DATA SCIENCE ROADMAP AND LEARNING PLAN (6 Months)

Months 1–2: Foundations and Programming

Week 1-2: Python Programming Basics

- **Objective:** Establish a solid understanding of Python.
  - Learn Python basics (variables, data types, loops, functions).
  - Practice writing simple scripts and solving problems.
  - Start an online Python course (e.g., Codecademy, Coursera).

  Learning Resources:

  - **Courses:**
    - Python for Everybody Specialization (Coursera)
    - Learn Python 3 (Codecademy)
  - **YouTube Channels:**
    - Corey Schafer (Python tutorials)
    - Tech with Tim (Beginner Python projects)
  - **Books:**
    - *Automate the Boring Stuff with Python* by Al Sweigart

Week 3-4: Python Libraries for Data Science

- **Objective:** Get hands-on with essential Python libraries.
  - Learn and practice with NumPy and Pandas.
  - Perform basic data manipulation and analysis tasks.
  - Work on small projects to apply these libraries (e.g., analyzing a simple dataset).

Learning Resources:

- **Courses:**
  - Data Analysis with Python (Coursera)
- **YouTube Channels:**
  - Keith Galli (NumPy, Pandas, and Data Science tutorials)
- **Books:**
  - *Python for Data Analysis* by Wes McKinney

Week 5-6: Introduction to Statistics

- **Objective:** Understand core statistical concepts.
  - Study descriptive statistics (mean, median, mode, variance).
  - Learn and apply basic probability theory.
  - Practice statistical analysis using Python.

Learning Resources:

- **Courses:**
  - Statistics for Data Science and Business Analysis (Udemy)
- **YouTube Channels:**
  - StatQuest with Josh Starmer (Statistics explained simply)
- **Books:**
  - *Naked Statistics* by Charles Wheelan

Week 7-8: Probability and Inferential Statistics

- **Objective:** Delve deeper into probability and inferential statistics.
  - Explore probability distributions and Bayes' theorem.
  - Understand hypothesis testing, confidence intervals, and p-values.
  - Apply these concepts to real-world datasets.

Learning Resources:

- **Courses:**
  - Probability and Statistics for Data Science (edX)
- **YouTube Channels:**
  - Khan Academy (Probability and statistics)

Month 3-4: Data Analysis and Visualization

Week 9-10: Data Cleaning and Preprocessing

- **Objective:** Learn to prepare data for analysis.
  - Understand the importance of data cleaning.
  - Practice data preprocessing techniques using Pandas.
  - Work on a data cleaning project to solidify these skills.

  Learning Resources:

  - **Courses:**
    - Data Cleaning in Python (Datacamp)
  - **YouTube Channels:**
    - Data School (Pandas tutorials)
  - **Books:**
    - *Effective Pandas* by Matt Harrison

Week 11-12: Exploratory Data Analysis (EDA)

- **Objective:** Gain insights from data through EDA.
  - Learn how to perform EDA using Pandas and visualization tools.
  - Identify patterns, trends, and anomalies in datasets.
  - Document and present findings from your EDA project.

  Learning Resources:

- **Courses:**
  - Exploratory Data Analysis with Python and Pandas (Udemy)
- **YouTube Channels:**
  - Krish Naik (Data Science projects and EDA tutorials)

Week 13-14: Data Visualization Techniques

- **Objective:** Master data visualization.
  - Learn to create various plots and charts using Matplotlib and Seaborn.
  - Understand the principles of effective data visualization.
  - Create visualizations that communicate insights.

  Learning Resources:

  - **Courses:**
    - Data Visualization with Python (Coursera)
  - **YouTube Channels:**
    - Sentdex (Matplotlib and Seaborn tutorials)
  - **Books:**
    - *Storytelling with Data* by Cole Nussbaumer Knaflic

Week 15-16: Interactive Data Visualization

- **Objective:** Build interactive visualizations.
  - Learn to use Plotly for interactive dashboards.
  - Develop a project where users can explore data interactively.
  - Share your interactive dashboard project with others.

  Learning Resources:

  - **Courses:**
    - Interactive Data Visualization with Plotly in Python (Udemy)
  - **YouTube Channels:**

- Charming Data (Plotly and Dash tutorials)

Month 5-6: Machine Learning and Projects

Week 17-18: Introduction to Machine Learning

- **Objective:** Start with the basics of machine learning.
  - Understand supervised and unsupervised learning.
  - Implement basic algorithms like linear regression and decision trees.
  - Use scikit-learn to apply these algorithms to datasets.

  Learning Resources:

  - **Courses:**
    - Machine Learning by Andrew Ng (Coursera)
  - **YouTube Channels:**
    - StatQuest with Josh Starmer (Machine learning algorithms)
  - **Books:**
    - *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow* by Aurélien Géron

Week 19-20: Advanced Machine Learning Topics

- **Objective:** Expand your ML knowledge.
  - Explore more complex algorithms like Random Forest, SVMs, and Gradient Boosting.
  - Learn about model evaluation and hyperparameter tuning.
  - Work on a small ML project using these advanced techniques.

  Learning Resources:

  - **Courses:**
    - Advanced Machine Learning with TensorFlow on Google Cloud (Coursera)

- **YouTube Channels:**
  - Data Professor (Advanced machine learning techniques)

Week 21-22: Introduction to Deep Learning

- **Objective:** Get a taste of deep learning.
  - Learn the basics of neural networks.
  - Explore frameworks like TensorFlow or Keras.
  - Implement a simple deep learning model.

  Learning Resources:

  - **Courses:**
    - Deep Learning Specialization by Andrew Ng (Coursera)
  - **YouTube Channels:**
    - DeepLizard (Deep learning tutorials)

Week 23-24: Capstone Project and Portfolio Building

- **Objective:** Apply everything you've learned in a comprehensive project.
  - Select a complex real-world problem and solve it using the skills acquired.
  - Document the entire process, from data collection to model deployment.
  - Publish the project on GitHub and add it to your portfolio.

  Learning Resources:

  - **Courses:**
    - Applied Data Science Capstone (Coursera)
  - **YouTube Channels:**
    - Ken Jee (Building a data science portfolio)

Throughout the 6 Months: Continuous Learning and Practice

- **Regular Practice:** Code regularly on platforms like LeetCode or HackerRank.
- **Kaggle Competitions:** Participate in competitions to gain practical experience.
- **Industry Updates:** Read data science blogs and follow trends.
- **Networking:** Join meetups, online communities, and connect with data scientists.
- **Regular Practice:**
  - LeetCode
  - HackerRank
- **Kaggle Competitions:**
  - Kaggle (Participate in competitions)
- **Industry Updates:**
  - **Blogs:**
    - Towards Data Science
    - Analytics Vidhya
  - **Podcasts:**
    - Data Skeptic
    - SuperDataScience
- **Networking:**
  - Meetup (Join data science meetups)
  - LinkedIn Groups (Join data science communities)

Additional Suggestions:

- **SQL Basics:** Integrate learning SQL for querying databases, as it's essential for data analysis. Mode Analytics SQL Tutorial

- **Version Control with Git:** Learn Git and GitHub for version control and collaboration. GitHub Learning Lab (Interactive Git tutorials)
- **Cloud Basics:** Consider learning cloud services (e.g., AWS, GCP) to deploy models and handle large-scale data. AWS for Data Science (Udacity)