**Day 13:**

**NumPy Basics: Arrays and Vectorized Computation**

 The NumPy ndarray: A Multidimensional Array Object

 Creating ndarrays

 Data Types for ndarrays

 Operations between Arrays and Scalars

 Basic Indexing and Slicing

 Boolean Indexing

 Fancy Indexing

 Transposing Arrays and Swapping Axes

 Universal Functions: Fast Element-wise Array Functions

 Data Processing Using Arrays

 Expressing Conditional Logic as Array Operations

 Mathematical and Statistical Methods

 Methods for Boolean Arrays

 Sorting

 Unique and Other Set Logic

 File Input and Output with Arrays

 Storing Arrays on Disk in Binary Format

 Saving and Loading Text Files

 Linear Algebra

 Random Number Generation

**Getting started with pandas**

 Introduction to pandas Data Structures

 Series

 DataFrame

 Index Objects

**Essential Functionality**

 Reindexing

 Dropping entries from an axis

 Indexing, selection, and filtering

 Arithmetic and data alignment

Function application and mapping

 Sorting and ranking

 Axis indexes with duplicate values

**Summarizing and Computing Descriptive Statistics**

 Correlation and Covariance

 Unique Values, Value Counts, and Membership

**Day 14:**

**Handling Missing Data**

 Filtering Out Missing Data

 Filling in Missing Data

 Hierarchical Indexing

 Reordering and Sorting Levels

 Summary Statistics by Level

 Using a DataFrame’s Columns

 Table

**Data Loading, Storage, and File Formats**

 Reading and Writing Data in Text Format

 Reading Text Files in Pieces

 Writing Data Out to Text Format

 Manually Working with Delimited Formats

 JSON Data

 XML and HTML: Web Scraping

 Binary Data Formats

 Using HDF5 Format

 Reading Microsoft Excel Files

 Interacting with HTML and Web APIs

 Interacting with Databases

 Storing and Loading Data in MongoDB

**Data Wrangling: Clean, Transform, Merge, Reshape**

 Combining and Merging Data Sets

 Database-style DataFrame Merges

 Merging on Index

 Concatenating Along an Axis

 Combining Data with Overlap

 Reshaping and Pivoting

 Reshaping with Hierarchical Indexing

 Pivoting “long” to “wide” Format

 Data Transformation

 Removing Duplicates

 Transforming Data Using a Function or Mapping

 Replacing Values

 Renaming Axis Indexes

 Discretization and Binning

 Detecting and Filtering Outliers

 Permutation and Random Sampling

 Computing Indicator/Dummy Variables

 String Manipulation

 String Object Methods

 Regular expressions

**Day 15:**

**Plotting and Visualization**

 A Brief matplotlib API Primer

 Figures and Subplots

 Colors, Markers, and Line Styles

 Ticks, Labels, and Legends

 Annotations and Drawing on a Subplot

 Saving Plots to File

 matplotlib Configuration

 Plotting Functions in pandas

 Line Plots

 Bar Plots

Histograms and Density Plots

 Scatter Plots

 Plotting Maps: Visualizing Haiti Earthquake Crisis Data

**Day 16:**

**Data Aggregation and Group Operations**

 GroupBy Mechanics

 Iterating Over Groups

 Selecting a Column or Subset of Columns

 Grouping with Dicts and Series

 Grouping with Functions

 Grouping by Index Levels

 Data Aggregation

 Column-wise and Multiple Function Application

 Returning Aggregated Data in “unindexed” Form

 Group-wise Operations and Transformations

 Apply: General split-apply-combine

 Quantile and Bucket Analysis

 Example: Filling Missing Values with Group-specific Values

 Example: Random Sampling and Permutation

 Example: Group Weighted Average and Correlation

 Example: Group-wise Linear Regression

 Pivot Tables and Cross-Tabulation

 Cross-Tabulations: Crosstab

**Time Series**

 Date and Time Data Types and Tools

 Converting between string and datetime

 Time Series Basics

 Indexing, Selection, Subsetting

 Time Series with Duplicate Indices

 Date Ranges, Frequencies, and Shifting

 Generating Date Ranges

 Frequencies and Date Offsets

Shifting (Leading and Lagging) Data

 Time Zone Handling

 Localization and Conversion

 Operations with Time Zone−aware Timestamp Objects

 Operations between Different Time Zones

 Periods and Period Arithmetic

 Period Frequency Conversion

 Quarterly Period Frequencies

 Converting Timestamps to Periods (and Back)

 Creating a PeriodIndex from Array