Syllabus - What you will learn from this course

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WEEK 1

WEEK 1 - INTRODUCTION TO DATA

In the first week of the course, we will review a course outline and discover the various concepts and objectives to be mastered in the weeks to come. You will get an introduction to the field of statistics and explore a variety of perspectives the field has to offer. We will identify numerous types of data that exist and observe where they can be found in everyday life. You will delve into basic Python functionality, along with an introduction to Jupyter Notebook. All of the course information on grading, prerequisites, and expectations are on the course syllabus and you can find more information on our Course Resources page.

5 hours to complete

11 videos (Total 114 min), 7 readings, 2 quizzes   SEE LESS

▶ **11 videos**

Welcome to the Course! 2m

Understanding and Visualizing Data Guidelines 3m

What is Statistics? 9m

Interview: Perspectives on Statistics in Real Life 28m

(Cool Stuff in) Data 8m

Where Do Data Come From? 12m

Variable Types 5m

Study Design 6m

Introduction to Jupyter Notebooks 9m

Data Types in Python 12m

Introduction to Libraries and Data Management 13m

📖 **7 readings**

Course Syllabus 5m

Meet the Course Team! 10m

About Our Datasets 2m

Help Us Learn More About You! 10m

Resource: This is Statistics 10m

Let's Play with Data! 10m

Data management and manipulation 10m

📋 **2 practice exercises**

Practice Quiz - Variable Types 30m

Assessment: Different Data Types 10m

WEEK 2

WEEK 2 - UNIVARIATE DATA

In the second week of this course, we will be looking at graphical and numerical interpretations for one variable (univariate data). In particular, we will be creating and analyzing histograms, box plots, and numerical summaries of our data in order to give a basis of analysis for quantitative data and bar charts and pie charts for categorical data. A few key interpretations will be made about our numerical summaries such as mean, IQR, and standard deviation. An assessment is included at the end of the week concerning numerical summaries and interpretations of these summaries.

5 hours to complete

8 videos (Total 92 min), 2 readings, 3 quizzes   **SEE LESS**

▶ **8 videos**

Categorical Data: Tables, Bar Charts & Pie Charts 4m

Quantitative Data: Histograms 12m

Quantitative Data: Numerical Summaries 9m

Standard Score (Empirical Rule) 7m

Quantitative Data: Boxplots 6m

Demo: Interactive Histogram & Boxplot 4m

Important Python Libraries 21m

Tables, Histograms, Boxplots in Python 25m

What's Going on in This Graph? 10m

Modern Infographics 10m

📋 **3 practice exercises**

Practice Quiz: Summarizing Graphs in Words 15m

Assessment: Numerical Summaries 10m

Python Assessment: Univariate Analysis 10m

WEEK 3

WEEK 3 - MULTIVARIATE DATA

In the third week of this course on looking at data, we'll introduce key ideas for examining research questions that require looking at more than one variable. In particular, we will consider both numerically and visually how different variables interact, how summaries can appear deceiving if you don't properly account for interactions, and differences between quantitative and categorical variables. This week's assignment will consist of a writing assignment along with reviewing those of your peers.

5 hours to complete

7 videos (Total 56 min), 3 readings, 3 quizzes   **SEE LESS**

▶ **7 videos**

Looking at Associations with Multivariate Categorical Data 9m

Looking at Associations with Multivariate Quantitative Data 7m

Demo: Interactive Scatterplot 2m

Introduction to Pizza Assignment 2m

Multivariate Data Selection 19m

Multivariate Distributions 8m

Unit Testing 5m

3 readings

Pitfall: Simpson's Paradox 10m

Modern Ways to Visualize Data 10m

Pizza Study Design Assignment Instructions 10m

2 practice exercises

Practice Quiz: Multivariate Data 10m

Python Assessment: Multivariate Analysis 15m

WEEK 4 - POPULATIONS AND SAMPLES

In this week, you'll spend more time thinking about where data come from. The highest-quality statistical analyses of data will always incorporate information about the process used to generate the data, or features of the data collection design. You'll be exposed to important concepts related to sampling from larger populations, including probability and non-probability sampling, and how we can make inferences about larger populations based on well-designed samples. You'll also learn about the concept of a sampling distribution, and how estimation of the variance of that distribution plays a critical role in making statements about populations. Finally, you'll learn about the importance of reading the documentation for a given data set; a key step in looking at data is also looking at the available documentation for that data set, which describes how the data were generated.

6 hours to complete

15 videos (Total 223 min), 8 readings, 2 quizzes   **SEE LESS**

15 videos

Sampling from Well-Defined Populations 16m

Probability Sampling: Part I 10m

Probability Sampling: Part II 15m

Non-Probability Sampling: Part I 10m

Non-Probability Sampling: Part II 9m

Sampling Variance & Sampling Distributions: Part I 15m

Sampling Variance & Sampling Distributions: Part II 7m

Demo: Interactive Sampling Distribution 21m

Beyond Means: Sampling Distributions of Other Common Statistics 10m

Making Population Inference Based on Only One Sample 14m

Inference for Non-Probability Samples 17m

Complex Samples 23m

Sampling from a Biased Population 15m

Randomness and Reproducibility 14m

The Empirical Rule of Distribution 18m

📖 **8 readings**

Building on Visualization Concepts 5m

Potential Pitfalls of Non-Probability Sampling: A Case Study 10m

Resource: Seeing Theory 10m

Article: Jerzy Neyman on Population Inference 10m

Preventing Bad/Biased Samples 10m

Optional: Deeper Dive Reference 10m

Course Feedback 10m

Keep Learning with Michigan Online 10m

📋 **2 practice exercises**

Assessment: Distinguishing Between Probability & Non-Probability Samples 10m

Generating Random Data and Samples 20m