




# Business and Economics Statistics

ECON205-3

CRN: , Spring 2023 (January 24, 2023- May 18, 2023)

Instructor:	Paul Yan
Contact Information:	Email: <a href="mailto:pyan@geneseo.edu">pyan@geneseo.edu</a> Phone: (585) 245-5260
Lecture Hours/Location:	MWF: 2:00pm - 3:15 pm @ South Hall Room: 338
Office Hours/Location:	W: 3:30pm-4:30pm @ South Hall 223C or via MS meeting
Prerequisites:	Math 213 or 221, or an equivalent course
Textbook:	Essentials for Modern Business Statistics with Microsoft Excel by Anderson and at al. 8th Edition (ISBN 9780357131626)
Websites:	<a href="https://canvas.geneseo.edu/courses/28041">https://canvas.geneseo.edu/courses/28041</a> (for syllabus, HW, etc.) <a href="http://datayyy.com/excel/">http://datayyy.com/excel/</a> (for learning Excel) <a href="http://datayyy.com/bs">http://datayyy.com/bs</a> (for syllabus, slides, videos, etc. )
Teaching method:	Go through slides quickly and do several in-class exercises
QR codes	 If you want to know how to generat those images, please let me know.
Course Description:	The course is designed to provide an introduction of statistics to the students in the fields of business administration, economics, and accounting. A conceptual introduction of statistics and its applications in business will be emphasized. Additionally, statistical package and database will be introduced. Major topics include descriptive statistics, discrete and continuous probability distributions, sampling distributions, interval estimation, hypothesis tests, comparisons between two population means, comparisons involving proportions, and linear regression.
School of Business Mission	Students acquire strong quantitative, analytical, and communication skills while preparing for professional success in today's complex business environment. We strive for teaching excellence and recognize that high-quality faculty scholarship and professional activities advance the impact we have on practice, pedagogy, and our knowledge of business.
Bachelor of Science Program Learning Goals	LG1: Our students will have strong analytical skills LG2: Our students will have strong quantitative skills LG3: Our students will have effective communications skills LG4: Our students will have a thorough understanding of various functional areas of business
Objectives Course Learning Objectives	After successfully completing this course, students are expected to demonstrate their ability to: <ul style="list-style-type: none"> <li>• Understand the principles of probability. (LG1)</li> <li>• Understand the properties of distributions. (LG1, LG2)</li> <li>• Apply statistical concepts to many business applications. (LG4)</li> <li>• Collect, organize, describe data and make statistical inference. (LG3).</li> </ul>

	<ul style="list-style-type: none"> <li>Understand the concept of confidence interval and use it to make inference about the data. (LG1, LG2)</li> </ul>																
Computational Tool	Microsoft Excel, every student should polish his/her Excel skills. Ask me if you have any questions related to Excel and my Excel learning site is <a href="http://datayyy.com/excel/">http://datayyy.com/excel/</a>																
Data	For this course, students would use lots of data including 291 data sets supplied by the authors. Several good ways to get data sets to Excel.																
Teaching method (hands-on)	Hands-on is critical. I will not go through slides one after another. Instead, we will do a few in-class exercises, kind of a flipped classroom environment. <a href="https://study.com/teach/flipped-classroom.html">https://study.com/teach/flipped-classroom.html</a>																
R is used to help students to learn this course	To install R, you can watch one of the following YouTube videos: Windows users: <a href="https://www.youtube.com/watch?v=ZoPJGmpYJzw">https://www.youtube.com/watch?v=ZoPJGmpYJzw</a> Mac users: <a href="https://www.youtube.com/watch?v=WJDrYUqNrHg">https://www.youtube.com/watch?v=WJDrYUqNrHg</a>																
One-line R command for this course	<code>source("http://datayyy.com/bs.txt")</code> Note #1: I will explain the above line during the first lecture. Note #2: For this course, I will NOT teach R. Literally, students are responsible for just one-line R code, shown above and you can copy-and-paste																
Extra oral exam (optional)	For extra credit. This will be conducted via zoom and it is optional.																
Academic Integrity:	<a href="https://www.geneseo.edu/dean_office/dishonesty">https://www.geneseo.edu/dean_office/dishonesty</a>																
Attendance Policy (I)	Attending classes regularly is required. Before-class preparation and in-class participation is an integral part of this course. Students are strongly encouraged to participate in class discussions and ask questions. Students are encouraged to discuss current events relevant to this course or their own experiences. Homework problems are regularly assigned.																
Attendance Policy (II)	For some reasons if you cannot attend classes regularly, make sure that you read the related chapters, lecture notes (slides), videos and finish assignments.																
Grade Evaluation:	<table> <tr> <td>HW</td> <td>30%</td> </tr> <tr> <td>Midterm</td> <td>25%</td> </tr> <tr> <td>Final exam</td> <td>25%</td> </tr> <tr> <td>Group Project</td> <td>10%</td> </tr> <tr> <td>Class participation</td> <td></td> </tr> <tr> <td>Including zoom office-hour</td> <td>10%</td> </tr> <tr> <td>-----</td> <td>-----</td> </tr> <tr> <td>Total</td> <td>100%</td> </tr> </table>	HW	30%	Midterm	25%	Final exam	25%	Group Project	10%	Class participation		Including zoom office-hour	10%	-----	-----	Total	100%
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-----	-----																
Total	100%																
Course Schedule:	For the detailed schedule, see below. I reserve the right to change the course schedule throughout the semester. Changes to the schedule will be announced in class or via email.																
Academic calendar	<a href="https://www.geneseo.edu/registrar/academic-calendar">https://www.geneseo.edu/registrar/academic-calendar</a>																

### Group project

Each group can have up to three members. A topic should be closely associated with this course. After the midterm, I will distribute a list of potential topics. In addition, you can choose your own topic. Real world topics are especially encouraged. Please discuss with me your topic before you start to work on it. Three parts are essential:

- 1) The maximum number of pages of your report is 15 with 12-point font.  
(MS Word or PowerPoint file will be fine)
- 2) Theory and background of the topic,
- 3) Final data set plus an excel file, and the source of raw data

From a percentage grade to a letter grade

Percentage grade	Letter grade
$grade \geq 90\%$	A
$85\% \leq grade < 90\%$	A-
$80\% \leq grade < 85\%$	B+
$75\% \leq grade < 80\%$	B
$70\% \leq grade < 75\%$	B-
$65\% \leq grade < 70\%$	C+
$60\% \leq grade < 65\%$	C
$55\% \leq grade < 60\%$	C-
$grade < 55\%$	F

Course Schedule: Academic calendar fall 2022:

Week	Date	Contents of the lecture	Notes
1	1/25	Self intro. & syllabus discussion, R installation, sources of data (291 data sets supplied by the authors), efficient ways to get data, Chapter 1: Data and Statistics: averages, medians, percentages, and maximums, cross-sectional and time series	
2	1/30 2/1	Chapter 1 (continued) Chapter 2: Descriptive Statistics: Tabular and Graphical Displays frequency distribution, Excel countif(), pivotTable, relative frequency, percentage frequency, frequency distribution, histogram, Cumulative Distributions	HW #1
3	2/6 2/8	Chapter 2 (continued) Chapter 3: Descriptive Statistics: Num Measures Measures of location, measures of variability, mean, median, mode, weighted mean, geometric mean (geometric mean for returns), percentiles, quartiles. Excel MODE.SNGL(), variance, standard deviation	
4	2/13 2/15	Chapter 3(continued) Chapter 4: Introduction to Probability Experiment, counting Rule for combinations, complement of an event, intersection of two events, addition law, mutually exclusive events, conditional probability, multiplication law, independent events, Bayes' Theorem, Prior Probabilities, Posterior Probability	HW #2
5	2/20 2/22	Chapter 4 (continued) Chapter 5: Probability Distributions Random variables (discrete and continuous), expected value vs. realized values, variance and standard deviation (when probabilities are given) , Bivariate Distributions, Binomial Probability Distribution, Poisson distribution, Hypergeometric Probability Distribution	HW #3
6	2/27 3/1	Chapter 5 (continued) Chapter 6: Continuous Probability Distributions, Uniform Probability Distribution, Normal Probability Distribution, Exponential Probability Distribution. Z-value, Exponential Probability Distribution, Excel functions: norm.dist(), norm.inv() etc.	HW #4
7	3/6 3/8	Chapter 6 (continued) <b>Midterm</b>	

Week	Date	Contents of the lecture	Files
8	<b>3/13</b> <b>3/15</b>	<b>Spring break, no classes</b>	
9	3/20 3/22	Chapter 7: Sampling and Sampling Distributions Sampling and Sampling Distributions, Sampling from Finite Population, Point Estimation, Central Limit Theorem, norm.dist(), sample distribution of $\bar{p}$ , cluster sampling, systematic sampling	List of projects HW #6 (?)
10	3/27 3/29	Chapter 8: Interval Estimation Population mean ( $\sigma$ known/unknown), margin of errors, standard error, critical values, confidence interval, significance level, confidence.norm(), t-distribution, Excel descriptive statistics tool, sample size	HW #7(?)
11	4/3 4/5	Chapter 9: Hypothesis Testing: Developing Null and Alternative Hypotheses, Type I and Type II Errors Population Mean ( $\sigma$ Known/Unknown), population proportion, one-tailed vs. two-tailed, p-value approach, critical value approach, hypothesis about population mean (proportion)	HW #8(?)
12	4/10 4/12	Chapter 10: Inference About Means/Proportions (2 populations), Inferences about the Difference between Two Population Means ( $\sigma$ 's known/unknown), interval estimation between mean1 and mane2, Paired Two Sample for Means	HW #9 (?)
13	4/17 4/19	Chapter 12: Goodness of Fit, Independence/Multiple Proportions, Goodness of Fit Test, Test of Independence, Testing for Equality of Three or More Population Proportions, Multinomial Probability Distribution	HW #10(?)
14	4/24 <b>4/26</b>	Chapter 12 (continued) <b>G.R.E.A.T. Day (no classes)</b>	HW #11
15	5/1 5/3	Chapter 14: A Simple Linear Regression Least Squares Method, Coefficient of Determination, Model Assumptions, Testing for Significance	HW#12
16	5/8 5/10	Chapter 15: Multiple Regression: Least Squares Method,• Multiple Coefficient of Determination, Model Assumptions Testing for Significance, Using the Estimated Regression Equation for Estimation and Prediction, Categorical Independent Variables, Residual Analysis	
	<b>5/17</b>	<b>Final exam (3:30pm – 6:00pm) Wednesday</b>	

Academic calendar: <https://www.geneseo.edu/registrar/academic-calendar>

Final exam:

<https://www.geneseo.edu/sites/default/files/sites/registrar/2022.11.14%20202301%20Exam%20Schedule.pdf>

## Appendix A: From where to download Excel (Microsoft Office)?

Step 1: Go to the following link (Geneseo software installations)

<https://wiki.geneseo.edu/display/cit/Software+at+Geneseo>

Step 2: Choose 'Microsoft Office'

Software Index

Microsoft Office

<https://wiki.geneseo.edu/display/cit/Software+at+Geneseo#SoftwareatGeneseo-MicrosoftOffice>

Step 3: Download the appropriate software

## Appendix B: After typing R, then issue the following line:

```
source("http://datayyy.com/bs.txt")
```

the following menu will pop up.

```
*-----*
* Business & Economics Statistics (ECON205) 2023 by Yan *
*-----*
* .c1 Data and Statistics          .c16 R basics          *
*                               [optional]              *
*-----*
* >.c1      # go to chapter 1 (a dot in front c1)      *
* >.uu      # for utility functions                    *
* >.bs      # back to the main menu                    *
*-----*
```

Every function or menu is self-explanatory. Typing its name would give you an introduction plus a few examples.

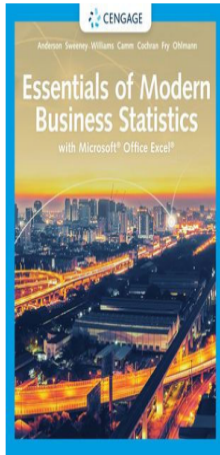
## Appendix C: After typing .c1, (note that there is a dot in front of c1), we see the following instructions.

```
> .c1
function(i){
" i Chapter 1: Data and Statistics
- -----
1 R installation/one line R code for this course
2 Textbook and Zoom for potential online office hours
3 Chapter 1 - Data and Statistics
4 What is Statistics?
5 Applications in Business and Economics
6 Data and data sets, elements, variables, and observations
7 Scales of Measurement
8 Categorical and Quantitative Data
9 Cross-Sectional Data
10 Time Series Data
11 Data Sources
12 Data Acquisition Considerations
13 Descriptive Statistics
14 Numerical Descriptive Statistics
15 Statistical Inference
16 Process of Statistical Inference
17 Statistical Analysis Using Microsoft Excel
18 Analytics/Data Warehousing/Data Mining
19 Ethical Guidelines for Statistical Practice
20 Links/Youtubes

Example #1:>.c1      # see the above list
Example #2:>.c1(1)  # see the 1st explanation
```

## Business and Economics Statistics

<a href="#">Home</a>	<a href="#">Teaching</a>	<a href="#">Finance</a>	<a href="#">Programming</a>	<a href="#">Data</a>	<a href="#">Links</a>
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Textbook by Anderson, Sweeney, Williams, Camm, and Cochran,

### Business and Economics Statistics (ECON205):

- ECON205 (Fall 2020): [syllabus](#)
- Textbook: [Essentials of Modern Business Statistics with Microsoft Excel](#) by Anderson et al., 8th Edition (2020) | [ebook](#)
- Computational tool is Excel: [my Excel website](#)  
[videos](#) | [data](#) | [chapters](#) | [slides](#)
- Week #1: v1 | v2 | [data](#) | C1: [Data and Statistics](#)
- Week #2: v1 | v2 | [data](#) | C2: [Descriptive Statistics](#)
- Week #3: v1 | v2 | [data](#) | C3: [Descriptive Stats: Numerical Measures](#)
- Week #4: v1 | v2 | [data](#) | C4: [Introduction to Probability](#)
- Week #5: v1 | v2 | [data](#) | C5: [Probability Distributions](#)
- Week #6: v1 | v2 | [data](#) | C6: [Continuous Probability Distributions](#)
- Week #7: v1 | v2 | [data](#) | C7: [Sampling and Sampling Distributions](#)
- Week #8: v1 | v2 | [data](#) | C8: [Interval Estimation](#)
- Week #9: v1 | v2 | [data](#) | C9: [Hypothesis Testing](#)
- Week #10: v1 | v2 | [data](#) | C10: [Inference Means/Prop\(2 popu\)](#)
- Week #11: xx | x | [data](#) | [Inferences About Population Variances](#)
- Week #12: v1 | v2 | [data](#) | C12: [Goodness Fit Ind./Multiple Proportions](#)
- Week #13: xx | xx | [Experimental Design/Analysis of Variance](#)
- Week #14: v1 | v2 | [data](#) | C14: [A Simple Linear Regression](#)
- Week #15: v1 | v2 | [data](#) | C15: [Multiple Regression](#)

### Supporting materials for 15 weeks (in an R-assisted learning environment)

- Step 1: Install R (just once): Click [here](#). 'CRAN' [choose a location] => => choose PC or Mac, then click "base"
- Step 2: After launching R, issue one of the following lines.  

```
source("http://datayyy.com/bs/week1.txt")
source("http://datayyy.com/bs/week2.txt")
.....
source("http://datayyy.com/bs/week14.txt")
source("http://datayyy.com/bs/week15.txt")
```

### Videos for 13 chapters

- R installation: v1 | v2 | [Windows\(6m39s\)](#) | [Mac\(13:20\)](#)
- C1: v1 | v2 | [Data types\(5:14\)](#) | [Ethics\(3:23\)](#)
- C2: v1 | v2 | [Big data\(11:22\)](#) | [Categorical num data\(4:13\)](#)
- C3: v1 | v2 | [Mean-median-mode\(8:53\)](#) | [Measure variability\(9:29\)](#)
- C4: v1 | v2 | [Expected value/var\(13:42\)](#) | [Conditional prob\(6:42\)](#)
- C5: [Benford dist\(20:41\)](#) | v2 | [Poisson\(5:08\)](#) | [Binomial\(6:50\)](#)
- C6: v1 | v2 | [Uniform\(6:56\)](#) | [Normal\(5:03\)](#) | [Exponential\(10:06\)](#)
- C7: v1 | v2 | [Sample dist\(7:17\)](#) | [Sample proportion\(9:48\)](#)
- C8: v1 | v2 | [Confidence Inter\(6:41\)](#) | [Inference 1 proportion\(10:26\)](#)
- C9: v1 | v2 | [Hypothesis: mean\(10:12\)](#) | [Type I \(II\) errors\(5:02\)](#)
- C10: v1 | v2 | [2 means\(6:20\)](#) | [2 proportions\(7:56\)](#)
- C11: -----
- C12: [Durbin-Watson\(28:36\)](#) | [Granger causality\(19:52\)](#) ||
- C13: -----
- C14: [Linear Reg\(1\)\(19:48\)](#) | [\(2\)\(20:08\)](#)
- C15: [Multi-variate reg\(17:22\)](#) | [Overall significance\(5:22\)](#)

### Data for this course

- Data supplied by the authors  
 Lists for chapters 1-4: [chapter 1](#) | [chapter 2](#) | [chapter 3](#) | [chapter 4](#)  
 Lists for chapters 5-8: [chapter 5](#) | [chapter 6](#) | [chapter 7](#) | [chapter 8](#)  
 Lists for chapters 9-12: [chapter 9](#) | [chapter 10](#) | [chapter 11](#) | [chapter 12](#)  
 Lists for chapters 13-15: [chapter 13](#) | [chapter 14](#) | [chapter 15](#)
- For extra data, click [here](#)

For any questions or suggestions, please contact me at [pyan@geneseo.edu](mailto:pyan@geneseo.edu), or click [here](#)