

General Course Outline

Course Outline for Python Programming Language:

Week 1: Introduction to Python

- Overview of Python and its features
- Installing Python and setting up the development environment
- Running Python programs using the interpreter and IDEs

Week 2: Variables, Data Types, and Operators

- Variables: declaration, assignment, and naming conventions
- Fundamental data types: integers, floats, strings, booleans
- Type conversion and typecasting in Python
- Arithmetic, comparison, and logical operators

Week 3: Control Flow and Functions

- Conditional statements: if, elif, else
- Looping structures: for loop, while loop
- Nesting loops and conditional statements
- Defining and calling functions
- Parameters and arguments

Week 4: Lists, Dictionaries, and Review

- Lists: creating, accessing, and manipulating elements
- Dictionaries: key-value pairs and dictionary operations
- Review of course content

Course Outline for Data Science:

Week 1: Introduction to Data Science

- Overview of data science and its applications
- Introduction to data science workflow and methodology
- Introduction to programming languages and tools for data science (e.g., Python, Jupyter Notebook)

Week 2: Data Collection and Preprocessing

- Data collection techniques
- Data formats and storage (e.g., CSV, JSON)
- Data cleaning and preprocessing techniques

Week 3: Exploratory Data Analysis

- Descriptive statistics and data summarization
- Data visualization techniques (e.g., matplotlib, seaborn)
- Handling missing data and outliers

Week 4: Data Visualization

- Advanced data visualization techniques
- Interactive visualization using libraries like Plotly

Week 5: Introduction to Machine Learning

- Overview of machine learning concepts and algorithms
- Supervised vs. unsupervised learning
- Training and evaluation of machine learning models

Week 6: Regression and Classification

- Linear regression
- Logistic regression
- Decision trees, random forests etc.

Week 7: Clustering and Dimensionality Reduction

- K-means clustering
- Hierarchical clustering
- Principal Component Analysis (PCA)

Week 8: Model Evaluation and Selection

- Model evaluation metrics
- Cross-validation techniques
- Hyperparameter tuning and model selection

Week 9: Real-World Applications and Case Studies

- Applying data science techniques to real-world problems
- Case studies and examples from various industries
- Final project presentation and discussion

Assessment Methods:

- Class participation and discussions
- Assignments
- Hands-on programming exercises
- Midterm and final projects