

DS4A Colombia: **Curriculum Outline**

Week 1: Data Science, Machine Learning, and Artificial Intelligence at a Glance; **Basics of Python; Data Interpretation**

- Case 1
 - Pre-requisites: None
 - Takeaways: Capabilities and limits of DS/ML/AI, appropriate use cases of DS/ML/AI
- Case 2
 - Pre-requisites: None
 - Skills: Setting up Git and the Python environment, Python basics
- Case 3
 - Pre-requisites: Case 2
 - Skills: Data extraction (basic), data transformation (basic)
- Case 4
 - Pre-requisites: Case 3
 - Skills: Data extraction (basic), web scraping (basic)
- Case 5
 - Pre-requisites: Case 3
 - Skills: Data transformation (basic)
- Case 6
 - Pre-requisites: None
 - Skills: Interpretation of charts, graphs, & tables
- Case 7
 - Pre-requisites: 6
 - Skills: Interpretation of charts, graphs, & tables
- Case 8
 - Pre-requisites: Cases 5 & 7
 - Takeaways: Coding data visualizations

Week 2: Data Investigation & Exploratory Data Analysis

- Case 9
 - Pre-requisites: 7
 - Skills: Information gathering, Information sufficiency
- Case 10
 - Pre-requisites: Cases 8 & 9
 - Skills: Precisely defining objectives & questions, data visualization
- Case 11
 - Pre-requisites: 9
 - Skills: Information gathering, Information sufficiency
- Case 12
 - Pre-requisites: 10 & 11
 - Skills: Hypothesis iteration, data visualization

Week 3: AWS; SQL in a Big Data World

- Case 13
 - Pre-requisites: 8
 - Takeaways: Setting up AWS
- Case 14
 - Pre-requisites: 8
 - Takeaways: RDBMS (basic), Writing efficient SQL queries to extract data
- Case 15
 - Pre-requisites: Cases 13 & 14
 - Takeaways: Writing efficient SQL queries to extract data, AWS
- Case 16
 - Pre-requisites: Case 15
 - Takeaways: Writing efficient SQL queries to transform data

Week 4: Data Wrangling & Cleaning; AWS; Interactive Data Visualization

- Case 17
 - Pre-requisites: Cases 8 & 16
 - Pre-requisites: Skills: Data transformation (intermediate), data loading, AWS
- Case 18
 - Pre-requisites: Case 17
 - Skills: Data extraction, data transformation (intermediate), AWS
- Case 19
 - Pre-requisites: Case 18
 - Skills: Data visualization, Dash
- Case 20
 - Pre-requisites: Case 19
 - Skills: Data visualization, Dash

Week 5: Data Wrangling & Cleaning (cont.); Data-Driven Decision-Making

- Case 21
 - Pre-requisites: Case 18
 - Skills: Data transformation (intermediate), dealing with text data
- Case 22
 - Pre-requisites: Case 12
 - Skills: Hypothesis testing, Statistical inference (basic)
- Case 23
 - Pre-requisites: Case 22
 - Skills: Statistical inference, Causal inference (basic)
- Case 24
 - Pre-requisites: Case 23
 - Skills: Causal inference (basic)

Week 6: Linear Modeling - Variations & Extensions

- Case 25
 - Pre-requisites: Cases 12 & 24
 - Skills: Implementing & interpreting linear models
- Case 26
 - Pre-requisites: Case 25
 - Skills: Residuals analysis, variable transformations
- Case 27
 - Pre-requisites: Case 26
 - Skills: Interactions & feature selection
- Case 28
 - Pre-requisites: Case 27
 - Skills: Feature engineering

Week 7: Classical Machine Learning Models & Cross-Validation

- Case 29
 - Pre-requisites: Case 28
 - Takeaways: Classification models
- Case 30
 - Pre-requisites: Case 29
 - Takeaways: Classification models, model selection
- Case 31
 - Pre-requisites: Case 30
 - Takeaways: Clustering models
- Case 32
 - Pre-requisites: Case 31
 - Takeaways: Underfitting, overfitting & cross-validation

Week 8: Regularization, Deep Learning, Sentiment Analysis

- Case 33
 - Pre-requisites: Case 32
 - Takeaways: L1/L2 regularization
- Case 34
 - Pre-requisites: Case 32
 - Takeaways: Deep learning (basic), Neural networks
- Case 35
 - Pre-requisites: Case 24
 - Skills: Segmentation & sampling, designing experiments
- Case 36
 - Pre-requisites: Cases 21 & 32
 - Skills: Natural language processing (basic), sentiment analysis

Week 9: Model Selection, Deep Learning (cont.)

- Case 37
 - Pre-requisites: 34
 - Skills: Convolutional neural networks, image processing & recognition
- Case 38
 - Pre-requisites: Cases 33, 36 & 37
 - Skills: Model selection

Week 10: Project Work & Presentations