Agricultural and Applied Economics (A A E) 335
Introduction to Data Analysis using Spreadsheets

1. Administrative Details

Credits:	2
Instructional mode:	Online
Time/location:	Online
Semester:	Spring 2020
Duration:	10 weeks (January 21st – April 5th)
Prerequisites:	None
Instructor:	Jordan van Rijn
E-mail:	vanrijn@wisc.edu
Office:	Taylor Hall Room 422
Office hours:	Fridays, 9am – 11am
Class website:	Canvas

Please contact me by e-mail if you have any questions or concerns. I commit to responding to e-mails within 24 hours during the week and 48 hours on weekends/Holidays. I also encourage you to stop by my office hours in person or via Canvas's Ultra video chat.

2. Course description

Introduction to data analysis for social scientists using spreadsheets software—with specific applications to economics, business and finance—including data management and manipulation; formulas and calculations; data visualization and presentation using charts and graphics; statistical and visual analysis of economic indicators using tables, functions, graphs and descriptive statistics; and optimization of functions with economic and financial data.

3. Learning Objectives & Outcomes

The ability to analyze data using spreadsheet software—such as Microsoft Excel—is critical for performing numerous important tasks in business, finance, economics, statistics and related fields in the social sciences. Most careers in these fields and many others require at least a basic understanding of managing and analyzing data using spreadsheets. Some important applications include database management,

statistical analysis, graphical presentation of data, and business intelligence, among others.

This course aims to provide students with an introduction to data analysis using spreadsheet software (in this case, Microsoft Excel) and is primarily intended for students in the social sciences (e.g., economics, business, finance) with zero or little prior experience with spreadsheets. By the end of this 2-credit course, students will be able to manage the basic navigation of Excel, enter and manipulate data, perform basic calculations, format data, create tables, perform descriptive statistics (e.g., average, sum, median), create and interpret charts and other visual graphics, and optimize and analyze data dynamically using Solver, Goal Seek and PivotTables. The course also aims to provide students with the foundational knowledge of spreadsheets as applied to economics, business and finance, so that they can quickly learn more advanced techniques used in more upper-level AAE courses, such as *AAE 419: Agricultural Finance, AAE 421: Economic Decision Analysis* and *AAE 526: Quantitative Methods in Agricultural & Applied Economics* (as well as related advanced courses in other departments, such as Finance, Consumer Science, Economics and Business).

The course will rely heavily on practical examples and assignments related to finance, business and economics. For example, students will create a personal budget in Excel, analyze business revenue and expenses, and graphically display economic data, such as indicators of inflation, gross domestic product (GDP) and employment. Thus, a secondary goal of the course is to provide students with sufficient experience with data analysis in Excel so as to be able to design and create tools that can help them analyze and manage their personal and/or business's finances, and be able to download, analyze and present economic and financial data.

Student Learning Outcomes:
Specifically, by the end of the course students should be able to:
- Navigate the basic Excel software, download and manipulate economic and financial data, and create basic formulas and functions.
- Create, refine and interpret Excel charts and other graphics with real world economic and financial data, and display and organize data using tables and PivotTables.
- Present, analyze and interpret trends and relationships among and between various economic indicators, and identify optimal solutions using Solver and Goal Seek.

4. Required Textbook & Software

4.1   Textbook

The only required textbook for this course is *Microsoft Excel 2016 Step by Step* by Curtis Frye (2015) (ISBN: 9780735697485), Microsoft Press, Redmond, Washington. This text or its e-version can be purchased directly from Microsoft or Amazon.com. As I prepare this, the textbook is available for $13.68 at Amazon and $27.99 from Microsoft Press. You will also need to download the practice files associated with the text at this website: http://aka.ms/Excel2016SBS/files.

4.2   Software

The software for this course is Microsoft Excel 2016, which is available to download for free from the UW Campus Software Library. You will also need to download Microsoft Word and PowerPoint, which should download together in the Microsoft 365 suite. Although we will be using Excel, the general knowledge gained is easily extendable to other spreadsheet software, such as Google's Sheets and Apple's Numbers.

It is my understanding that starting in 2016, Excel in Microsoft Windows is very similar to Excel using Mac. However, some differences may exist, and in my experience these differences can prove challenging for students learning Excel with Apple computers. For consistency, we will be using the Microsoft Excel version for PC computers (e.g., in Windows). For students using Apple computers, I would recommend one of the following options:

1. *Use Microsoft Excel in Windows in a UW Computer Lab.* If you choose this option, you will need to be careful to save your work and maintain a copy in your e-mail, Wisc Box or other repository.
2. *Use Excel on your personal Apple computer.* If there appears to be a difference between what I am teaching and the formulas on the Mac version, notify me and search for a solution online. I will do my best to support you but cannot guarantee that I'll be able to help with technical questions.
3. *Use a dual-boot system to access both Windows and Mac operating systems on your personal computer.* The DOIT Help Desk should be able to help with changing your computer's setup to allow this option.
4. *Install the Parallels Desktop for Mac software.* This allows you to run Windows apps on Mac computers and the student version is $79.99.

I recommend that you choose one of these options as early in the semester as possible to ensure that you are ready to go well before the first assignment is due.

5.   Course Requirements & Grading

The distribution of points for your final grade in this course is as follows:

Quizzes (12)	15%
Class participation & discussion	15%
Assignments (5)	50% (10% each)
Final project	20%

Grades will be allocated as follows:

A	94% - 100%
AB	87% - 93%
B	80% - 86%
BC	74% - 79%
C	68% - 73%
D	60% - 67%
F	< 60%

5.1   Course videos & quizzes

Since this is an online course, the main mode of instruction is online instructional videos that I have recorded. As with any course, it is imperative that you **view all of the video lectures** in sequence and in a timely manner. To help the class progress at a comparable pace, I will release the videos in two-week modules. Each video will be approximately 10 – 15 minutes in length and you are encouraged to stop, replay and review the videos as needed to fully understand the material.

15% of your grade will be based on **bi-weekly quizzes** based on the material in the videos and related reading assignments. The quizzes are multiple choice and are not intended to be tricky or overly difficult but simply to ensure that you have viewed the videos and completed the required reading material. Quizzes will also be immediately available on the course website at the start of every two-week module and can be completed anytime up to the end of the module, at which point the quiz will be closed and you will receive a 0% if not completed by then. Quizzes must be completed independently but you can refer to the textbook and videos (open book). However, they are timed such that you will not have sufficient time to look up all of the answers and should not simply rely on the textbook.

5.2   Class participation & discussions

Although this is an online course, it is helpful to you and other students if we can create as collaborative and interactive a learning environment as possible. To encourage you in this, I will post **weekly prompts and questions on Canvas's Discussions site** related to the material that we are studying. Some example of questions and topics may include:

1. Search online for news articles where there is data analysis used in the article. How is it being used? What skills from the course can you identify in the article? Do you agree with the analysis?
2. What topics and research question/s are you considering for your Final Research Project? What datasets do you plan to use?
3. Find an example of one or more of the following graphs in a news article: histogram, dual axis graph, stacked column graph. What does the graph tell us about the data?
4. Here is a video from the news about a contemporary economic issue. What types of graphs were used in the report? What examples of data analysis was used? What specific tools that we've learned in the class can you identify?

I expect you to ***post at least five responses and or new questions to the online discussions board*** throughout the duration of the course. This means that you should post at least once every other week; in other words, students should expect to participate in at least 50% of the weekly discussions. Discussion comments must be substantive and contribute to the overall discussion (see Grading Rubric for details). In general, I will wait for students to answer questions of other students before posting myself. You will also be asked to **post a brief introduction** to yourself in Week 1 stating your major (or intended) major, interest in the course and how you hope to use data analysis and spreadsheets in your future goals and career. Class participation will constitute 15% of your grade, but I will also keep in mind students that are particularly helpful when considering marginal grades.

5.3   Assignments

There will be ***five assignments*** throughout the course with each posted approximately once every two weeks throughout the semester. You will have two weeks to work on each assignment but must e-mail me your completed spreadsheets by 11:59pm on the posted due date. Each assignment is worth 10% of your grade (50% total). The assignments will build on each other and follow the material in the videos and textbook. Generally, they will cover the following topics:

Assignment #1: Excel basics, including creating a workbook, modifying a workbook, entering data, creating tables, and basic calculations.

Assignment #2: Introduction to data management and applications of spreadsheet software in finance, including sorting and filtering data, downloading data, analyzing and manipulating data using basic formulas and functions, creating a personal budget, and applying financial formulas.

Assignment #3: Data visualization and presentation using economic indicators, including creating and refining charts and other graphics, downloading economic and financial data, and interpreting trends and relationships between economic variables.

Assignment #4: Applying data analysis skills to contemporary news. Students will find a contemporary news article related to economics, finance or business that includes a graph with publicly available data. Students will then recreate the graph, interpret the results, and critique the news article based on skills learned in the class.

Assignment #5: Data optimization and more advanced statistical analysis using PivotTables, Solver, Goal Seek and Excel's "Data Analysis add-in".

If you have trouble with a particular assignment, feel free to contact me via e-mail, visit me during office hours, or post your question to the course website. You may also work on the assignments in groups as long as you do not directly copy each other's work or share files—each student must turn in his or her own spreadsheet. Copying another student's spreadsheet is not allowed and will be dealt with per UW policies and procedures. At a minimum, no credit will be given for the plagiarized material and a report will be forwarded to the Dean of CALS. Given the nature of the assignments, it will be very clear if there is direct copying or sharing of files.

5.4   Research project

To provide students with experience in conducting data analysis and interpreting economic data using spreadsheets, students will prepare a complete research report using spreadsheet tools, graphics and analysis. This final research project will be completed by the end of class and will constitute 20% of your grade.

The final research project will include choosing a country or U.S. state, downloading data of economic indicators related to your state or country (e.g., GDP, unemployment, inflation, population), creating tables and graphics to summarize and present your data, and interpreting the graphics and tables. You will also compare your country or state's economic indicators to a region, country or the world, as appropriate. For example, if you choose a country, you should

compare that country's economic growth to the world or a larger region (e.g., for Brazil you might compare its economic growth with the rest of Latin America or with the world); if you choose a U.S. state (e.g., Wisconsin), you might compare Wisconsin's unemployment rate to the rest of the U.S.

Some sources of data you may wish to use include:
      World Bank: https://data.worldbank.org/indicator
      International Monetary Fund: https://www.imf.org/en/Data
      U.S. Federal Reserve: https://fred.stlouisfed.org/

The report should include **at least 4-5 economic indicators** covering a time period of at least 20 years to allow you to explore trends over time. You should also include **at least four graphs and two tables** that summarizes your indicators, as well as an executive summary, and at least one paragraph that briefly interprets the data in each table/graph. The full report should be roughly 8 - 10 pages (single-spaced) including all tables and graphics but excluding references (please do not exceed 12 pages).

This type of report is common among business economists and international economists that seek to analyze trends in an economy's performance to consider its economic development over time, potential for investment, or impact on other countries/states. I create a similar report in my work as Senior Economist for the Credit Union National Association (CUNA) and will provide examples both online and through videos to ensure that you understand exactly what is expected of you.

Finally, while I will reserve the last two weeks of the course for you to work on finalizing the project, I strongly recommend that you do not wait until the last week to begin working on it. To encourage you to make progress on the project throughout the semester, I will set the following deadlines:

Task	Deadline
Choose country / state	End of week 2
Choose economic indicators & download data	End of week 5
Final project due	End of week 10

Late Assignments: Quizzes will be available in Canvas at the start of each module and open until the end of each the module (2 weeks total). After that, the quizzes for that module will be closed and you will receive 0% for that quiz. For other late assignments you can turn them in past the deadline but I will deduct 10% of the total grade for each day that they are turned in past the deadline (including the Research Project).

6. Course Outline

The course is organized into five two-week modules and one two-week module (10 weeks total) in the following general areas:

> *Module 1:* Introduction to Spreadsheets and Working with Data in Excel
> *Module 2:* Data Management and Applications in Finance
> *Module 3:* Data Visualization and Presentation of Economic Indicators
> *Module 4:* Data Optimization and more Advanced Statistical Analysis
> *Module 5:* Final Research Project—Applying Data Analysis Skills to Economic Indicators

A more detailed list of topics with the corresponding videos and related tasks is found below.

Module/Weeks	Topics	Videos	Tasks
Module 1 Weeks 1-2	Excel basics Work with data Functions Formulas Downloading data	Welcome (~5 min.) Syllabus review (~20 min.) Overview of course website (~13 min) Intro. to spreadsheets Part 1 (~15 min.) Intro. to spreadsheets Part 2 (~15 min.) Working with data Part 1 (~15 min.) Working with data Part 2 (~15 min.) Intro to Tables (~15 min.) Intro to formulas & functions (~15 min) Data sources & downloading data (~20 min) Conditional formulas & errors (~15 min)	Read Chs. 1-3 Post introduction on Canvas Quizzes 1-3 Choose project topic Assignment #1
Module 2 Weeks 3-4	Appearance Formatting Reordering data Look up info Basic finance	Workbook appearance (~10 min) Conditional Formatting (~9 min) Example: Creating a Personal Budget (~15 min) Filtering data (~12 min) Sorting data (~7 min) Look up info / vlookup (~15 min) Finance basics (~15 min) Research project overview (~19 min)	Read Chs. 4-6 Quizzes 4-6 Indicators & data due Assignment #2
Module 3 Weeks 5-6	Charts & graphics Graphs in PowerPoint Graphs in Word Graph Alternative data sets Quick Analysis	Intro to Graphs: Bar Chart (~19 min) Example #2: Stacked Column (~15 min) Graph Example #3: Multiple Category Line Graph (~17 min)	Read Chs. 8-9, 13 Assignment #3 Quizzes 7-9

		Graph Example #4:
		  Combo / Dual Axis Graph (~15 min)
		Graph Example #5:
		  Clustered Column (~13 min)
		Working with Excel Charts in MS Word (~16 min)
		Quick Analysis (~10 min)	

Module 4
Weeks 7-8
	Optimization
	Data Tables
	Descriptive Stats
	PivotTables
	Advanced Stats
		Data Tables #1: Intro (10 min)
		Data Tables #2: Finance Example
		  (16 min)
		Goal Seek (~5 min)
		Solver (~19 min)
		Data Analysis: Descriptive Statistics
		  (~11 min)
		Data Analysis: Histogram (~18 min)
		Data Analysis: T-test of means (~10 min)
		Data Analysis: Regression (~18 min)
		PivotTables - Introduction (~8 min)
		PivotTables – More advanced (~9 min)
		Printing (~9 min)
			Read Chs.10-11
			 p. 431-432
			Assignment #4
			Quizzes 10-12

Module 5 Weeks 9-10	Final project Economic indicators Creating tables & graphs Interpreting graphs & tables Analyzing relationships between variables Using economic intuition for data analysis	Research Project Overview (~20 min)	Final project Assignment #5

7.   Other Resources

7.1 Lynda

While all of the material necessary to succeed in this course is included in my online lectures and the textbook, it is often helpful to have additional resources for students that want to spend more time with the material or experience an alternative/additional explanation. Fortunately, there are many online resources that can help if you are struggling with learning Excel. One helpful resource is Lynda.com, which includes an extensive online database of videos for learning Excel (and other software).

As a member of the UW community you have unlimited access to the *Lynda.com* website. However, to utilize the UW site license you must login to your *MyUW* account and add the *Lynda.com* app to your *MyUW* webpage. You do this by clicking on the *MyUW* "Add more to home" button (top right). After you have added the *Lynda.com* app, click on the *Lynda.com* icon on your *MyUW* webpage. (Do not go directly to www.lynda.com). Once you click on the *Lynda.com* icon from within *MyUW*, you should be directed to a login form where you input your UW NetID information. Once in, you

can search for the Excel playlists and any particular topic you may be interested in learning more about. I will also post links to relevant Lynda videos on the course discussion board throughout the semester. For additional information, this *DoIt Knowledgebase document* contains a series of questions/answers concerning how to access *Lynda.com*.

7.2 Youtube

In addition to *Lynda.com*, there are numerous free Youtube videos that also explain various functions and methods in Excel. You can easily search for these videos by typing the desired topic into the Youtube search bar (i.e., "vlookup" or "PivotTables"). Some Youtube playlists that you might find helpful include:

1. *Excel for Beginners* by *Technology for Students and Teachers*
2. *Intro to Excel* by *FreeTutorials*
3. *Microsoft Excel 2016 Tutorial for Beginners* by *Subjectmoney*

7.3 Statistics: Khan Academy

While there are no prerequisites for this course, some basic knowledge of statistics—such as averages and medians—is necessary to fully understand the material. In my videos, I will review all of the statistics necessary for the course, but if you feel you need additional resources, the Khan Academy is an excellent source of video tutorials on statistics (and many other topics). You can easily search their videos for any topic you might be having trouble with (e.g., "medians").

While I may briefly discuss more sophisticated statistics in my videos—such as t-tests and regressions—you will not be required to master these topics or use them in your assignments or research project; the purpose of that material is simply to provide examples of more advanced statistical techniques that can be done in Excel, for those that are interested or already have the statistical background.

8.   How Course Hours are Met by the Course

In accordance with the UW-Madison Credit Hour Policy (b), it is expected that students in this course will engage in at least 90 hours of learning activities (45 hours per credit), including viewing weekly instructional videos, taking weekly quizzes, four at-home assignments, weekly reading and studying of the textbook, class participation, and a final research project. Specifically, students should expect to spend at least 2.25 hours per week, on average, viewing and replaying the instructional videos (22.5 total hours); 1.5 hours per week reading the textbook and reviewing important material (15

total hours); 45 minutes per week preparing for and taking weekly quizzes (7.5 total hours); and 30 minutes per week engaging in class participation (i.e., posting questions and answers to the course website, and reading others' posts) (5 total hours). In addition, students should spend at least four hours on each of the five assignments (20 total hours) and 20 hours on the final research project. For a 10-week course, this means at least 9 hours per week of dedicated study time.

9. Academic Integrity

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

10. Accommodations for Students with Disabilities

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform me of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. I will work either directly with the you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.
http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

11. Diversity & Inclusion

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture,

background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world. https://diversity.wisc.edu/