Part 1: Introduction to Python

- Introduction to Python and Jupyter Notebooks
- Variable Types
  - Numbers
  - Strings
  - Lists
  - Tuples
  - Dictionaries
  - Booleans
- Control Flow
  - If-Else
  - While Loops
  - For Loops
  - List Comprehensions
- Functions
  - Built-in functions
  - Importing python packages/modules and using their functions
  - Writing functions
  - Lambda Functions
- Simple Data I/O
  - Reading and writing to text files

Part 2: Data Analysis with Python

- Introduction to Jupyter
- What a Jupyter notebook is
  - How to create and edit a Jupyter notebook
  - How Jupyter notebooks can be effectively used in the workplace
- Loading Data into a Pandas DataFrame
  - Loading data from text files (csv, tab delimited, whitespace delimited)
  - Loading data from databases
  - Tips and tricks for loading data
- Describing Data
  - Describe a datasets size, shape, and variable types
- Selecting Data from a DataFrame
  - Select data by position
  - Select data by conditions
- Handling Dates in a DataFrame
  - Convert dates in data to datetime objects
  - Calculate time deltas
  - Convert time zones
- Manipulate Data DataFrame
  - Update values, delete values, drop rows and columns
- Analyzing Groups of Data
  - Easily sort data into groups and perform group wise analyses and comparisons
• Custom Analysis (apply your own functions to DataFrames)
  o Go beyond the built in analysis functions and write your own formulas and algorithms
• Merging DataFrames
  o Combining dataframes
• Basic Data Visualization
  o Create line plots, histograms, and bar plots
  o Format plot labels and axes

Part 3: Developing with Python

• Introduction to Visual Studio Code for Python
  o Explore the basics of Visual Studio Code and learn how you can use it
• Write scripts that accept command line arguments for reusability and automation
• Write python modules for organized and reusable code
• Learn how to write and install your own python packages
  o Learn how these can be co-developed and used across your team for increased efficiency and productivity
• Testing your code with pytest
  o Learn why tests are important and how to easily implement them in python
• Effectively incorporating logging in your code
  o Learn how to set up logging and handle different levels of logging messages (error, info, debug, etc...)

Part 4: Machine Learning with Python

• Introduction to Jupyter
• Collecting and Describing Data
• Exploring Data
• Training Regression and Classification Models
  o Logistic Regression
  o Decision Trees
  o Linear Regression
  o Neural Networks
  o K-Nearest Neighbors
• Using Cross Validation To Tune Hyper parameters
  o What Cross Validation Is and Why It Is Important
• Preventing Overfitting
  o Strategies to prevent overfitting
  o What regularization is and how to use it.
• Testing Models
  o How to test your models and what to consider when aligning tests with real world business problems.

Part 5: Workshop

• Workshop scenario and data will be identified during pre-course planning