COURSE SYLLABUS

Python Data Science & Machine Learning Live Online (High School & College)

Learn the most powerful and versatile programming language this summer. In this live online course, high school students will learn Python for data science and machine learning.

For more information, visit
https://www.creativelive.com/classes/python-summer-course-level-1



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Course Outline

Day 1-3

Introduction to Programming

- History of Python
- Understanding Hardware
- Anaconda Distribution
- Jupyter Notebook Fundamentals
- Writing First Program (“Hello World”)

Terminal Commands

- Navigate & Manipulate Directory Structures
- Edit Files
- Basic Scripting

Python Fundamentals

- Data Types
- Operators
- Expression
- Indexing & Slicing
- Strings
- Conditionals
- Functions
- Control Flow
- Nested Loops
- Sets & Dictionaries

Data Science Fundamentals

- Import Data
- Functions
- Basic Data Tool

Advanced Python Fundamentals

- Lists
- Mutating Operations
- Tuples, Sets, Dictionaries
- Loops
- Control Flow
- List Comprehension
- Error Handling

Day 4-5

Processing

- String Methods
- Read & Write to Text Files
- Natural Language Processing
- Mini Project

Object Oriented Programming

- Classes
- Constructors
- Object Methods
- Writing Modules
- Advanced Scripting
- Terminal & Socket Connection

Day 6-8

Numerical Python

- Arrays
- Universal Functions
- Concatenating, Indexing, Slicing
- Arithmetic & Boolean Operations

Day 9-10

Python Data Analysis: Pandas 1

- Data Series
- Data Frames
- Import CSV & Excel Files
- Organize Data Frames
- Data Manipulation
- Descriptive Statistics

Advanced Python

- File Input
- User Input
- List Comprehension
- Packages

Data Analysis

- Cleaning Data
- Filtering Data
- Advanced Grouping
- Pivot Tables

Data Visualization

- Plotting with Matplotlib
- Scatter Plots
- Histograms & Bar Plots
- Custom Visualizations

Day 11-15

Basic Regression Analysis

- Linear Regression
- Mean squared error
- Training set vs Test set
- Cross validation

Advanced Regression Analysis

- Multi-linear regression
- Feature engineering
- Overfitting

Classification

Logistic Regression

- Regression vs Classification
- Logistic Regression
- Sigmoid function

K-nearest Neighbors

- K-nearest neighbors
- Model-based vs memory-based
- Parametric vs non-parametric
- Evaluating performance

Final Project

Details

- Curate Data
- Import, Clean, and Merge Data
- Analyze Data
- Visualize Data
- Present Results