COURSE SYLLABUS

Python for Data Science & AI Machine Learning 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.

> Group classes (Live Online) and onsite training are available for this course. For more information, email onsite@graduateschool.edu or visit: https://www.graduateschool.edu/courses/python-summer-course



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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