# Tutorial: Install VS Code and Set Up Jupyter Notebook for Machine Learning

## 1. Install VS Code

1. \*\*Download Visual Studio Code\*\*:  
 - Visit the [VS Code official website](https://code.visualstudio.com/).  
 - Download the installer for your operating system (Windows, macOS, or Linux).  
 2. \*\*Install VS Code\*\*:  
 - Follow the installation prompts for your operating system.  
 - During installation (on Windows), check the box \*\*“Add to PATH”\*\*.  
 3. \*\*Verify Installation\*\*:  
 - Open a terminal or command prompt and type:  
 ```  
 code --version  
 ```  
 - If the command shows the version, VS Code is installed correctly.

## 2. Install Python

1. \*\*Download Python\*\*:  
 - Visit the [Python official website](https://www.python.org/).  
 - Download and install Python for your operating system.  
 2. \*\*Verify Installation\*\*:  
 - Check the installation by running:  
 ```  
 python --version  
 pip --version  
 ```  
 - Ensure Python and pip are accessible.

## 3. Install VS Code Extensions

1. Open VS Code and go to the \*\*Extensions\*\* panel on the left sidebar (or press `Ctrl+Shift+X`).  
 2. Search for and install these essential extensions:  
 - \*\*Python\*\* (by Microsoft): Adds Python support.  
 - \*\*Jupyter\*\* (by Microsoft): Adds support for Jupyter Notebooks.  
 - \*\*Pylance\*\*: Provides rich Python editing features like autocompletion.

## 4. Set Up Python and Jupyter in VS Code

1. Open a terminal in VS Code (use `Ctrl+`` or go to \*\*View > Terminal\*\*).  
 2. Install Jupyter Notebook:  
 ```  
 pip install notebook  
 ```  
 3. Install additional machine learning libraries:  
 ```  
 pip install numpy pandas matplotlib seaborn scikit-learn tensorflow keras  
 ```  
 4. Check the installation by running:  
 ```  
 jupyter notebook --version  
 ```

## 5. Use Jupyter Notebook in VS Code

1. \*\*Create a New Jupyter Notebook\*\*:  
 - Open VS Code and create a new file with a `.ipynb` extension (e.g., `example.ipynb`).  
 - Alternatively, use the Command Palette (`Ctrl+Shift+P`) and search for \*\*“Jupyter: Create New Blank Notebook”\*\*.  
 2. \*\*Select Python Interpreter\*\*:  
 - When opening a `.ipynb` file, VS Code will prompt you to select a Python interpreter.  
 - Choose the environment where Jupyter is installed.  
 3. \*\*Run Code Cells\*\*:  
 - Write code in a cell and press `Shift+Enter` to execute it.

## 6. Configure a Virtual Environment (Optional but Recommended)

Using virtual environments helps isolate dependencies for different projects.  
 1. \*\*Create a Virtual Environment\*\*:  
 ```  
 python -m venv myenv  
 ```  
 2. \*\*Activate the Virtual Environment\*\*:  
 - \*\*Windows\*\*:  
 ```  
 myenv\Scripts\activate  
 ```  
 - \*\*macOS/Linux\*\*:  
 ```  
 source myenv/bin/activate  
 ```  
 3. \*\*Install Required Libraries\*\*:  
 ```  
 pip install notebook numpy pandas matplotlib seaborn scikit-learn tensorflow keras  
 ```  
 4. \*\*Select the Virtual Environment in VS Code\*\*:  
 - Open the Command Palette (`Ctrl+Shift+P`) and search for \*\*“Python: Select Interpreter”\*\*.  
 - Choose the virtual environment you just created.

## 7. Additional Useful Extensions for Machine Learning

1. \*\*VS Code Extensions\*\*:  
 - \*\*Code Runner\*\*: Run snippets of code directly.  
 - \*\*GitLens\*\*: Manage Git repositories easily.  
 - \*\*Markdown Preview Enhanced\*\*: For better markdown previews.  
 2. \*\*Jupyter Extensions (Optional)\*\*:  
 - \*\*Table of Contents\*\*: Adds a table of contents for notebooks.  
 - \*\*Variable Inspector\*\*: Displays variables and their values.

## 8. Test the Setup

1. Create a new `.ipynb` file and write a sample Python script:  
 ```python  
 import numpy as np  
 import pandas as pd  
 import matplotlib.pyplot as plt  
  
 # Sample data  
 x = np.linspace(0, 10, 100)  
 y = np.sin(x)  
  
 # Plot the data  
 plt.plot(x, y)  
 plt.title("Sine Wave")  
 plt.show()  
 ```  
 2. Execute the cell to verify everything is working correctly.

## 9. Troubleshooting

- \*\*Jupyter Not Found\*\*:  
 - Ensure Jupyter is installed in the correct Python environment.  
 - Run:  
 ```  
 pip install notebook  
 ```  
 - \*\*Interpreter Not Detected\*\*:  
 - Use the Command Palette (`Ctrl+Shift+P`) and search for \*\*“Python: Select Interpreter”\*\* to select the correct environment.  
 - \*\*Kernel Errors\*\*:  
 - Restart VS Code and ensure the environment is activated properly.