RUTGERS
Center for Innovation Education

Data Science and Visualization Program

CURRICULUM OVERVIEW

Over the past decade, the explosive growth of data has transformed virtually every industry. Small wonder that skilled professionals who can translate that data into actionable insights are in high demand. Our 24-week bootcamp is a part-time program that will give you the knowledge and skills to conduct robust analytics on a host of real-world problems.

Whether you're employed or a full-time student, the Rutgers Data Science Bootcamp is designed to fit into your life, with convenient weekend and evening sessions. The program is rigorous, fast-paced, and focused on the practical technical skills needed to analyze and solve data problems. You'll gain proficiency in a broad array of technologies like Excel, Python, JavaScript, SQL Databases, and Tableau, and more—plus you'll graduate with an impressive Professional Portfolio and the confidence you need to succeed in today's data-driven economy.

Is This Program Right For You?

Are you creative, curious, and ambitious? Do you want to be part of the data revolution?
If any of the following describes you, enrolling in our Data Science Bootcamp could be a smart career move:

- You're a data professional and want to advance your career by building new technical skills.
- You are a manager or professional in a business where data can positively impact the bottom line.
- You're interested in visualizing social, consumer, or popular trends.
- You would like to enter a new field—healthcare, government, or media, for example—and are looking for a way to jump in.
- You are a full-time student, hungry to learn more and expand your skill set.

The Skills You'll Gain

You will graduate with skills in Data Science and Visualization, including:

Advanced Excel

- Pivot Tables
- VBA Scripting

Fundamental Statistics

- Modeling
- Forecasting

Python Programming

- Python 3
- NumPy
- Pandas
- Matplotlib
- API Interactions
- Social Media Mining

Databases

- MySQL
- MongoDB

Front-End Web Visualization

- HTML
- CSS
- Bootstrap
- Dashboarding
- JavaScript Charting
- D3.js
- Geomapping with Leaflet.js

Business Intelligence Software

- Tableau

Advanced Topics

- Big Data Analytics with Hadoop
- Machine Learning

* Note: These topics are subject to change based on local market demand and the input of our hiring partners.

Building On The Basics

For those new to the Data Analytics field, knowing where to start can be a challenge. No worries: We've designed our curriculum to provide you with a foundation of core skills essential to success in the field. As you progress through the program, you'll acquire new skills and apply them in solving "real-world" problems. By the time you complete the program, you will have a created a strong professional portfolio showcasing your work.

Real Projects, Real Jobs

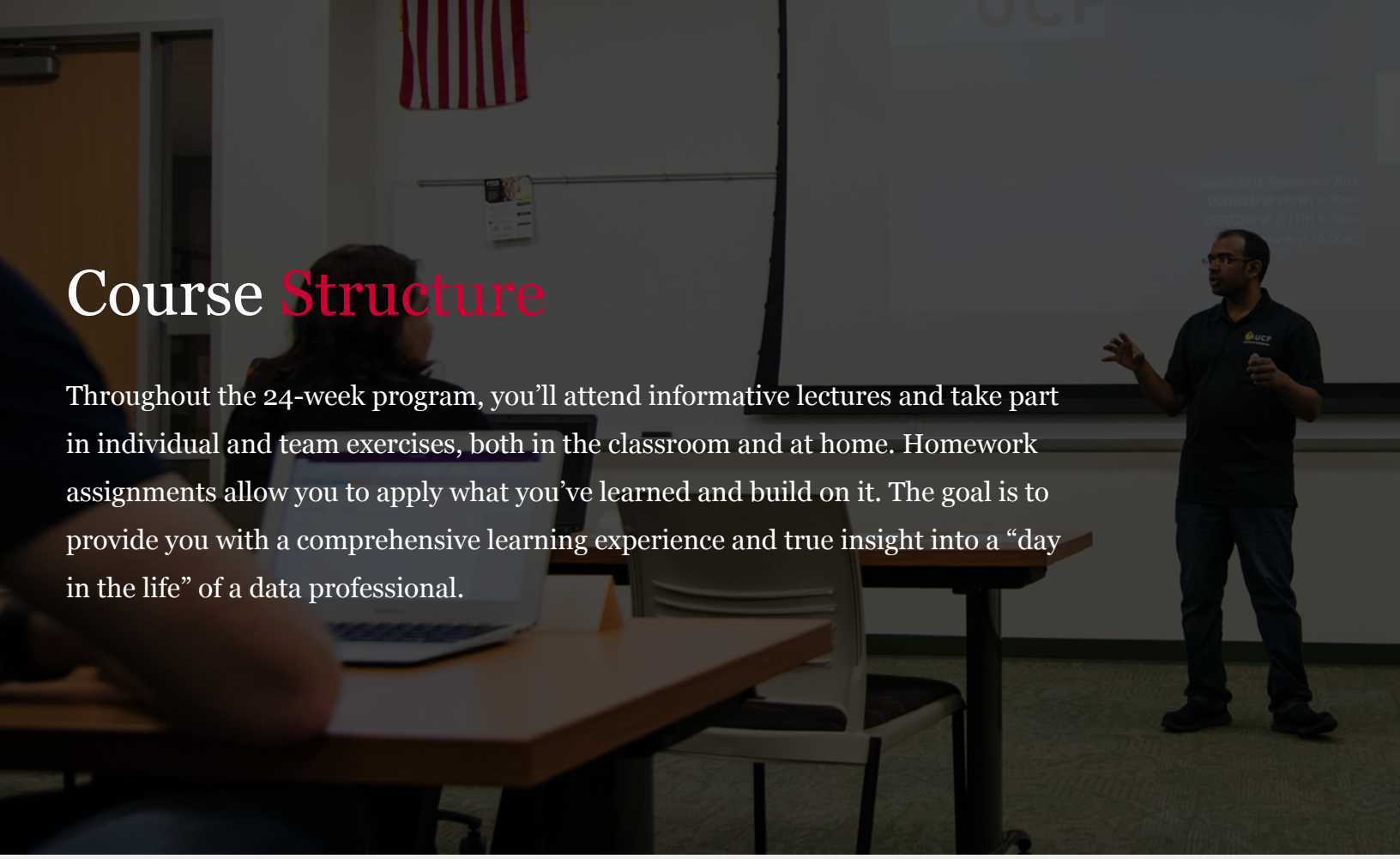
Our graduates will be qualified for a wide range of roles, including:

- Data Analyst
- Data Engineer
- Data Scientist
- Data Journalist
- Business Analyst
- SQL Developer
- Systems Engineer
- Database Administrator
- Big Data Engineer
- Business Intelligence Analyst
- Research Analyst
- Software Engineer

What You Will Learn

By the time you graduate, you can expect to be able to:

- Employ statistical analysis to model, predict, and forecast trends
- Build VBA scripts in Excel to automate manual processes
- Utilize real-world data sources to identify and analyze social, financial, and political phenomena
- Create Python-based scripts to automate the cleanup, restructuring, and rendering of large, heterogeneous datasets
- Interact with RESTful APIs using Python Requests and JSON parsing techniques
- Create in-depth graphs, charts, and tables utilizing a variety of data-driven programming languages and libraries
- Use geographic data to create visually exciting, interactive, and informative maps
- Build custom interactive data visualizations using D3.js and other JavaScript libraries
- Write SQL commands to perform Create, Read, Update, and Delete commands
- Use advanced SQL and Mongo techniques to combine multiple datasets in order to create even more impressive and comprehensive databases
- Create basic interactive websites and applications to showcase your work
- Work in—and lead—small-scale teams to create applications and visual datasets
- Scrape information from web pages in order to collect data from a broad range of online sources
- Gain and communicate new business insights using enterprise-grade tools like Tableau
- Analyze social media trends on Twitter and Facebook using automated programs
- Work independently or in a group on complex data-mining projects
- Master the basics of troubleshooting and enhancing legacy code



Course Structure

Throughout the 24-week program, you'll attend informative lectures and take part in individual and team exercises, both in the classroom and at home. Homework assignments allow you to apply what you've learned and build on it. The goal is to provide you with a comprehensive learning experience and true insight into a "day in the life" of a data professional.

DISCUSSION

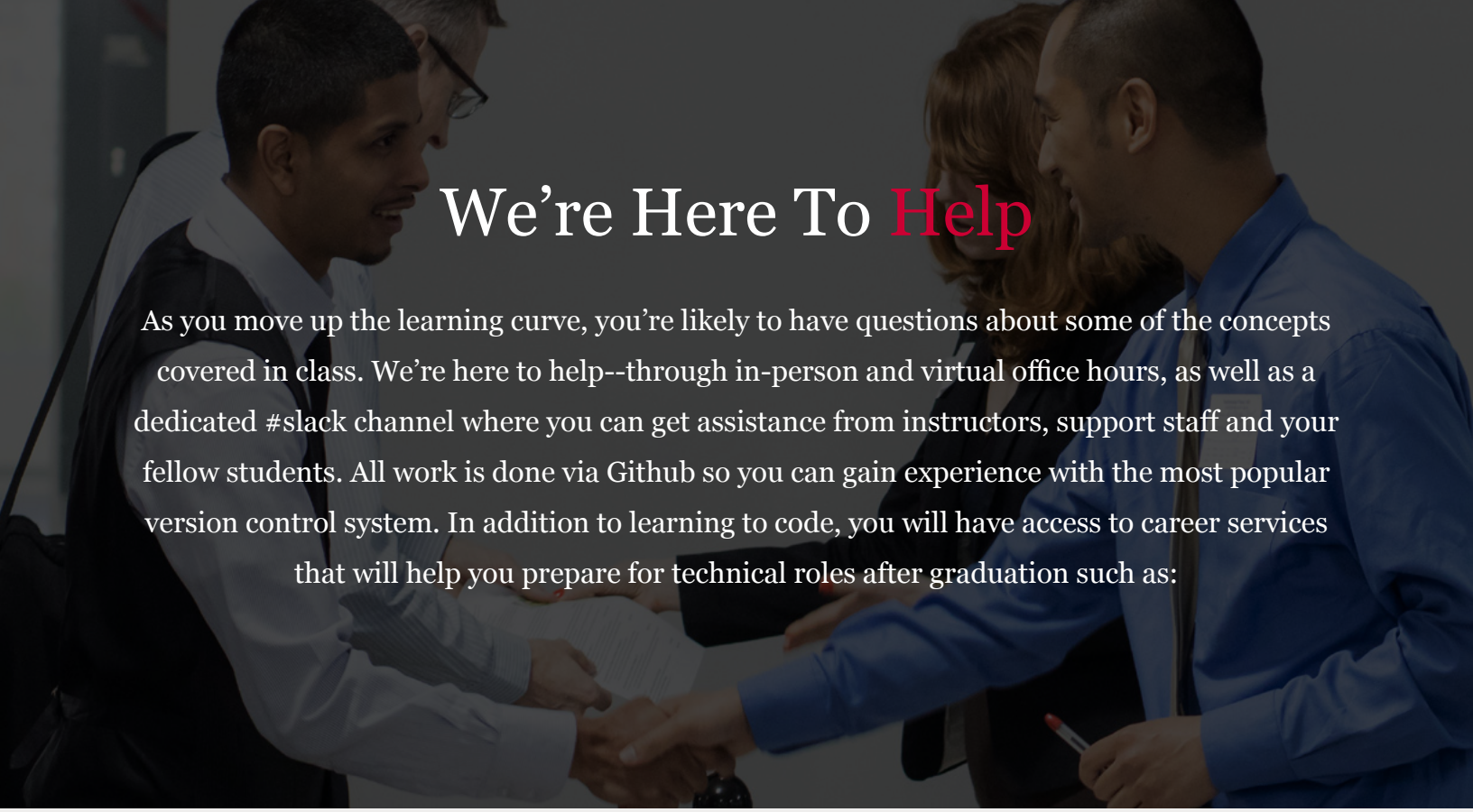
Instructor-led discussions cover the background, history, and use of a new technology or concept.

PROJECT WORK

You'll put classroom teaching into practice—individually and as part of a team—to work on timed in-class exercises and projects.

PORTFOLIO PROJECTS

You'll build a substantial portfolio of projects that demonstrate your abilities across a diverse array of technologies and signal to employers that you are ready for prime time!



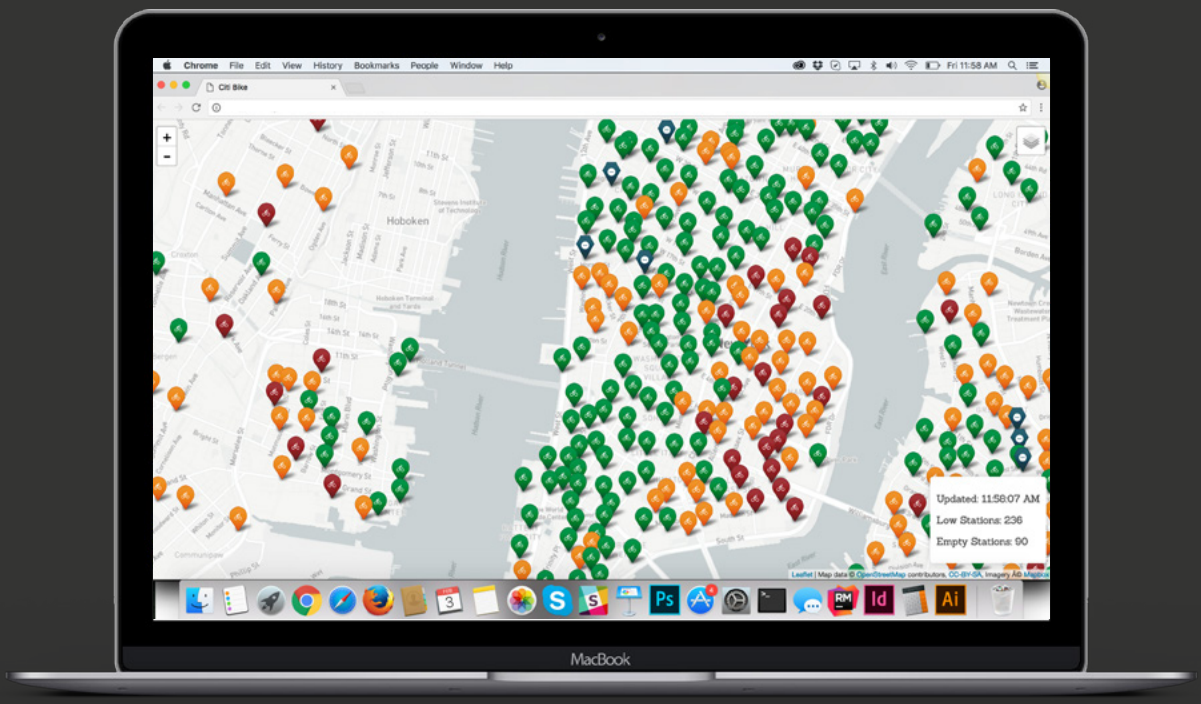
We're Here To Help

As you move up the learning curve, you're likely to have questions about some of the concepts covered in class. We're here to help--through in-person and virtual office hours, as well as a dedicated #slack channel where you can get assistance from instructors, support staff and your fellow students. All work is done via Github so you can gain experience with the most popular version control system. In addition to learning to code, you will have access to career services that will help you prepare for technical roles after graduation such as:

- Career Services
- Access to Prospective Employers
- Career Content and Practice Sessions
- Projects Supported by Industry
- Customizable Tools and Templates
- Panel Speaker Event
- Career Coaching
- High Impact Career Events
- Soft Skills Training

Building Your Portfolio

It's a fact: Companies care about what you can do, not what you say you can do. For that reason, our curriculum teaches you how to put what you've learned to work on real-world data projects, from visualizing bike-sharing data in New York City to mapping earthquakes worldwide in real time.



Building Your Portfolio

Bank Deserts

Social economists have long noted a dearth of reputable banks and financial services in high-poverty geographic areas, resulting in heightened rates of financial victimization. Is there a way to use data to illustrate this trend? In this activity, you'll learn how to combine data from the U.S. Census, Google Maps, and Google Places to visualize the relationship between various socioeconomic factors and the number of banks in a given zip code.

Skills Needed

- Python
- Pandas
- Google Maps
- Google Places
- Matplotlib
- APIs

Objectives

- Utilize the Python Requests library to make hundreds of API calls to the US Census and Google Maps datasets
- Utilize the Python pandas library to organize the retrieved information by zip code and socioeconomic factors
- Build scatter plots to easily communicate the Banking Desert phenomena

Earthquake History

Data isn't just about finance and numbers. It can also be used for societal good. In this activity, you will create an interactive visualization of historic earthquakes over time using Leaflet.js, a popular JavaScript geo-mapping library. Your final application will provide a near-live feed of earthquakes around the world and their relative magnitudes.

Skills Needed

- HTML
- CSS
- Javascript
- Leaflet.js
- APIs
- JSON

Objectives

- Harness the power of APIs and JSON to gather earthquake data from USGS datasets
- Utilize Leaflet.js library to create visually compelling, animated maps
- Embed the created map onto a live web page using HTML and CSS

Portfolio continued...

Web Scraping Application

Sometimes, the data we need is *just* out of reach. Whether it's a social media website guarding its information, a government agency with poorly organized records, or a cookbook website filled with secret recipes, data isn't always accessible by external applications. This is where data scraping comes in. Utilizing Python libraries like Beautiful Soup, you will learn to convert data straight from raw HTML into a queryable and storable form, opening up troves of data for your future applications.

Skills Needed

- Python
- Beautiful Soup
- HTML
- CSS
- MongoDB

Objectives

- Scrape your favorite social media website for otherwise inaccessible data
- Parse through the retrieved information and store it into a MongoDB database
- Create new representations of the data using HTML and CSS

Data Journalism and D3

In this activity, you take on the role of a data visualization specialist working for a major metropolitan newspaper. Your editor wants to run a series of features about the health risks facing particular demographic groups in the United States. You will create charts and interactive graphs to accompany the articles, using the latest information from two government databases and the D3 JavaScript library.

Skills Needed

- JavaScript & D3 Library
- HTML/CSS
- Bootstrap
- Microsoft Excel

Objectives

- Collect data from two government databases
- Store the data within a series of .CSV files
- Create fully interactive graphs that alter with button-clicks
- Place all of your information into a mobile-responsive webpage

Portfolio continued...

Game Studio Analytics

Congratulations! You have landed a job as Lead Analyst for an independent game company. Your first assignment will really test your skills and involves analyzing data and creating a report for the company's latest hit release. You will use the Python Pandas Library and Jupyter Notebook to create demographic and other financial reports.

Skills Needed

- Python
- Jupyter Notebook
- Pandas Library

Objectives

- Use Python and the Pandas library to create a report containing a vast amount of data
- Make the data viewable using Jupyter Notebook
- Find, analyze, and write descriptions of observable trends in the data

PlotBot5

Twitter bots are all the rage these days and, for this assignment, you will create an interactive Twitter bot of your own. This Twitter bot will receive tweets via mentions and then perform "sentiment analysis" on the first Twitter account specified in the mention. A plot of data will then be tweeted out from the PlotBot5 Twitter feed.

Skills Needed

- Python
- VADER (Sentiment Analysis)
- Tweepy (Twitter)
- Pandas
- Matplotlib
- Heroku

Objectives

- Create your own fully interactive Twitter bot, to be run off of Heroku
- Perform sentiment analysis on Twitter accounts using VADER and Tweepy
- Parse, store, and post to the web on call

Course Curriculum By Module

Module	Description	What You'll Learn
Module 1: Excel Crash Course (Weeks 1-2)	Learn to do more with Microsoft Excel! This module covers advanced topics like statistical modeling, forecasting and prediction, pivot tables and VBA scripting. You will even learn how to model historic stock trends – and, hopefully, how to beat the market!	» Microsoft Excel » VBA Script » Statistics Modeling
Module 2: Python Data Analytics (Weeks 3-9)	Gain a solid foothold in one of today's fundamental programming languages. You'll develop proficiency in core Python; data analytic tools like NumPy, Pandas, and Matplotlib; and specific libraries for interacting with web data, like Requests, BeautifulSoup, and Tweepy.	» Python » APIs » JSON » NumPy » Pandas » Matplotlib » Beautiful Soup » Tweepy
Module 3: Databases (Weeks 10-12)	Dive deep into the most prolific database languages: SQL and NoSQL. Work with MySQL and MongoDB to organize data into well-structured, easily retrievable formats.	» SQL » NoSQL » MySQL » MongoDB
Module 4: Web Visualization (Weeks 13-19)	Building visualizations is of little benefit without a way to communicate the message. In this module, you'll learn how to use the core web development technologies (HTML, CSS, and JavaScript) to create new and interactive data visualizations that you can share with everyone on the web!	» HTML » CSS » JavaScript » AJAX » D3 » Leaflet
Module 5: Advanced Topics (Weeks 20-23)	By program's end, you'll be immersed in new and in-demand topics like Tableau, Hadoop, and Machine Learning.	» Tableau » Hadoop » Machine Learning
Module 6: Final Project (Week 24)	As part of a small team, you'll draw upon everything you have learned in the program to create an impressive data-visualization application. Get creative and come up with something cool to show off to the whole world!	» Dreaming up something fantastic and pushing the bounds of reasonable and achievable