



THE SCHOOL OF DATA SCIENCE

Data Analysis and Visualization with Microsoft Power BI



NANODEGREE SYLLABUS

Overview

Data Analysis and Visualization with Microsoft Power BI Nanodegree Program

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

**TIME**

3 months
Study 5 hours/week

**LEVEL**

Foundational

**PREREQUISITES**

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

**HARDWARE/SOFTWARE REQUIRED**

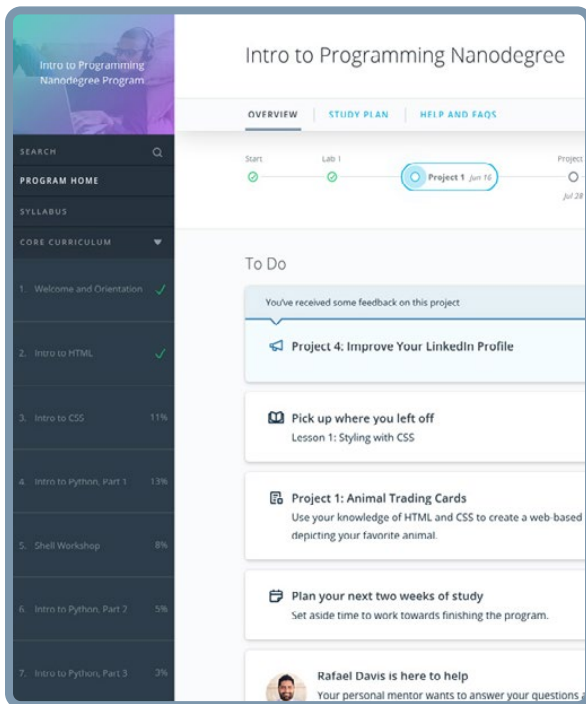
Learners will need the Windows operating system, and will need to download and install free Microsoft Power BI Desktop software. The hardware/OS requirements listed are:

- Supported Operating System: Windows 10, Windows Server 2012 R2, Windows Server 2012, Windows 8, Windows 8.1, Windows Server 2016, Windows Server 2019, Windows 11
- Microsoft Power BI Desktop requires Internet Explorer 10 or greater and Microsoft Power BI Desktop is available for 32-bit (x86) and 64-bit (x64) platforms.

**LEARN MORE ABOUT THIS
NANODEGREE**

Contact us at
enterpriseNDs@udacity.com.

Our Classroom Experience



REAL-WORLD PROJECTS

Learners build new skills through industry-relevant projects and receive personalized feedback from our network of 900+ project reviewers. Our simple user interface makes it easy to submit projects as often as needed and receive unlimited feedback.

KNOWLEDGE

Answers to most questions can be found with Knowledge, our proprietary wiki. Learners can search questions asked by others and discover in real-time how to solve challenges.

WORKSPACES

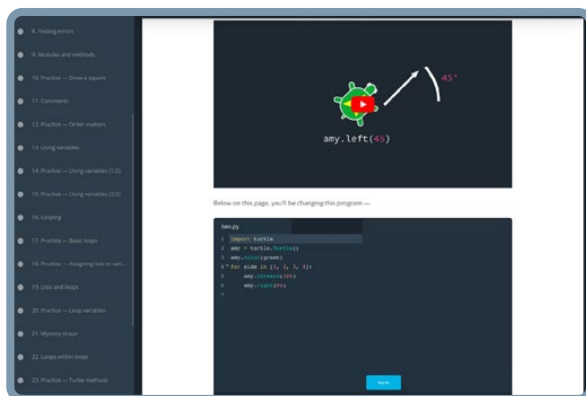
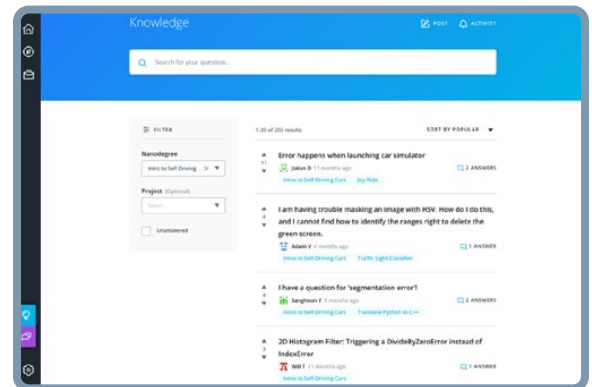
Learners can check the output and quality of their code by testing it on interactive workspaces that are integrated into the classroom.

QUIZZES

Understanding concepts learned during lessons is made simple with auto-graded quizzes. Learners can easily go back and brush up on concepts at anytime during the course.

CUSTOM STUDY PLANS

Create a custom study plan to suit your personal needs and use this plan to keep track of your progress toward your goal.



PROGRESS TRACKER

Personalized milestone reminders help learners stay on track and focused as they work to complete their Nanodegree program.

Learn with the Best



Joseph Lozada

BUSINESS INTELLIGENCE
AND 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 Microsoft Power BI analytics at the Community College of Rhode Island.



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 Microsoft Power BI work has been featured recently at the Microsoft Business Applications Summit and on Microsoft Mechanics.



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.



Course 1: Introduction to Preparing and Modeling Data

In a perfect world, every BI professional would be able to rely on a pristine data warehouse and enterprise level data models to easily build and deploy reliable data models — but where do you even start when the data you 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 students to take on the remaining courses in the Nanodegree program.

Project

Build a Data Model for Seven Sages Brewing Company

Introduction to Preparing and Modeling data culminates with a final project in which you will 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. Your 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 mark smart decisions about what products to prioritize as the company continues to grow.

Students will demonstrate an understanding of core data modeling principles, including the ability to clean, organize and structure data in Power Query, to make a date table, to build a data model with the appropriate relationships and filters and to create a simple report using common visualizations and DAX measures.

Nanodegree Program Overview

LESSON TITLE	LEARNING OUTCOMES
INTRODUCTION TO PREPARING AND MODELING DATA	<ul style="list-style-type: none">• 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
KEY CONCEPTS IN DATA MODELING	<ul style="list-style-type: none">• Conceptualize data modeling, including fact tables, dimension tables, key columns, and relationships• Define the role each component plays in reporting
GETTING YOUR DATA & INITIAL TRANSFORMATIONS	<ul style="list-style-type: none">• 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
BIGGER TRANSFORMATIONS & DATE TABLES	<ul style="list-style-type: none">• 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
RELATIONSHIPS & RELATIONSHIP-RELATED DAX	<ul style="list-style-type: none">• Select the correct relationships for your data model• Create Implicit and Quick Measures• Leverage relationships and filters in common DAX functions
REPORTS AND DAX FOR COMMON REPORTING NEEDS	<ul style="list-style-type: none">• 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



Course 2: Creating Visualizations with Microsoft Power BI

In this course, students will learn how to carry Microsoft Power BI beyond mere bar charts and transform their reports into data exploration & 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, the course will culminate with students combining elements they have learned from the rest of the lesson to deliver a couple of advanced features capable of elevating how users navigate and engage with visuals and the report itself.

Project

Building a Microsoft Power BI report for Waggle

Waggle is a hot new start-up that produces smart devices for pets. Their leading product, the Lapdog collar, has been a tremendous success for the company and it allows pet owners 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 students 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, students 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.

Nanodegree Program Overview

LESSON TITLE	LEARNING OUTCOMES
WELCOME TO CREATING VISUALIZATIONS WITH MICROSOFT POWER BI	<ul style="list-style-type: none">• 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
BUILDING COMPELLING DATA VISUALIZATIONS	<ul style="list-style-type: none">• Identify important business metrics and pair them with appropriate data visuals• Build common data visuals, including bar charts & line charts• Design complementary visuals, including cards, donut charts & tables• Build more complex data visuals, including scatter plots & bubble maps• Recognize standard formatting options for Microsoft Power BI visuals and navigate the unique formatting features that vary between visuals
DESIGNING USER-FRIENDLY REPORTS	<ul style="list-style-type: none">• 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 & highlight data stories• Maximize accessibility for diverse user groups

Nanodegree Program Overview

LESSON TITLE

LEARNING OUTCOMES

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

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, students 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 students 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 students 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 students become effective at the process of retrieving, analyzing and visualizing data in order to answer questions and draw conclusions.



Nanodegree Program Overview

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, you 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, you 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. You 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 TITLE

LEARNING OUTCOMES

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

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

Nanodegree Program Overview

LESSON TITLE	LEARNING OUTCOMES
POWER QUERY TRANSFORMATIONS	<ul style="list-style-type: none">• 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
DAX FUNCTIONS	<ul style="list-style-type: none">• 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
ADVANCED VISUALIZATIONS	<ul style="list-style-type: none">• 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

Our Nanodegree Programs Include:



Pre-Assessments

Our in-depth workforce assessments identify your team's current level of knowledge in key areas. Results are used to generate custom learning paths designed to equip your workforce with the most applicable skill sets.



Dashboard & Progress Reports

Our interactive dashboard (enterprise management console) allows administrators to manage employee onboarding, track course progress, perform bulk enrollments and more.



Industry Validation & Reviews

Learners' progress and subject knowledge is tested and validated by industry experts and leaders from our advisory board. These in-depth reviews ensure your teams have achieved competency.



Real World Hands-on Projects

Through a series of rigorous, real-world projects, your employees learn and apply new techniques, analyze results, and produce actionable insights. Project portfolios demonstrate learners' growing proficiency and subject mastery.

Our Review Process

Real-life Reviewers for Real-life Projects

Real-world projects are at the core of our Nanodegree programs because hands-on learning is the best way to master a new skill. Receiving relevant feedback from an industry expert is a critical part of that learning process, and infinitely more useful than that from peers or automated grading systems. Udacity has a network of over 900 experienced project reviewers who provide personalized and timely feedback to help all learners succeed.



Vaibhav
UDACITY LEARNER

"I never felt overwhelmed while pursuing the Nanodegree program due to the valuable support of the reviewers, and now I am more confident in converting my ideas to reality."

now at
CODING VISIONS INFOTECH

All Learners Benefit From:



Line-by-line feedback for coding projects



Industry tips and best practices



Advice on additional resources to research



Unlimited submissions and feedback loops

How it Works

Real-world projects are integrated within the classroom experience, making for a seamless review process flow.

- Go through the lessons and work on the projects that follow
- Get help from your technical mentor, if needed
- Submit your project work
- Receive personalized feedback from the reviewer
- If the submission is not satisfactory, resubmit your project
- Continue submitting and receiving feedback from the reviewer until you successfully complete your project

About our Project Reviewers

Our expert project reviewers are evaluated against the highest standards and graded based on learners' progress. Here's how they measure up to ensure your success.

900+

Expert Project Reviewers

Are hand-picked to provide detailed feedback on your project submissions.

1.8M

Projects Reviewed

Our reviewers have extensive experience in guiding learners through their course projects.

3

Hours Average Turnaround

You can resubmit your project on the same day for additional feedback.

4.85 /5

Average Reviewer Rating

Our learners love the quality of the feedback they receive from our experienced reviewers.



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