

**Introduction to Jupyter Widgets**

**Course Number:** PYTH-258  
**Duration:** 3 days

**Overview**

This Jupyter Widgets training course teaches Python and JavaScript/TypeScript developers how to extend Jupyter Labs/Notebooks using customized widgets. Attendees learn high-level concepts of creating and running custom widgets. Then the course dives into low-level concepts and features that power widgets and how to employ those concepts and features to create new widgets. This Jupyter Widgets class can be taught with JavaScript or TypeScript.

**Prerequisites**

Python and JavaScript programming experience. Experience with Backbone.js, jQuery, and the web browser DOM API is strongly recommended. If students have no experience with Backbone.js, jQuery, and the web browser DOM API, then we recommend that Accelebrate prepend this class with two days of hands-on prerequisite topics.

**Materials**

All Jupyter Widgets training attendees receive comprehensive courseware.

**Software Needed on Each Student PC**

* A modern web browser like Microsoft Edge, Chrome, or Firefox. Internet Explorer is not supported.
* Visual Studio Code with the Python Extension
* For classes delivered online, all participants need either dual monitors or a separate device logged into the online session to do their work on one screen and watch the instructor on the other. A separate computer connected to a projector or large-screen TV would be another way for students to see the instructor's screen simultaneously with working on their own.

**Objectives**

* Extend Jupyter Labs/Notebooks with custom widgets
* Leverage Python and JavaScript/TypeScript to build custom widgets
* Set up a custom widgets development environment using a Cookie Cutter Template
* Use built-in widgets
* Lay out and style widgets
* Implement asynchronous widgets
* Understand the deeper inner workings of Jupyter Widgets
* Document and publish custom widgets

**Outline**

* Extending Jupyter Labs
  + What are Jupyter Labs?
  + Python Programming
  + JavaScript Programming
  + Backbone.js
  + Web Application Programming
  + Ways to Extend
* Setup Development Environment
  + Manage NPM Packages with Yarn
  + Jupyter Notebook Development Release
  + Install with Pip or Conda
  + Running the Environment
* Built-In Widgets
  + Numeric Widgets
  + Boolean Widgets
  + Selection Widgets
  + String Widgets
  + Container/Layout Widgets
  + Output Widgets
  + Other Widgets
* Widget Events
  + Special Events
  + Traitlet Events
  + Linking Widgets
  + Continuous Updates
  + Debouncing
  + Throttling
* Widget Presentation
  + Styling
  + Layout
  + User Interaction with Interact
* Asynchronous Widgets
  + User Interaction – Event Loop Integration
  + User Interaction – Generators
  + Widget Background Updates
* Low-Level Understanding of Widgets
  + Communications
  + Synchronized State
  + Models and Views
  + Code Execution
  + Model Execution
  + Display a View
  + Widget Skeleton
  + Serialization of Widget Attributes
  + Installation
  + Static Assets
  + Distribution
* Publishing a Widget
  + Documentation
  + Widget Spec
  + Publish NPM Packages
  + Update Version Number
* Conclusion