

## **Week 5-8: Lab Session: Exploring Machine Learning with Python on W3Schools**

**Duration:** 4 hours

**Objective:** To provide hands-on experience with fundamental machine learning concepts using Python, guided by W3Schools tutorials.

[http://w3schools.com/python/python\\_ml\\_getting\\_started.asp](http://w3schools.com/python/python_ml_getting_started.asp)

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### **Prerequisites**

- Basic knowledge of Python programming.
  - Access to the internet and a web browser.
  - Optional: Python installed locally with libraries such as numpy, pandas, matplotlib, scikit-learn.
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### **Lab Activities**

#### **1. Introduction to Machine Learning (20 minutes)**

- Navigate to the W3Schools Machine Learning introduction:
  - [Machine Learning Introduction](#)
- Understand the basics of machine learning and its applications.

#### **2. Regression Analysis (20 minutes)**

- Study different regression techniques:
  - [Linear Regression](#)
  - [Polynomial Regression](#)
  - [Multiple Regression](#)
- Implement regression models and interpret the results.

#### **3. Data Preprocessing and Model Evaluation (40 minutes)**

- Understand data scaling:
  - [Scale](#)
- Learn about training and testing models:
  - [Train/Test](#)
- Evaluate model performance using appropriate metrics.

## 4. Classification Techniques (60 minutes)

- Explore classification methods:
  - [Decision Tree](#)
  - [Logistic Regression](#)
  - [K-nearest neighbors](#)
- Understand confusion matrices:
  - [Confusion Matrix](#)
- Implement classification models and analyze their accuracy.

## 5. Clustering and Advanced Topics (80 minutes)

- Learn about clustering algorithms:
  - [K-means](#)
  - [Hierarchical Clustering](#)
- Explore model optimization techniques:
  - [Grid Search](#)
  - [Cross Validation](#)
  - [Bootstrap Aggregation](#)
- Understand performance metrics:
  - [AUC - ROC Curve](#)

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### Deliverables

- A summary report detailing the exercises completed, including code snippets and outputs.
  - Screenshots or saved results from the W3Schools "Try it Yourself" editor demonstrating successful execution of examples.
  - Reflections on the insights gained from each section in next week's workshop how these Machine Learning algorithms can work on your selected dataset from last week towards your final assessment task.
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