



HARNESS THE POWER  
OF KNOWLEDGE

## Signal Processing Practice

TRAIN



## Introduction

Signal processing is a broad field that encompasses the analysis, manipulation, and synthesis of signals. It plays a crucial role in various applications, including telecommunications, audio and video processing, medical imaging, and radar technology.

This comprehensive 5-day professional training course will equip you with the essential knowledge and skills to effectively apply signal processing techniques in various domains.

## Course Objectives

By the end of this course, you will be able to:

- Understand the fundamental principles of signal processing, including continuous-time and discrete-time signals, systems, and transforms
- Apply various signal processing techniques, such as filtering, modulation, and demodulation, to manipulate and analyze signals
- Utilize signal processing tools and software to process and interpret real-world data
- Design and implement signal processing algorithms for specific applications, such as noise reduction and speech recognition
- Stay updated on the latest advancements and techniques in signal processing research and industry practices

## Course Agenda

### Day 1: Introduction to Signal Processing

- Delve into the history, principles, and applications of signal processing in various fields
- Explore the different types of signals, including continuous-time and discrete-time signals, periodic and aperiodic signals, and analog and digital signals
- Understand the concept of signal systems and their representation using block diagrams and differential equations
- Discuss the sampling process and its impact on signal representation

### Day 2: Signal Analysis and Filtering

- Analyze signals using various techniques, including Fourier analysis, time-frequency analysis, and correlation analysis
- Apply filtering techniques, such as low-pass, high-pass, band-pass, and band-stop filters, to modify signal frequency content
- Implement filtering algorithms using digital signal processing tools and software
- Design and implement finite impulse response (FIR) and infinite impulse response (IIR) filters for specific applications

### Day 3: Modulation and Demodulation

- Understand the principles of analog modulation techniques, including amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM)
- Apply modulation techniques to transmit signals over communication channels
- Explore digital modulation techniques, such as pulse amplitude modulation (PAM), pulse width modulation (PWM), and pulse code modulation (PCM)
- Design and implement demodulation algorithms to recover original signals from modulated signals

### Day 4: Signal Processing Applications

- Analyze and process audio signals using signal processing techniques, such as noise reduction, equalization, and reverberation
- Apply signal processing techniques in image processing, including filtering, edge detection, and image enhancement
- Explore signal processing applications in medical imaging, such as noise reduction in MRI images and signal processing in electrocardiograms (ECGs)

- Discuss the use of signal processing in radar technology for target detection and ranging

#### Day 5: Advanced Signal Processing Concepts and Case Studies

- Delve into advanced signal processing concepts, such as adaptive filtering, wavelet transforms, and spectral estimation
- Analyze real-world case studies demonstrating the application of signal processing techniques in various domains
- Discuss the challenges and opportunities of applying signal processing in different signal environments
- Stay updated on the latest advancements and techniques in signal processing research and industry practices

#### Who Should Attend

This course is designed for:

- Aspiring and experienced engineers and scientists seeking to enhance their understanding of signal processing principles and applications
- Electrical engineers and computer engineers working on signal processing algorithms and hardware design
- Telecommunications engineers involved in signal transmission, reception, and processing
- Audio and video engineers working on signal processing in media and entertainment
- Biomedical engineers and scientists working on signal processing in medical imaging and healthcare applications
- Students and professionals interested in pursuing a career in signal processing and related fields

#### Course Benefits

- Develop a comprehensive understanding of signal processing principles, techniques, and applications in various domains
- Gain hands-on experience in applying signal processing techniques using industry-standard tools and software
- Enhance your ability to analyze, manipulate, and synthesize signals using various signal processing methods
- Design and implement signal processing algorithms for specific applications and real-world problems
- Stay updated on the latest advancements and techniques in signal processing research and industry practices