

Course	Week	Date	Topic	Skills
1	1	Aug. 17	1. Introduction: What is Data Visualization? 2. Data Visualization for Different Types of Variables	Can define data visualization and provide examples; Can describe different types of variables and how these impact data visualization options; Can describe when certain types of graphics are or are not appropriate and why.
1	2	Aug. 24	Do's and Do Not's of Data Visualization: Storytelling, Ethics, and Common Pitfalls	Can provide examples of how data visualization can be used, either purposefully or accidentally, to mislead decision-makers; Can discuss ethical considerations surrounding data visualizations and their use; Can provide positive examples of how data visualization can be used in storytelling and decision-making.
1	3	Aug. 31	Data Visualization in Excel, Part I: Graphing Quantitative Data	Can use software to create and customize scatterplots, histograms, time-series charts, combination plots, etc.; Can use pivot table and pivot chart features to create and customize graphics representing quantitative data.
1	4	Sept. 7	1. Data Visualization in Excel, Part II: Graphing Qualitative Data 2. Online Tools for Qualitative Data Visualization	Can use software to create and customize bar charts, pie charts, and other qualitative data visualizations; Can use pivot table and pivot chart features to create and customize graphics representing qualitative data; Can generate representations of unstructured/uncategorized qualitative data (e.g. word clouds) using online software.
1	5	Sept. 14	Real-Time Dashboarding: An Introduction to Online Interactive Dashboards	Can describe the difference between a dashboard and a report; can distinguish between static, interactive, and real-time graphics and provide examples of when each may be desirable; Can describe the do's and do not's of creating effective dashboarding and/or reporting tools.
1	6	Sept. 21	Tableau: Creation of Dashboard Tools	Can upload and manipulate data in Tableau; Can build basic graphics using dashboard software; can build reports and dashboards utilizing complex graphics, filters, and other advanced options.
1	7	Sept. 28	Power BI, Part I: Creation of Dashboard Tools	Can upload and manipulate data in Tableau; Can build basic graphics using dashboard software; Can build reports and dashboards utilizing complex graphics, filters, and other advanced options.

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1	8	Oct. 5	Power BI, Part II: Creation of Custom Maps and Geospatial Visualizations	Can create custom maps in Power BI; Experience working with shapefiles and JSON files; Can use a variety of software tools (e.g. QGIS, mapshaper, etc.) in tandem to generate custom maps in Power BI.
End of Course 1: Data Visualization Beginning of Course 2: Introduction to Data Organization, Preparation, and Analysis				
2	1	Oct. 12	1. Data Organization and Ctrl Tricks 2. Using Excel as a Calculator	Knowledge of data structure and proper recording; Knowledge of spreadsheet applications; Ability to use shortcut keys; Use of Excel as a calculator.
2	2	Oct. 19	1. Describing Data 2. What All Can the Ribbon Do?	Freezing panes; Simple functions (average, median, min, max, var, function button); Making plots; Familiarity with Excel Ribbon and its features.
2	3	Oct. 26	Sorting, Filtering, Cleaning, and Formatting	Sort and filter; Cleaning through column and row removal; Formatting times and dates; Cleaning individual data points.
2	4	Nov. 2	1. Data Manipulation Hacks 2. Marginal vs. Conditional Stats, and How to Calculate and Visualize That Data in Excel	Conditional formulas and calculations; Use of the \$ anchor, VLOOKUP, etc.; Other data manipulation/data munging tricks; Using data cleaning and manipulation/data munging to make graphics and draw inferences.
End of Course 2: Introduction to Data Organization, Preparation, and Analysis Beginning of Course 3: Introduction to Data Analysis				
3	1	Nov. 9	1. Summarizing Data 2. Pivot Chart and Pivot Table Features	Can calculate summary statistics such as mean, median, and standard deviation; Can discuss the difference between marginal versus conditional statistics; Can calculate both marginal and statistical descriptive statistics; Can subset data based on conditional statements using filter and other Excel tools; Can construct Pivot tables in Excel; Use of Pivot graphics in Excel; Understanding of different procedures for displaying conditional differences (or lack of differences) between groups.

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3	2	Nov. 16	1. Hypothesis Testing 2. t-Tests 3. Displaying Significance with Standard Errors and Confidence Intervals	Can correctly construct null and alternative hypotheses; Can identify events and the complement of events; Understands the difference between a p-value and a Type I error (α); Can conduct basic one population and paired t-tests; Correctly uses Excel functions to calculate test statistics, critical values, and p-values for one-tailed and two-tailed t-tests; can distinguish between a standard deviation and a standard error; can create graphics that indicate significance using standard error or confidence interval bars.
3	NA	Nov. 24	No Class – Happy Thanksgiving!	
3	3	Nov. 30	1. One-Way ANOVA and Diagnostics 2. Two-Way ANOVA	Knowledge of general linear model construction; Use of one-way ANOVA, factorials, etc. to analyze real-world experiments; Use of diagnostics to assess model fit; Use of advanced linear model techniques to interpret complex model interactions
3	4	Dec. 7	Regression, Diagnostics, and Time Series Forecasting	Simple regression; Polynomial/curvilinear regression; Linear modeling; Plots regression curves; Calculates predicted values using regression; Uses regression diagnostics to assess fit and predictability; Time series analysis; Forecasting
End of Course 3: Introduction to Data Analysis Happy Holidays!!! Break from Dec. 8 to Jan. 10 Beginning of Course 4: Introduction to R				
4	1	Jan. 11	Introduction to R R as a Calculator	Basic knowledge of R syntax and workspace; Knowledge of different variable types (e.g. numeric, integer, character, logic, etc.) and the implications of different variable types when attempting to complete calculations in R.
4	2	Jan. 18	Handling Different Types of Variables Lists and Data Frames	Knowledge of different variable types (e.g. numeric, integer, character, logic, etc.) and the implications of different variable types when attempting to complete calculations in R; Working knowledge of computational lists and data frames as well as how to utilize data contained in these objects.
4	3	Jan. 25	Dates, Times, Environments, Functions, and Packages	Ability to work with dates and times in R; Knowledge of different environments, including the working environment, in R; Ability to install and call packages in R; Ability to implement standard and intermediate functions in R; Ability to create basic novel functions in R.

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4	4	Feb. 1	Flow Control, Looping, and plyr	Ability to implement set theory and conditional statements to complete coding tasks efficiently; Looping and flow control in coding; Experience working with the plyr package and data organization; Intermediate R coding experience.
4	5	Feb. 8	Getting Data and Working with Your Own Stuff Syntax and Data Tidying Recap	Working with external datasets in R; Fluency in R language syntax; Data management, scrubbing, reorganization, merging, and tidying in R.
4	6	Feb. 15	Data Visualization	Data visualization in R, including basic graphics and ggplot2 graphics.
4	7	Feb. 22	Intro to Statistics and Data Analytics in R	Ability to conduct common statistical analyses and other data analyses in R.
4	8	Mar. 1	Random Number Generators and Basic Diagnostics	Can create vectors of randomly generated numbers; Use of random generated numbers to create training and validation datasets for data analysis and model validation; Use of random generated numbers to create test datasets; Ability to conduct basic model and programming diagnostics in R.
End of Course 4: Introduction to R Spring Break! Beginning of Course 5: Introduction to Python				
5	1	Mar. 15	Introduction to Python Python and Its IDEs	Basic knowledge of Python syntax and introductory commands; Installing Python IDEs and pip install; Knowledge of different variable types (e.g. integers, floats, strings, Boolean, etc.) and the implications of different variable types when attempting to complete calculations in Python; Making comments and cells; Running cells, lines, and entire files.
5	2	Mar. 22	What's in a List: Working with Lists Types of Variables and Lists	Knowledge of different variable types (e.g. integers, floats, strings, Boolean, etc.) and the implications of different variable types when attempting to complete calculations in Python; Working knowledge of lists, how to perform functions on lists, and how to use and modify (add, delete, merge, etc.) data contained in lists.
5	3	Mar. 29	Conditional Statements: If, Else, and Elif Looping	Ability to implement set theory and conditional statements to complete coding tasks efficiently; Looping and flow control in coding; Knowledge of spacing considerations when looping in Python.

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5	4	Apr. 5	Functions, Modules, Packages, and Libraries	Can describe the difference between functions, modules, packages, and libraries in Python; Ability to install and call modules in Python; Ability to create basic novel functions in Python.
5	5	Apr. 12	Data Frames, and Working with Your Own Stuff	Working knowledge of data frames in Python, how to read these into Python, and how to utilize data contained within these objects; working with external datasets in Python; Data management, scrubbing, reorganization, merging, and tidying in Python; Intermediate Python coding experience.
5	6	Apr. 19	Intro to Statistics and Data Analytics in Python	Ability to conduct common statistical analyses and other data analyses in Python.
5	7	Apr. 26	Data Visualization	Data visualization in Python; Exact visuals covered will depend on the interests of the class.
5	8	May 3	Intro to Machine Learning in Python	Performance of introductory machine learning tasks in Python; Exact algorithms and methods learned will depend on the interests of the class.