

DATA SCIENCE & AI BOOTCAMP

Powered by Flatiron School

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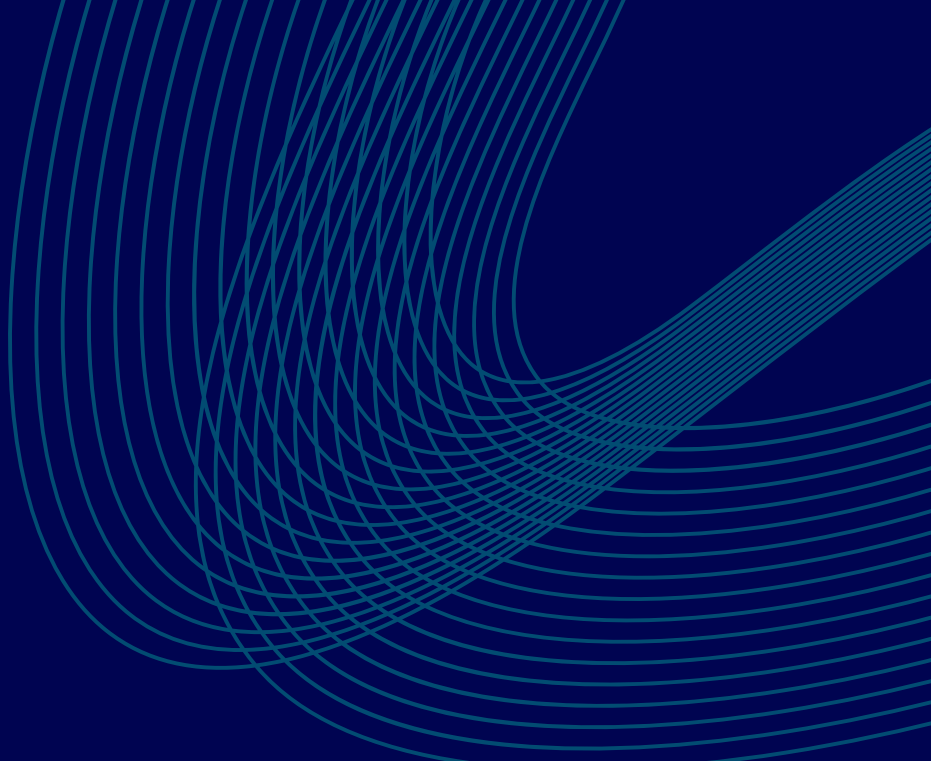


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COURSE OVERVIEW

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Data is only as valuable as the person behind it - we train you to be that person. Akademi's Data Science Bootcamp will show you how to extract and visualize data, leverage it to find actionable insights, and make powerful predictions with artificial intelligence - all rare yet highly desired skill sets.

The course begins by teaching Python, which will help process data and automate tasks. From there students will learn other key concepts such as SQL & Pandas (to help query data and prep for statistical analysis), natural language processing, regression modeling, and more.

To become a data scientist, you'll need a mix of software engineering, statistical understanding, and the ability to apply both skills in new and challenging domains. In addition, our program will teach you the aptitude and skills to keep learning so you can stay relevant in the industry for the years ahead.



LEARNING OUTCOMES



Students learn the following skills:

- How to gather data from outside sources and organize data using Python
- Apply statistical analysis to answer questions with data
- Create beautiful visualizations to present key findings
- Explore data and write down multiple hypotheses for further analysis of the data
- Perform A/B tests
- Build advanced artificial intelligence models to solve complex data science problems in vision and language
- Apply and use Big Data
- Learn presentation techniques to share conclusions about approach and analysis to key stakeholders



CURRICULUM

All instruction is held within Canvas, leveraging content from our curriculum partner, Flatiron School. The Data Science & AI Bootcamp (Part-Time) is 25 weeks long and requires students to be available at minimum 10-15 hours per week for the duration of the program.

| | |
|---------|---|
| Phase 1 | Data Analysis & Engineering |
| Phase 2 | Scientific Computing & Quantitative Methods |
| Phase 3 | Machine Learning Fundamentals |
| Phase 4 | Advanced Machine Learning |
| Phase 5 | Data Science Project |



DATA SCIENCE PREP

All students are required to complete what we call “Data Science Prep” one week before the start of class.

The Data Science Prep covers introductory principles over the course of 20-40 hours of reading and labs. By the end of the prep, you’ll be prepared to dive into the material on day 1 of your program at the same level as your cohort-mates.

You will start your learning journey by diving into Python programming. First, you will learn about basic Python data types, data structures, and conditionals. Next, you will begin the mastery of programming principles like loops and functions, then you will be introduced to the world of Python libraries. Finally, towards the end of Prep, you will know how to use Python to compute summary statistics like the mean, median, and variance, on a collection of data and to create impactful visualizations.



PHASE 1: DATA ANALYSIS AND ENGINEERING

In this phase, students build on their understanding of Python basics from the Prep phase. They synthesize multiple real-world datasets to generate analytical insights and produce interactive data visualizations.

To achieve these goals, the focus is on two main areas: 1. more Python libraries; and 2. business intelligence software for data science and business analytics. The Python libraries include csv and json, which students use to analyze more file formats.

Students are also introduced to pandas, a key tool for interacting with structured data in Python. They use tools in Python, including NumPy and pandas, to perform statistical analyses with tabular datasets and also learn about sensitive features and data ethics. Finally, students learn to use business intelligence software tools such as Tableau (in combination with Python) to produce highly shareable, interactive deliverables.

- Variables, Booleans and Conditionals
- Lists
- Dictionaries
- Looping
- Functions
- Data Structures
- Data Cleaning
- Pandas
- Numpy
- Matplotlib/Seaborn for Data Visualization
- Git/Github SQL
- Accessing Data Through APIs
- Web Scraping



PHASE 1 (CONT): DATA ANALYSIS AND ENGINEERING

Python Programming for Data Science

Students will learn to write Python code for data processing and analysis.

Data Analysis With Python and Numpy

Students will learn to calculate and interpret summary statistics for a dataset as well as create and customize data visualizations with Python. They will also perform file input/output operations to extract data from serialized pandas DataFrame.

Professional Data Science Tooling And Setup

Students learn to use data ethically, execute commands in the terminal to navigate through local file systems and run Python scripts, and create reproducible and publication-ready data reports. The environment setup is for collaborating on future projects using scientific computing and software tools, and also communicating basic data analysis results to diverse audiences via writing and live presentation.

Understanding Pandas

Students will use scientific computing tools to generate business insights and prepare data for statistical analysis.

Data Visualization with Tableau

Students will be introduced to Tableau Public. They will learn how to make visualizations and dashboards with Tableau.



PHASE 2: SCIENTIFIC COMPUTING & QUANTITATIVE METHODS

In this phase, students move beyond basic descriptive analysis on small datasets and learn about databases and statistical modeling. Students use statistics-focused quantitative analysis techniques to author publication-quality, reproducible data reports. More specifically, they use scientific computing tools in Python, including NumPy, pandas, and SciPy to perform statistical analyses on tabular datasets, culminating in an introduction to simple linear regression. Students are introduced to SQL, the other major language of Data Science covered in the program, to interact with databases and write highly efficient queries. Phase 2 Includes:

- Combinatorics
- Probability Theory
- Statistical Distribution
- Bayes Theorem
- Hypothesis Testing
- A/B Testing
- Linear Regression
- Model Evaluation

Inferential Statistics Underlying Concepts

Students will begin to understand the fundamentals of statistical distributions, confidence intervals, and the Central Limit Theorem.

Hypothesis Testing & Simple Inferential Modeling

Students will conduct inferential statistical tests, including A/B testing and analysis of extant datasets. They will also understand the concept of "model parameters" and generate inferential insights with linear regression.



PHASE 3: MACHINE LEARNING FUNDAMENTALS

In this phase, students gain experience with artificial intelligence by using statistical models to make predictions about unseen data. Students start with inferential modeling via multiple linear regression and transformations of linear models. Next, they learn about object-oriented programming with scikit-learn, and then move on to the fundamentals of artificial intelligence theory, including concepts such as data leakage, overfitting, and regularization.

Students also learn data cleaning, preprocessing, and feature engineering techniques that are specific to machine learning data preparation. Lastly, they learn about classification with logistic regression and decision trees and a variety of classification metrics.

- Linear Algebra
- Logistic Regression
- Maximum Likelihood Estimation
- Pipeline Building
- Hyperparameter Tuning
- K-Nearest Neighbors
- Decision Trees
- Ensemble Methods
- Optimization Cost Function
- Grid Search
- Scikit-Learn
- Gradient Descent



PHASE 3 (CONT): MACHINE LEARNING FUNDAMENTALS

Predictive Regression Modeling

Students will make predictions on unseen data with linear regression and apply appropriate preprocessing and feature engineering steps to tabular data in preparation for statistical modeling. They will also communicate results of statistical tests to diverse audiences through writing and live presentation.

Object-Oriented Programming

Students will begin to understand the fundamentals of Object-Oriented Programming in Python and apply the concept of code reusability.

Artificial Intelligence Tools and Models

Students will learn scikit-learn, which is the popular and robust artificial intelligence library for the Python programming language. With scikit-learn, they will use decision trees as both a classifier and as a regressor.



PHASE 4: ADVANCED MACHINE LEARNING

Once students have a strong foundation in artificial intelligence from the previous phase, they are ready to move on to advanced AI models, deployment, and model interpretability. Some of the models have interfaces in scikit-learn similar to linear or logistic regression but more complex artificial intelligence algorithms underneath, such as k-nearest neighbors, random forests, clustering, and principal component analysis. Students also learn how to build artificial intelligence models for additional types of data, such as text data (also known as NLP or natural language processing). Further, students learn about the following two artificial intelligence models recommendation systems and deep learning with neural networks. To round out the phase, students learn how to quantitatively interpret model results and how to deploy artificial intelligence models with pipelines. Phase 4 includes:

- Dimensionality Reduction
- Clustering
- Times Series Analysis
- Neural Networks
- Natural Language Processing
- Big Data
- Text Vectorization
- Natural Language Toolkit
- Regular Expressions
- Word2Vec
- Text Classification
- Recommendation Systems

Unsupervised Machine Learning

Students will investigate how dimensionality reduction addresses the problem of multicollinearity. They will also use clustering algorithms such as k-means and hierarchical methods when a target is not known.



PHASE 4 (CONT): ADVANCED MACHINE LEARNING

Recommendation Systems

Students will understand and describe the differences between content-based and collaborative-filtering algorithms. They will also use the surprise package to build recommendations.

Ensemble Methods

Students will move beyond the basic decision tree artificial intelligence model that was learned in Phase 3, and learn the ensemble artificial intelligence methods of random forests and boosting.

Natural Language Processing

Students will understand the pre-processing steps needed for working with text data while applying feature engineering algorithms such as bag-of-words and TF-IDF. They will also use scikit-learn and the nltk package to build Natural Language Processing models.

Deep Learning

Students will explore neural network architectures and decipher how to solve machine learning problems using deep learning frameworks.

Model Interpretability

Students will be able to describe how model interpretability supports the goals of an artificial intelligence project and explain interpretability in the context of artificial intelligence. Further, the students will be able to understand the difference between black and white box models.



PHASE 5: DATA SCIENCE PROJECT

The final phase of the program is a capstone project. Students will work individually to create a large-scale data science and machine learning project. This final project provides an in-depth opportunity for students to demonstrate their learning accomplishments and get a feel for what working on a large-scale data science project is really like.

They will pitch different ideas and then decide on their final project with the instructors. Instructors advise on projects based on difficulty and feasibility given the course's time constraints.

Upon project completion, students will know how to construct a project that gathers and builds statistical or machine learning models to deliver insights and communicate findings through data visualization and storytelling techniques.



QUESTIONS? CONTACT US.

At Akademi, we're committed to helping you learn the skills to start or elevate your career. Contact us for any additional information about the Data Science & AI Bootcamp.

