

# 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 in Live Online and onsite training is available for this course. For more information, email [onsite@graduateschool.edu](mailto: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