

# Signal Preprocessing and Feature Extraction for Data Analytics with MATLAB

## Prerequisites

*MATLAB Fundamentals* or equivalent experience using MATLAB

Day 1 of 1	
<b>Explore and Analyze Signals (Time Series) in MATLAB</b>	<p><b>Objective:</b> Learn to easily import and visualize multiple signals or time series data sets to gain insights into the features and trends in the data.</p> <ul style="list-style-type: none"><li>Import, visualize, and browse signals to gain insights</li><li>Make measurements on signals</li><li>Compare multiple signals in the time and frequency domain</li><li>Perform interactive spectral analysis</li><li>Extract regions of interest for focused analysis</li><li>Recreate analysis with auto-generated MATLAB scripts</li></ul>
<b>Preprocess Signals to Improve Data Set Quality</b>	<p><b>Objective:</b> Learn techniques to clean signal sets with operations such as resampling, removing outliers, and filling gaps.</p> <ul style="list-style-type: none"><li>Perform resampling to ensure a common time base across signals</li><li>Work with non-uniformly sampled data</li><li>Find gaps in data and remove or fill gaps</li><li>Remove noise and unwanted frequency content</li><li>Perform wavelet denoising</li><li>Use the envelope spectrum to perform fault analysis</li><li>Locate outlier values in data and replace them with acceptable data</li><li>Locate signal changepoints and use boundaries to automatically create signal segments</li></ul>
<b>Extract Features from Signals</b>	<p><b>Objective:</b> Apply different techniques in time and frequency domains to extract features. Become familiar with the spectral analysis tools in MATLAB and explore ways to bring out features for multiple signals.</p> <ul style="list-style-type: none"><li>Locate peaks</li><li>Locate desired signals from patterns in the time and spectral domains</li><li>Use spectral analysis to extract features from signals</li><li>Perform classification using supervised learning</li><li>Use the Classification Learner app to interactively train and evaluate classification algorithms</li></ul>