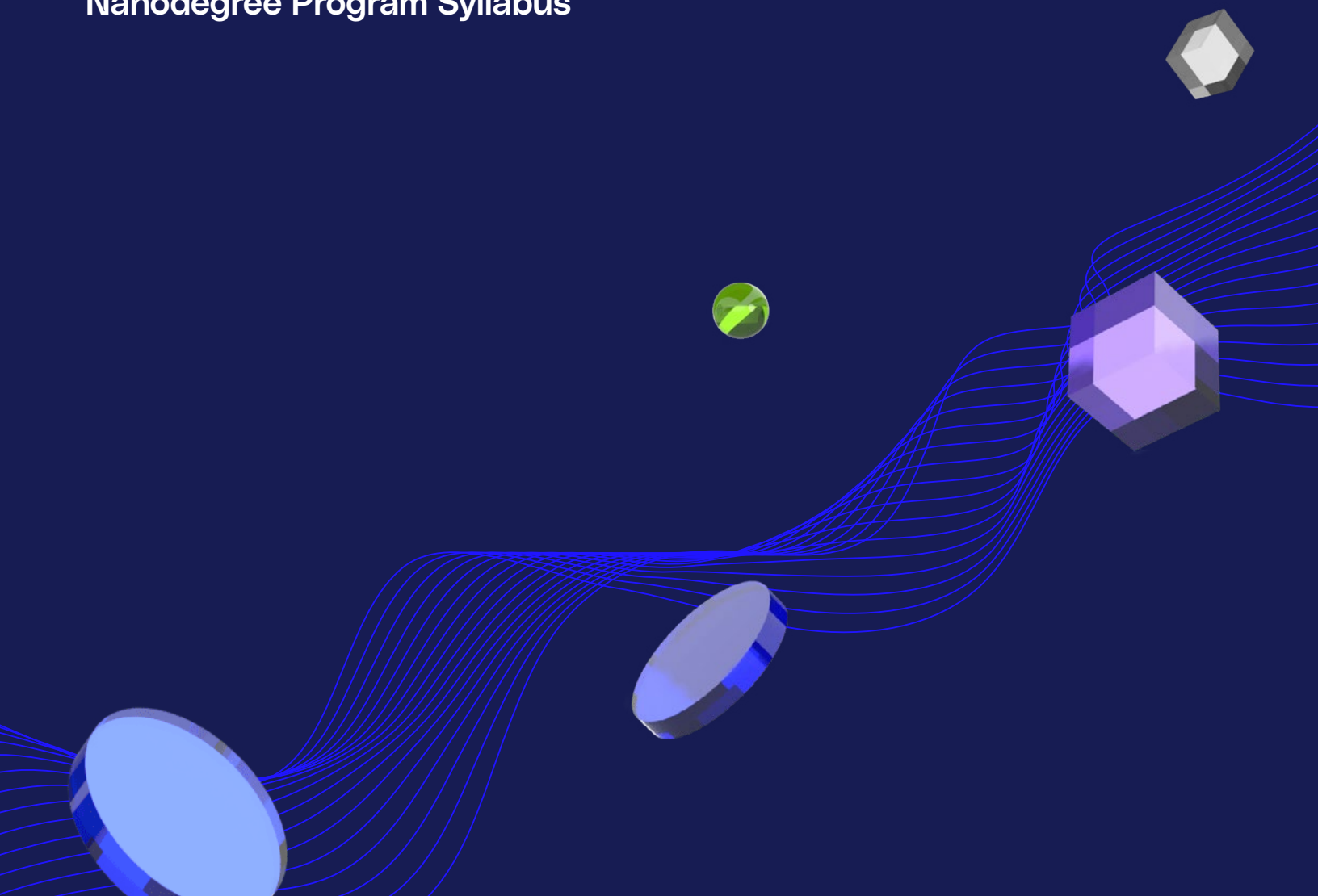


# Data Analysis & Visualization with Microsoft Power BI

Nanodegree Program Syllabus



# Overview

The Data Analysis and Visualization with Microsoft Power BI program will equip any learner who wants to develop in-demand skills in data pre-processing, visualization, and analysis using Microsoft Power BI as the primary tool. Students in this program will learn to connect Microsoft Power BI to multiple data sources, process and transform data to prepare it for reporting and visualization, build compelling data visualizations that tell a story and employ best design practices, and draw insights from data dashboards and visualizations that can allow for insights and help a business make critical decisions.

## Program information



### Estimated Time

3 months at 5hrs/week\*



### Skill Level

Beginner

\*The length of this program is an estimation of total hours the average student may take to complete all required coursework, including lecture and project time. If you spend about 5-10 hours per week working through the program, you should finish within the time provided. Actual hours may vary.



## Prerequisites

A well-prepared learner should have knowledge of:

- Microsoft Excel basic functions (SUM, DIVIDE, AVERAGE, etc.)
- Microsoft Excel basic formulae ( $a + b = c$ , for example)
- Microsoft Excel tables



## Required Hardware/Software

Learners will need a Windows operating system, and will need to download and install free Microsoft Power BI Desktop software. The hardware/OS requirements listed are:

- Windows 10, Windows Server 2012 R2, Windows Server 2012, Windows 8, Windows 8.1, Windows Server 2016, Windows Server 2019, or Windows 11
- Internet Explorer 10 or greater
- A 32-bit (x86) or 64-bit (x64) platform

# Introduction to Preparing & Modeling Data

In a perfect world, every BI professional would be provided with pristine data warehouse and enterprise level data models to easily build and deploy reliable data models themselves—but that isn't reality. Often, the data they need for a single report lives in a bunch of different files and software systems. This is where preparing and modeling data becomes essential. This course is a crucial step in Microsoft Power BI for anyone who needs to mash together multiple data sources, clean them, restructure them, and harmonize them into a single and efficient data model to support reporting. We'll cover Microsoft Power BI's built-in Extract-Transform-Load (ETL) tool: Power Query, learn foundational data modeling principles, cover some introductory DAX (data analytics expressions), and touch on troubleshooting and optimization. Each of these steps creates the foundation for beautiful reports and efficient DAX, ideally positioning learners to take on the remaining courses in the Nanodegree program.



## Course Project

### Build a Data Model for Seven Sages Brewing Company

Create a data model and Microsoft Power BI report for Seven Sages Brewing, a small company struggling to leverage their disjointed data to facilitate smart decision-making. The mission is to tame their datasets and create an efficient data model that will help the company better understand what products are popular—and profitable—so they can make smart decisions about what products to prioritize as the company continues to grow. Learners will demonstrate an understanding of core data modeling principles, including the ability to clean, organize, and structure data in Power Query. They will also make data tables, build a data model with the appropriate relationships and filters, and create a simple report using common visualizations and DAX measures.

### Lesson 1

## Introduction to Preparing & Modeling Data

- Describe the Microsoft Power BI data Pipeline.
  - Recognize the range of stakeholders a data modeler should collaborate with.
  - Become familiar with the role of Power Query, data modeling, and reporting to meet business needs.
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### Lesson 2

## Key Concepts in Data Modeling

- Conceptualize data modeling, including fact tables, dimension tables, key columns, and relationships.
  - Define the role each component plays in reporting.
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### Lesson 3

## Getting Your Data & Initial Transformations

- Access a range of data sources using Get Data.
  - Leverage Power Query to perform initial transformations to make your queries user friendly.
  - Develop a familiarity with data types and their role in Microsoft Power BI.
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### Lesson 4

## Bigger Transformations & Data Tables

- Correct—and know when to correct—errors and gaps.
  - Make more complex column changes within queries.
  - Morph data across queries to align with reporting needs.
  - Choose and build the right data table for your purposes.
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### Lesson 5

## Relationships & Relationship-Related DAX

- Select the correct relationships for your data model.
  - Create implicit and quick measures.
  - Leverage relationships and filters in common DAX functions.
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### Lesson 6

## Reports & DAX for Common Reporting Needs

- Choose between a measure and calculated column.
- Create basic report visualizations such as Matrixes and Cards.
- Make DAX functions that leverage conditional logic.
- Troubleshoot and organize your Microsoft Power BI file.

# Creating Visualizations with Microsoft Power BI

Learn how to carry Microsoft Power BI beyond mere bar charts and transform reports into data exploration and storytelling tools that companies can use to better understand their data. Students will start by learning about a variety of common and more advanced data visualizations, ranging from bar charts and line charts to scatter plots and bubble maps. Then, students will learn how to design reports around these data visuals in order to focus user attention on key insights, help users navigate different features and report pages, and enable accessibility options for diverse audiences. Next, the student will learn how to use filters and slicers to make the Microsoft Power BI tools they develop more interactive and encourage users to explore datasets and visuals. Finally, students will deliver a couple of advanced features capable of elevating user navigation and engagement with visuals and the report itself.



## Course Project

### Building a Power BI report for Waggle

Waggle is a hot new startup that produces smart devices for pets. Their leading product, the Lapdog collar, has been a tremendous success for the company and it allows a pet owner to easily track their dog's steps, heart rate, and general health from the convenience of their phone. The product has been so successful, in fact, that the company is considering releasing a similar product for cats called Lapcat and has been testing hundreds of prototypes in the field for the past several months.

Now, the data from those tests has been compiled and Waggle leadership has requested a Microsoft Power BI report that summarizes key insights comparing Lapcat and Lapdog devices that can be presented to the CEO. This project will test learners on the data visualization and report design skills learned in the course while also challenging them to implement a variety of interactive features that can enhance the user experience. By the end of the project, learners will have designed a detailed Microsoft Power BI report with many data visuals that tell the story of how the new Lapcat devices compared to Lapdog collars.

## Lesson 1

### Welcome to Creating Visualizations with Microsoft Power BI

- Describe the learning objective of the course.
  - Explain why data visualization is important for business intelligence.
  - Identify the main stakeholders that BI analysts interact with.
  - Identify when data visualization is useful and when it is not.
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## Lesson 2

### Building Compelling Data Visualizations

- Identify important business metrics and pair them with appropriate data visuals.
  - Build common data visuals, including bar charts and line charts.
  - Design complementary visuals, including cards, donut charts, and tables.
  - Build more complex data visuals, including scatter plots and bubble maps.
  - Recognize standard formatting options for Microsoft Power BI visuals and navigate the unique formatting features that vary between visuals.
- 

## Lesson 3

### Designing User-Friendly Reports

- Customize Microsoft Power BI themes with unique color palettes.
  - Insert elements like images, shapes, and buttons to create compelling and versatile layouts for their reports.
  - Apply design principles that reduce noise and highlight data stories.
  - Maximize accessibility for diverse user groups.
- 

## Lesson 4

### Creating Interactive Reports for Data Exploration

- Design visuals that interact with one another and help users explore data by filtering and drilling for insights.
- Identify the differences between filters and slicers in a Microsoft Power BI report, including when to use each and differences in functionality.
- Apply filters to data visuals, pages, and reports.
- Customize the filter pane for reporting needs.
- Help users explore the data with different types of slicers.

## Lesson 5

### Elevating Reports with Advanced Report Features

- Customize Microsoft Power BI reports in ways that foster interactivity and help users tell compelling data stories.
- Build custom data stories with Microsoft Power BI bookmarks.
- Empower users with navigation buttons.
- Design drill-through pages for deep-dive analysis.

## Course 3

# Advanced Data Analysis

In this course, learners will focus on the techniques and skills needed for data analysis in Microsoft Power BI. The course is centered around building a strong foundation and intuition of analytics so that learners can take their skills beyond simply aggregating data in Microsoft Power BI and into the realm of statistics, forecasting, and strategy. We first start with an introduction to data analysis looking at different terms and techniques such as descriptive and inferential statistics, histograms, linear regression, and an introduction to the concepts of correlation and probability. After taking the introductory lessons on data analytics, the course then moves to M, the language of Power Query, and learning to build custom formulas as part of the data transformation process. In this section, the syntax of the language is explored and learners are challenged with different exercises to build their familiarity and skills. After Power Query, the course then moves to DAX. In a similar approach, the syntax of the language is reviewed along with common functions and exercises to build an intuition for analyzing data with DAX. The final lesson of the course goes through a number of visualizations in Microsoft Power BI and explores how those visuals may be used, edited or enhanced to effectively relay information to an audience. The overarching goal of the course is to help learners become effective at the process of retrieving, analyzing and visualizing data in order to answer questions and draw conclusions.





## Course Project

# Market Analysis Report for National Clothing Chain

An online national clothing chain needs your help creating a targeted marketing campaign. Sales have been flat and they want to lure lost customers back. They want to advertise specific products to specific customers in specific locations, but they don't know who to target. They need you to conduct an analysis to determine the best product to advertise to each customer. In this project, learners will use population statistics from the US Census Bureau to determine where the greatest income exists around the country and whether there is a correlation between sales and income. We don't know the incomes of our customers, but we should be able to predict it by looking at their purchase history and locations and comparing that against the census data. Additionally, we want to analyze our inventory, specifically customer ratings and return rate and see if there's a correlation between the two. Through this project, learners will demonstrate the ability to use custom M code to import, clean, format, and organize data in Power Query and use custom DAX code to analyze data in Microsoft Power BI. Learners will also conduct statistical analysis to understand relationships and probabilities of the data sources, including linear regression, histogram, and standard deviation, and create advanced visualizations to present conclusions and recommendations that are driven by the statistical analysis.

## Lesson 1

### Welcome to Advanced Data Analysis in Microsoft Power BI

- Describe the learning objectives of the course.
- Explain what data analysis is and why it's important.
- Identify the main stakeholders that data analysts interact with.
- Identify when data analysis is useful and when it is not.

## Lesson 2

### Advanced Data Analytics

- Define, investigate, and analyze data in order to draw conclusions.
- Use historical analysis to investigate, aggregate, and describe data.
- Use predictive analysis to understand relationships between data and forecast the probabilities of future outcomes.

### Lesson 3

## Power Query Transformations

- Compare and contrast Power Query and DAX.
  - Use M in Power Query to manually edit table columns.
  - Write custom formulas using the advanced editor in order to effectively clean and format imported data.
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### Lesson 4

## DAX Functions

- Write custom DAX formulas to perform calculations or format data.
  - Use DAX to create calculated tables.
  - Troubleshoot common DAX errors and fix the underlying issues with their code.
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### Lesson 5

## Advanced Visualizations

- Use advanced visualizations in order to analyze data and draw conclusions.
- Distinguish between advanced and standard visualizations.
- Customize advanced visualizations with filters, formatting, and trend analysis.

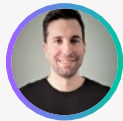
# Meet your instructors.



## **Lenore R Flower**

**Senior Business Intelligence Specialist**

Lenore is a Senior Business Intelligence Specialist with a background in finance and a passion for empowering her colleagues to make data-driven decisions—even if the information they have to work with is a little rough around the edges.



## **Sean Chandler**

**Senior Business Intelligence Engineer at Humana**

Sean is a Senior Business Intelligence Engineer at Humana, where he oversees an enterprise community of thousands of users & developers. His Power BI work has been featured recently at the Microsoft Business Applications Summit and on Microsoft Mechanics.

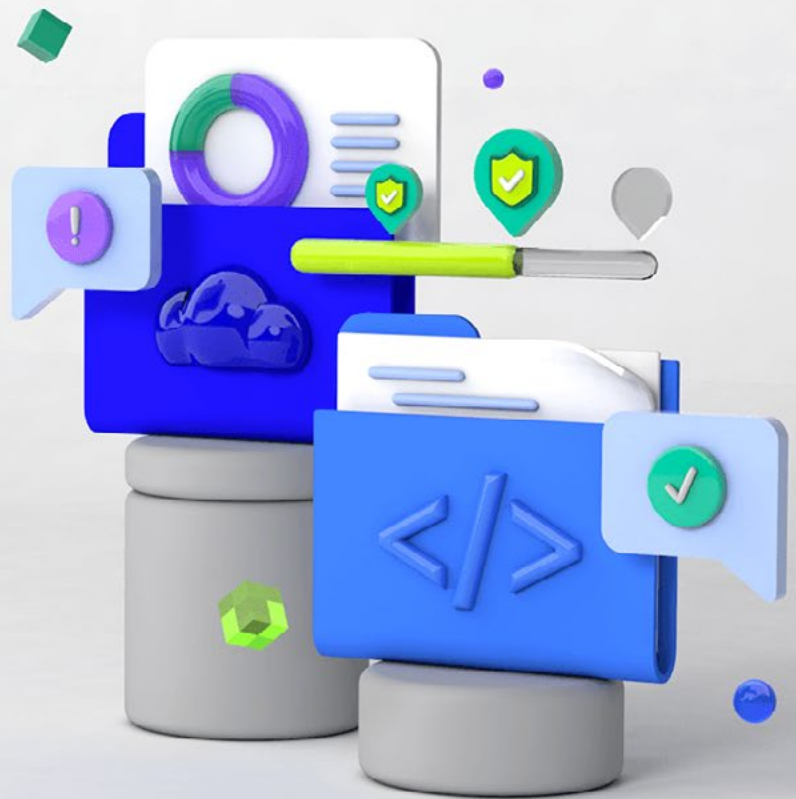


## **Joseph Lozada**

**Business Intelligence & Operations Professional**

Joseph works as a client services team leader at Morneau Shepell, where he manages a team of analysts and oversees the data management and systems functionality for his clients. He also works as an adjunct instructor of Excel and Power BI analytics at the Community College of Rhode Island.

# Udacity's learning experience



## Hands-on Projects

Open-ended, experiential projects are designed to reflect actual workplace challenges. They aren't just multiple choice questions or step-by-step guides, but instead require critical thinking.



## Knowledge

Find answers to your questions with Knowledge, our proprietary wiki. Search questions asked by other students, connect with technical mentors, and discover how to solve the challenges that you encounter.



## Workspaces

See your code in action. Check the output and quality of your code by running it on interactive workspaces that are integrated into the platform.



## Quizzes

Auto-graded quizzes strengthen comprehension. Learners can return to lessons at any time during the course to refresh concepts.



## Custom Study Plans

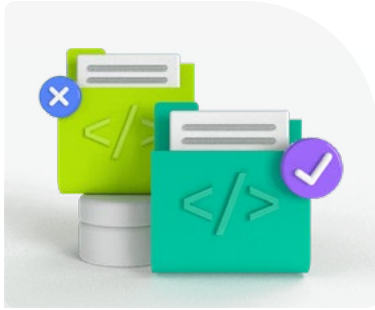
Create a personalized study plan that fits your individual needs. Utilize this plan to keep track of movement toward your overall goal.



## Progress Tracker

Take advantage of milestone reminders to stay on schedule and complete your program.

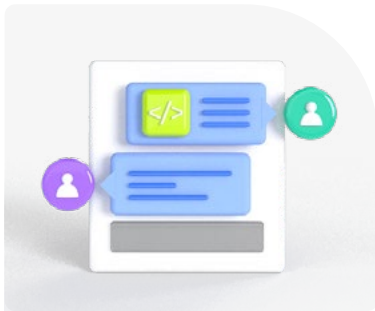
# Our proven approach for building job-ready digital skills.



## Experienced Project Reviewers

### Verify skills mastery.

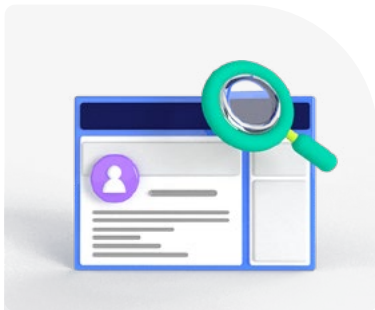
- Personalized project feedback and critique includes line-by-line code review from skilled practitioners with an average turnaround time of 1.1 hours.
- Project review cycle creates a feedback loop with multiple opportunities for improvement—until the concept is mastered.
- Project reviewers leverage industry best practices and provide pro tips.



## Technical Mentor Support

### 24/7 support unblocks learning.

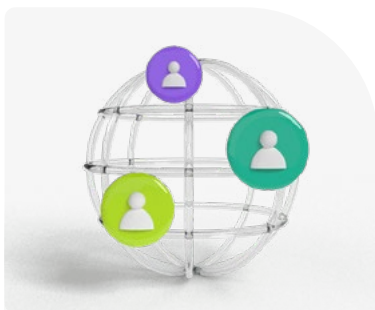
- Learning accelerates as skilled mentors identify areas of achievement and potential for growth.
- Unlimited access to mentors means help arrives when it's needed most.
- 2 hr or less average question response time assures that skills development stays on track.



## Personal Career Services

### Empower job-readiness.

- Access to a Github portfolio review that can give you an edge by highlighting your strengths, and demonstrating your value to employers.\*
- Get help optimizing your LinkedIn and establishing your personal brand so your profile ranks higher in searches by recruiters and hiring managers.



## Mentor Network

### Highly vetted for effectiveness.

- Mentors must complete a 5-step hiring process to join Udacity's selective network.
- After passing an objective and situational assessment, mentors must demonstrate communication and behavioral fit for a mentorship role.
- Mentors work across more than 30 different industries and often complete a Nanodegree program themselves.

\*Applies to select Nanodegree programs only.

Learn more at

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