

**MATLAB I/O and External Interfaces**

**Course Number:** MTLB-110  
**Duration:** 1 day

**Overview**

This advanced-level MATLAB I/O and External Interfaces training course teaches attendees how to connect MATLAB to a wide variety of external connectors, including COM, Java, C++, .NET, Python, website URLs, disk, I/O, and more.

**Note:** This course can be condensed to a half-day with fewer examples and less hands-on practice. We strongly recommend the full-day version if possible.

**Prerequisites**

Attendees should have taken Accelebrate's [Introduction to MATLAB course](file:////training/matlab-scripts-programs) or have equivalent knowledge. Students must be comfortable using the MATLAB environment and have some basic MATLAB programming experience.

**Materials**

All training students will receive comprehensive courseware.

**Software Needed on Each Student PC**

* Any Windows, Linux, or macOS operating system
* A recent version of MATLAB

**Objectives**

* Access file data programmatically in MATLAB
* Access external Java/C++/.NET/COM functionality within MATLAB
* Use the custom programmatic styling of MS Office documents in MATLAB
* Manipulate external objects via MATLAB code
* Use MATLAB’s new C++ and Python interfaces

**Outline**

* Introduction
* MATLAB File I/O
  + High/medium/low level I/O
  + Binary vs. text format
  + Performance considerations and other tradeoffs
* Connecting MATLAB to a URL
  + The urlread and webread functions, and their relatives
  + Customizing the underlying network object
  + Using JSON data format
* Connecting MATLAB to a COM Server
  + The actxserver function and its relatives
  + Manipulating Microsoft Office documents (Excel, PowerPoint, Word)
  + Enumerations
  + Avoiding COM access pitfalls
* Using .NET Objects in MATLAB
  + The import command
  + Implicit data-type conversion
  + Calling .NET functions and processing the returned results
* Using Java Objects in MATLAB
  + The javaaddpath function and its relatives
  + Using Java objects within MATLAB
  + Data type conversions
  + Java-MATLAB arrays
  + Static vs. dynamic classpath
  + Attaching MATLAB callbacks to Java events (if time permits)
  + Avoiding Java access pitfalls
* Using Python in MATLAB
  + In-process vs. external Python engine
  + Calling Python functions and processing the returned results
* Synchronicity
  + MATLAB’s Main Thread and Java/Python/.NET function calls
  + Implications of argument data being passed by value
  + Using Java/.NET/Python threads
* Using C++ Code in MATLAB
  + MEX
  + MATLAB’s changed memory access
  + Avoiding MEX access pitfalls
  + The loadlibrary function and its relatives
  + The new import functionality
* Conclusion