11	11/20	**Quiz 3**
		
		Q&A session on Final In-Class Presentations
		
		Other important statistical tests
		   • Significance of correlation coefficient
		   • chisq
		   • F Test
		   • ANOVA (again)
			Bring ideas/questions about Final In-Class Presentations
			
			Chapter 15
			Chapter 17
			Chapter 18

12	11/27	Introduction to Data Mining Q&A session on student projects --work on projects in class	Chapter 20 Bring ideas/questions about final presentations
13	12/4	**Final In-Class Presentations**	
14	12/11	**Final In-Class Presentations**	