DATA SCIENCE ADVANCED COURSE CONTENT

Week 1

1. What is data science and its applications?
2. Introduction to Python for data science
3. Basic data analysis using Numpy
4. ·Introduction to NumPy and its functions for mathematical operations on arrays
5. **Mini Project 1:** Hands-on practice with 4 Jupyter Notebooks

Week 2 - 4

6. Overview of statistical concepts like mean, median, mode, and standard deviation
7. Loc and iloc practices using boolean condition
8. Probability distributions and hypothesis testing
9. Overview of data wrangling and cleaning
10. Cleaning and transforming data using Python libraries like Pandas
11. Handling missing values and outliers
12. Merging and reshaping data
13. Hands-on practice cleaning and transforming real-world datasets
14. Regex
15. Loading data with different file formats and performing EDA (txt, JSON)
16. Introduction to Python libraries such as Scipy and Statsmodels
17. Installation and setup of the required libraries
18. Importing and loading data
19. Performing statistical analysis using Python libraries
20. Visualization of results using Matplotlib or other visualization libraries
21. **Mini Project 2**: Hands-on practice implementing statistical analysis using Python libraries like Numpy and Pandas
22. **Mini Project 3:** Hands-on project using the real-life dataset implementing Regex and JSON formats

Week 4 & 5

23. Why visualization is important in data science
24. Introduction to Power BI for data visualization
25. Connecting data sources within Power BI
26. Creating basic charts and graphs in Power BI
27. Understanding advanced visualization techniques in Power BI

28. Creating interactive visualizations in Tableau
29. Mapping data in Tableau
30. Customizing colors, labels, and titles
31. Adding filters and sorting data
32. Working with calculated fields and parameters in Tableau
33. Best practices for designing effective dashboards in Tableau
34. Hands-on practice creating visualizations using real-world datasets
35. **Mini Project 4**: A full-fledged advanced Power BI dashboard for portfolio and practice

Week 5 & 6

36. What is machine learning and its applications
37. Supervised and unsupervised learning
38. Types of machine learning algorithms: linear regression, logistic regression, decision trees, and clustering
39. Introduction to sci-kit-learn library for machine learning
40. Hands-on practice implementing basic machine learning algorithms in Python
41. **Mini Project 5**: Implementation of Machine Learning Models using real-time datasets.

Week 7

42. What is SQL
43. SQL and data science
44. Basic Queries Structure
45. SQL Commands: DDL, DQL, DML, DCL, and TCL With real-life datasets.
46. **Mini Project 6**: SQL Project on a real-life dataset to implement data retrieval processes.

Week 8 - 10

47. Deep learning and neural networks
48. RNN, CNN, and LSTM architecture
49. Activation functions: Sigmoid, ReLU, and Tanh.
50. Backpropagation algorithm: The process of adjusting weights and biases in the network to minimize the error.
51. Popular deep learning frameworks: TensorFlow, Keras, and PyTorch.
52. YOLO interpretation for Computer Vision
53. Object Detection, Image Segmentation, and Image Analysis
54. Natural language processing (NLP) and text analytics
55. Large Language Models
56. Hands-on practice implementing advanced machine learning techniques in Python

Week 11 & 12

57. **Mega Project** Proposal Submission
58. **Mega Project** Evaluation 1
59. **Mega Project** Evaluation 2
60. **Mega Project** Submission
61. **Mega Project** Poster Design
62. Viva & Presentation